

MBS Audio Plugin Documentation

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0.1 Introduction

This is the PDF version of the documentation for the Xojo Plug-in from Monkeybread Software Germany.
Plugin part: MBS Audio Plugin

0.2 Content

- 1 List of all topics 3
- 2 List of all classes 15
- 3 All items in this plugin 17
- 5 List of Questions in the FAQ 155
- 6 The FAQ 165

Chapter 1

List of Topics

• 3 Audio	17
– 3.1.1 class PortAudioDeviceInfoMBS	17
* 3.1.3 Constructor	17
* 3.1.5 DefaultHighInputLatency as Double	17
* 3.1.6 DefaultHighOutputLatency as Double	18
* 3.1.7 DefaultLowInputLatency as Double	18
* 3.1.8 DefaultLowOutputLatency as Double	18
* 3.1.9 DefaultSampleRate as Double	18
* 3.1.10 HostApiIndex as Integer	18
* 3.1.11 Index as Integer	19
* 3.1.12 MaxInputChannels as Integer	19
* 3.1.13 MaxOutputChannels as Integer	19
* 3.1.14 Name as String	19
– 3.2.1 class PortAudioHostApiInfoMBS	20
* 3.2.3 Constructor	20
* 3.2.5 defaultInputDevice as Integer	20
* 3.2.6 defaultOutputDevice as Integer	20
* 3.2.7 deviceCount as Integer	21
* 3.2.8 Index as Integer	21
* 3.2.9 Name as String	21
* 3.2.10 Type as Integer	21
– 3.3.1 class PortAudioHostErrorInfoMBS	23
* 3.3.3 Constructor	23
* 3.3.5 ErrorCode as Integer	23
* 3.3.6 ErrorText as String	23
* 3.3.7 HostApiType as Integer	23

– 3.4.1 class PortAudioMBS	25
* 3.4.3 ASIOGetAvailableBufferSizes(DeviceIndex as Integer, byref minBufferSizeFrames as Integer, byref maxBufferSizeFrames as Integer, byref preferredBufferSizeFrames as Integer, byref granularity as Integer) as Integer	26
* 3.4.4 ASIOGetInputChannelName(DeviceIndex as Integer, ChannelIndex as Integer) as String	26
* 3.4.5 ASIOGetOutputChannelName(DeviceIndex as Integer, ChannelIndex as Integer) as String	27
* 3.4.6 ASIOGetSampleRate(byref rate as double) as Integer	28
* 3.4.7 ASIOShowControlPanel(device as integer, parentWindow as DesktopWindow) as Integer	28
* 3.4.8 ASIOShowControlPanel(device as integer, parentWindow as window = nil) as Integer	28
* 3.4.9 CountDevices as Integer	29
* 3.4.10 DefaultHostApiIndexd as Integer	30
* 3.4.11 DefaultInputDeviceID as Integer	30
* 3.4.12 DefaultOutputDeviceID as Integer	31
* 3.4.13 DeviceInfo(DeviceIndex as Integer) as PortAudioDeviceInfoMBS	31
* 3.4.14 DisableHostAPI(API as string) as boolean	32
* 3.4.15 ErrorText(ErrorNumber as Integer) as string	32
* 3.4.16 GetSampleSize(Format as Integer) as Integer	32
* 3.4.17 HostApiCount as Integer	33
* 3.4.18 HostApiDeviceIndexToDeviceIndex(hostApiIndex as Integer, hostApiDeviceIndex as Integer) as Integer	33
* 3.4.19 HostApiInfo(hostApiIndex as Integer) as PortAudioHostApiInfoMBS	34
* 3.4.20 HostApiTypeIdToHostApiIndex(type as Integer) as Integer	34
* 3.4.21 HostError as PortAudioHostErrorInfoMBS	35
* 3.4.22 IsFormatSupported(input as PortAudioStreamParametersMBS, output as PortAudioStreamParametersMBS, sampleRate as Double) as Integer	35
* 3.4.23 MacCoreAudioChannelName(DeviceIndex as Integer, ChannelIndex as Integer, Input as Boolean) as String	35
* 3.4.24 MacCoreAudioGetBufferSizeRange(DeviceIndex as Integer, byref minBufferSizeFrames as Integer, byref maxBufferSizeFrames as Integer) as Integer	36
* 3.4.25 SampleSize(theFormat as Integer) as Integer	36
* 3.4.26 SetDebugLogFile(File as FolderItem) as boolean	37
* 3.4.27 Sleep(msec as Integer)	37
* 3.4.28 Version as Integer	37
* 3.4.29 VersionControlRevision as String	37
* 3.4.30 VersionText as String	37
* 3.4.31 WinDefaultChannelMask(numChannels as Integer) as Integer	38
– 3.5.1 class PortAudioStreamBaseMBS	41
* 3.5.3 Abort as Integer	41
* 3.5.4 AsioSetStreamSampleRate(sampleRate as double) as integer	41

	5
* 3.5.5 Close as Integer	41
* 3.5.6 Constructor	42
* 3.5.7 HostError as PortAudioHostErrorInfoMBS	42
* 3.5.8 Info as PortAudioStreamInfoMBS	42
* 3.5.9 Read(Buffer as Ptr, frameCount as integer) as integer	42
* 3.5.10 Start as Integer	43
* 3.5.11 Stop as Integer	43
* 3.5.12 WinMMESTreamInputHandle(index as Integer) as Ptr	43
* 3.5.13 WinMMESTreamInputHandleCount as integer	43
* 3.5.14 WinMMESTreamOutputHandle(index as Integer) as Ptr	44
* 3.5.15 WinMMESTreamOutputHandleCount as integer	44
* 3.5.16 Write(Buffer as Ptr, frameCount as integer) as integer	44
* 3.5.18 CPULoad as Double	45
* 3.5.19 IsStreamActive as Integer	45
* 3.5.20 IsStreamStopped as Integer	45
* 3.5.21 MacCoreAudioStreamInputDevice as Integer	46
* 3.5.22 MacCoreAudioStreamOutputDevice as Integer	46
* 3.5.23 ReadAvailable as Integer	46
* 3.5.24 Time as Double	46
* 3.5.25 WriteAvailable as Integer	47
* 3.5.26 UseSafeThreading as boolean	47
– 3.6.1 class PortAudioStreamBufferedMBS	49
* 3.6.3 AddAudio(Data as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, BitSize as Integer=16, ClearBuffers as boolean=false) as boolean	49
* 3.6.4 AddAudioStereo(Data1 as memoryblock, Data2 as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, BitSize as Integer=16, ClearBuffers as boolean=false) as boolean	50
* 3.6.5 AddFloatAudio(FloatData as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, ClearBuffers as boolean=false) as boolean	51
* 3.6.6 AddFloatAudioStereo(FloatData1 as memoryblock, FloatData2 as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, ClearBuffers as boolean=false) as boolean	51
* 3.6.7 Constructor	52
* 3.6.8 FreeSpace as Integer	52
* 3.6.9 HasFreeSpace as boolean	52
* 3.6.10 OpenDefaultStream(numOutputChannels as Integer, sampleRate as Double) as Integer	53
* 3.6.11 OpenStream(outputParameters as PortAudioStreamParametersMBS, sampleRate as Double, framesPerBuffer as Integer, streamFlags as Integer) as Integer	53
* 3.6.12 PlayAudio(Data as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, BitSize as Integer=16, ClearBuffers as boolean=false) as boolean	54
* 3.6.13 PlayAudioStereo(Data1 as memoryblock, Data2 as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, BitSize as Integer=16, ClearBuffers as boolean=false) as boolean	55

* 3.6.14	PlayFloatAudio(FloatData as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, ClearBuffers as boolean=false) as boolean	56
* 3.6.15	PlayFloatAudioStereo(FloatData1 as memoryblock, FloatData2 as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, ClearBuffers as boolean=false) as boolean	56
* 3.6.17	HadUnderflow as Boolean	57
* 3.6.18	NoUnderflow as Boolean	57
* 3.6.19	OutputPosition as Double	57
* 3.6.20	OutputPositionRelative as Double	58
* 3.6.22	Finished	58
– 3.7.1	class PortAudioStreamInfoMBS	59
* 3.7.3	Constructor	59
* 3.7.5	InputLatency as Double	59
* 3.7.6	OutputLatency as Double	59
* 3.7.7	SampleRate as Double	60
– 3.8.1	class PortAudioStreamMBS	61
* 3.8.3	Constructor	61
* 3.8.4	OpenDefaultStream(numInputChannels as Integer, numOutputChannels as Integer, sampleFormat as Integer, sampleRate as Double, framesPerBuffer as Integer, Flags as Integer) as Integer	61
* 3.8.5	OpenStream(inputParameters as PortAudioStreamParametersMBS, outputParameters as PortAudioStreamParametersMBS, sampleRate as Double, framesPerBuffer as Integer, streamFlags as Integer) as Integer	62
* 3.8.7	Callback(InputBuffer as memoryblock, outputBuffer as memoryblock, FrameCount as Integer, inputBufferAdcTime as Double, currentTime as Double, outputBufferDacTime as Double, statusFlags as Integer) as Integer	64
* 3.8.8	Finished	65
– 3.9.1	class PortAudioStreamParametersMBS	66
* 3.9.3	ASIOFlags as Integer	66
* 3.9.4	ChannelCount as Integer	66
* 3.9.5	Device as Integer	66
* 3.9.6	MacCoreAudioChannelMapSize as Integer	67
* 3.9.7	MacCoreAudioFlags as Integer	67
* 3.9.8	SampleFormat as Integer	67
* 3.9.9	SuggestedLatency as Double	68
* 3.9.10	WASChannelMask as Integer	68
* 3.9.11	WASFlags as Integer	68
* 3.9.12	WASStreamCategory as Integer	68
* 3.9.13	WASStreamOption as Integer	69
* 3.9.14	WASThreadPriority as Integer	69
* 3.9.15	WinDirectSoundChannelMask as Integer	69
* 3.9.16	WinDirectSoundFlags as Integer	69

	7
* 3.9.17 WinDirectSoundFramesPerBuffer as Integer	69
* 3.9.18 WinMMEMBufferCount as Integer	70
* 3.9.19 WinMMEChannelMask as Integer	70
* 3.9.20 WinMMEDeviceCount as Integer	70
* 3.9.21 WinMMEFlags as Integer	70
* 3.9.22 WinMMEFramesPerBuffer as Integer	71
* 3.9.23 WinWDMKSCchannelMask as Integer	71
* 3.9.24 WinWDMKSFflags as Integer	71
* 3.9.25 WinWDMKSNofPackets as Integer	71
* 3.9.26 ASIOChannelSelectors(Index as Integer) as Integer	72
* 3.9.27 MacCoreAudioChannelMap(Index as Integer) as Integer	72
* 3.9.28 WinMMEDevicesChannelCount(Index as Integer) as Integer	72
* 3.9.29 WinMMEDevicesDevice(Index as Integer) as Integer	73
– 3.10.1 class PortAudioStreamRecorderMBS	77
* 3.10.3 Constructor(BufferSize as Integer)	77
* 3.10.4 Flush	77
* 3.10.5 OpenDefaultStream(numInputChannels as Integer, sampleRate as Double) as Integer	77
* 3.10.6 OpenStream(inputParameters as PortAudioStreamParametersMBS, sampleRate as Double, framesPerBuffer as Integer, streamFlags as Integer) as Integer	78
* 3.10.7 ReadFrames(mem as memoryblock, SizeInBytes as Integer) as Integer	79
* 3.10.8 ResizeBuffer(BufferSize as Integer)	80
* 3.10.10 Buffer as Memoryblock	80
* 3.10.11 BufferReadIndex as Integer	80
* 3.10.12 BufferSize as Integer	80
* 3.10.13 BufferWriteIndex as Integer	81
* 3.10.14 FramesAvailable as Integer	81
* 3.10.15 NumInputChannels as Integer	81

• 4 MIDI	111
– 4.1.1 class PortMidiDeviceInfoMBS	111
* 4.1.3 HasInput as Boolean	111
* 4.1.4 HasOutput as Boolean	111
* 4.1.5 InterfaceName as String	112
* 4.1.6 Name as String	112
– 4.2.1 class PortMidiEventMBS	113
* 4.2.3 Set(status as Integer, data1 as Integer, data2 as Integer)	113
* 4.2.4 SetRaw(data0 as Integer, data1 as Integer, data2 as Integer, data3 as Integer)	113
* 4.2.6 CurrentEvent as PortMidiEventMBS	113
* 4.2.7 Data1 as Integer	114
* 4.2.8 Data2 as Integer	114
* 4.2.9 RawData0 as Integer	114
* 4.2.10 RawData1 as Integer	114
* 4.2.11 RawData2 as Integer	114
* 4.2.12 RawData3 as Integer	115
* 4.2.13 RawMessage as Integer	115
* 4.2.14 Status as Integer	115
* 4.2.15 When as Integer	115
– 4.3.1 class PortMidiMBS	116
* 4.3.3 CountDevices as Integer	116
* 4.3.4 DefaultInputDeviceID as Integer	117
* 4.3.5 DefaultOutputDeviceID as Integer	117
* 4.3.6 DeviceInfo(DeviceID as Integer) as PortMidiDeviceInfoMBS	118
* 4.3.7 ErrorText(ErrorNumber as Integer) as string	119
* 4.3.8 Initialize as Integer	119
* 4.3.9 ReInitialize as Integer	119
– 4.4.1 class PortMidiStreamMBS	121
* 4.4.3 Abort as Integer	121
* 4.4.4 Close	121
* 4.4.5 currentTimeStamp as Integer	122
* 4.4.6 ErrorText(ErrorNumber as Integer) as string	122
* 4.4.7 HostError as string	122
* 4.4.8 OpenInput(DeviceID as Integer, BufferSize as Integer) as Integer	122
* 4.4.9 OpenOutput(DeviceID as Integer, BufferSize as Integer, Latency as Integer) as Integer	123
* 4.4.10 Poll as Integer	123
* 4.4.11 Read(byref data as PortMidiEventMBS) as Integer	123
* 4.4.12 SetChannelMask(mask as Integer) as Integer	124
* 4.4.13 SetFilter(filters as Integer) as Integer	124

* 4.4.14 Write(data as PortMidiEventMBS) as Integer	125
* 4.4.15 WriteShort(When as Integer, message as Integer) as Integer	125
* 4.4.16 WriteSysEx(When as Integer, message as memoryblock, offset as Integer) as Integer	125
* 4.4.17 WriteSysEx(When as Integer, message as string) as Integer	126
* 4.4.19 ChannelMask as Integer	126
* 4.4.20 DeviceID as Integer	126
* 4.4.21 DeviceName as String	126
* 4.4.22 Filters as Integer	127

• 3 Audio	17
– 3.11.1 class <code>WindowsAudioMixerMBS</code>	82
* 3.11.3 <code>DeviceCount</code> as Integer	82
* 3.11.4 <code>DeviceName(index as Integer)</code> as string	82
* 3.11.6 <code>DeviceIndex</code> as Integer	82
* 3.11.7 <code>Lasterror</code> as Integer	82
* 3.11.8 <code>DestinationDigitalMute</code> as boolean	83
* 3.11.9 <code>DestinationDigitalVolume</code> as Double	83
* 3.11.10 <code>DestinationHeadPhonesMute</code> as boolean	83
* 3.11.11 <code>DestinationHeadPhonesVolume</code> as Double	84
* 3.11.12 <code>DestinationLineMute</code> as boolean	84
* 3.11.13 <code>DestinationLineVolume</code> as Double	84
* 3.11.14 <code>DestinationMonitorMute</code> as boolean	85
* 3.11.15 <code>DestinationMonitorVolume</code> as Double	85
* 3.11.16 <code>DestinationSpeakersMute</code> as boolean	85
* 3.11.17 <code>DestinationSpeakersVolume</code> as Double	86
* 3.11.18 <code>DestinationTelephoneMute</code> as boolean	86
* 3.11.19 <code>DestinationTelephoneVolume</code> as Double	86
* 3.11.20 <code>DestinationVoiceInMute</code> as boolean	86
* 3.11.21 <code>DestinationVoiceInVolume</code> as Double	87
* 3.11.22 <code>DestinationWaveInMute</code> as boolean	87
* 3.11.23 <code>DestinationWaveInVolume</code> as Double	88
* 3.11.24 <code>SourceAnalogMute</code> as boolean	88
* 3.11.25 <code>SourceAnalogVolume</code> as Double	88
* 3.11.26 <code>SourceAuxiliaryMute</code> as boolean	88
* 3.11.27 <code>SourceAuxiliaryVolume</code> as Double	89
* 3.11.28 <code>SourceCompactDiscMute</code> as boolean	89
* 3.11.29 <code>SourceCompactDiscVolume</code> as Double	89
* 3.11.30 <code>SourceDigitalMute</code> as boolean	90
* 3.11.31 <code>SourceDigitalVolume</code> as Double	90
* 3.11.32 <code>SourceLineMute</code> as boolean	90
* 3.11.33 <code>SourceLineVolume</code> as Double	91
* 3.11.34 <code>SourceMicrophoneMute</code> as boolean	91
* 3.11.35 <code>SourceMicrophoneVolume</code> as Double	91
* 3.11.36 <code>SourcePCSpeakerMute</code> as boolean	92
* 3.11.37 <code>SourcePCSpeakerVolume</code> as Double	92
* 3.11.38 <code>SourceSynthesizerMute</code> as boolean	92
* 3.11.39 <code>SourceSynthesizerVolume</code> as Double	93
* 3.11.40 <code>SourceTelephoneMute</code> as boolean	93
* 3.11.41 <code>SourceTelephoneVolume</code> as Double	93
* 3.11.42 <code>SourceWaveOutMute</code> as boolean	94

	11
* 3.11.43 SourceWaveOutVolume as Double	94
– 3.12.1 class WindowsMCIMBS	95
* 3.12.3 Run	97
* 3.12.5 Command as string	97
* 3.12.6 Errorcode as Integer	97
* 3.12.7 Errorstring as string	98
* 3.12.8 Result as string	98

• 4 MIDI	111
– 4.5.1 class WindowsMidiInputInfoMBS	129
* 4.5.3 DriverVersion as Integer	129
* 4.5.4 Flags as Integer	129
* 4.5.5 ManufacturerID as Integer	129
* 4.5.6 Name as String	129
* 4.5.7 ProductID as Integer	130
– 4.6.1 class WindowsMidiInputMBS	131
* 4.6.3 Close	131
* 4.6.4 Idle	131
* 4.6.5 InputErrorText(errorcode as Integer) as string	131
* 4.6.6 Open(DeviceID as Integer, BufferSize as Integer)	132
* 4.6.7 Reset	132
* 4.6.8 Start	132
* 4.6.9 Stop	132
* 4.6.11 DeviceClose	133
* 4.6.12 DeviceData(timestamp as Integer, status as Integer, data1 as Integer, data2 as Integer, RawData as Integer)	133
* 4.6.13 DeviceError(timestamp as Integer, status as Integer, data1 as Integer, data2 as Integer, RawData as Integer)	133
* 4.6.14 DeviceLongData(timestamp as Integer, data as string, dataMemory as memoryblock)	133
* 4.6.15 DeviceLongError(timestamp as Integer, data as string, dataMemory as memoryblock)	134
* 4.6.16 DeviceOpen	134
– 4.7.1 class WindowsMidiMBS	135
* 4.7.3 Connect(output as WindowsMidiOutputMBS)	136
* 4.7.4 DataLost as Integer	136
* 4.7.5 Disconnect(output as WindowsMidiOutputMBS)	136
* 4.7.6 EventsLost as Integer	137
* 4.7.7 Idle	137
* 4.7.8 InputDevice(index as Integer) as WindowsMidiInputInfoMBS	137
* 4.7.9 NumberOfMidiInputDevices as Integer	138
* 4.7.10 NumberOfMidiOutputDevices as Integer	138
* 4.7.11 OutputDevice(index as Integer) as WindowsMidiOutputInfoMBS	138
* 4.7.13 Handle as Integer	139
* 4.7.14 Lasterror as Integer	139
– 4.8.1 class WindowsMidiOutputInfoMBS	140
* 4.8.3 ChannelMask as Integer	140
* 4.8.4 DriverVersion as Integer	140
* 4.8.5 Flags as Integer	140

	13
* 4.8.6 ManufacturerID as Integer	141
* 4.8.7 Name as String	141
* 4.8.8 Notes as Integer	141
* 4.8.9 ProductID as Integer	141
* 4.8.10 Technology as Integer	141
* 4.8.11 Voices as Integer	142
* 4.8.12 Volume as Boolean	142
* 4.8.13 VolumeStereo as Boolean	142
– 4.9.1 class WindowsMidiOutputMBS	143
* 4.9.3 Close	143
* 4.9.4 Open(DeviceID as Integer)	143
* 4.9.5 OpenDefault	143
* 4.9.6 OutputErrorText(errorcode as Integer) as string	144
* 4.9.7 Reset	144
* 4.9.8 SendData(data as memoryblock)	144
* 4.9.9 SendData(data as memoryblock, size as Integer)	144
* 4.9.10 SendData(data as string)	145
* 4.9.11 SendMessage(message as Integer)	145
* 4.9.12 SendMessage(status as Integer, data1 as Integer, data2 as Integer)	146
* 4.9.14 Volume as Integer	147
* 4.9.16 DeviceClose	147
* 4.9.17 DeviceDataSent	147
* 4.9.18 DeviceOpen	148
* 4.9.19 DevicePositionCallback	148
– 4.10.1 class WindowsMidiStreamMBS	149
* 4.10.3 Close	149
* 4.10.4 Open(DeviceID as Integer)	149
* 4.10.5 Pause	149
* 4.10.6 PositionBytes as Integer	149
* 4.10.7 PositionMS as Integer	150
* 4.10.8 PositionSamples as Integer	150
* 4.10.9 PositionTicks as Integer	150
* 4.10.10 Restart	150
* 4.10.11 SendMessage(message as Integer)	150
* 4.10.12 SendMessage(status as Integer, data1 as Integer, data2 as Integer)	151
* 4.10.13 Stop	151
* 4.10.15 Handle as Integer	152
* 4.10.16 Lasterror as Integer	152
* 4.10.17 Tempo as Integer	152
* 4.10.18 TimeDiv as Integer	152
* 4.10.19 Volume as Integer	152

• 3 Audio	17
– 3.13.1 class WindowsPlayerDeviceMBS	101
* 3.13.3 Channels as Integer	101
* 3.13.4 DriverVersion as Integer	101
* 3.13.5 Formats as Integer	102
* 3.13.6 Index as Integer	102
* 3.13.7 ManufacturerID as Integer	102
* 3.13.8 Name as String	102
* 3.13.9 ProductID as Integer	102
* 3.13.10 Support as Integer	103
– 3.14.1 class WindowsPlayerMBS	104
* 3.14.3 Constructor(data as MemoryBlock)	104
* 3.14.4 Constructor(data as String)	105
* 3.14.5 Constructor(file as folderitem)	105
* 3.14.6 Device(index as Integer) as WindowsPlayerDeviceMBS	105
* 3.14.7 GetVolume(byref VolumeLeft as Double, byref VolumeRight as Double)	105
* 3.14.8 Pause	106
* 3.14.9 Play(offset as Double = 0.0)	106
* 3.14.10 Resume	106
* 3.14.11 SetVolume(VolumeLeft as Double, VolumeRight as Double)	106
* 3.14.12 Stop	106
* 3.14.14 Buffer as MemoryBlock	107
* 3.14.15 BufferLength as Integer	107
* 3.14.16 ChannelCount as Integer	107
* 3.14.17 ChannelMask as Integer	107
* 3.14.18 DeviceCount as Integer	108
* 3.14.19 DeviceID as Integer	108
* 3.14.20 Duration as Double	108
* 3.14.21 Lasterror as Integer	108
* 3.14.22 Pitch as Double	109
* 3.14.23 Position as Double	109
* 3.14.24 Rate as Double	109
* 3.14.25 SampleRate as Integer	109
* 3.14.26 Volume as Double	109

Chapter 2

List of all classes

• PortAudioDeviceInfoMBS	17
• PortAudioHostApiInfoMBS	20
• PortAudioHostErrorInfoMBS	23
• PortAudioMBS	25
• PortAudioStreamBaseMBS	41
• PortAudioStreamBufferedMBS	49
• PortAudioStreamInfoMBS	59
• PortAudioStreamMBS	61
• PortAudioStreamParametersMBS	66
• PortAudioStreamRecorderMBS	77
• PortMidiDeviceInfoMBS	111
• PortMidiEventMBS	113
• PortMidiMBS	116
• PortMidiStreamMBS	121
• WindowsAudioMixerMBS	82
• WindowsMCIMBS	95
• WindowsMidiInputInfoMBS	129
• WindowsMidiInputMBS	131
• WindowsMidiMBS	135

• WindowsMidiOutputInfoMBS	140
• WindowsMidiOutputMBS	143
• WindowsMidiStreamMBS	149
• WindowsPlayerDeviceMBS	101
• WindowsPlayerMBS	104

Chapter 3

Audio

3.1 class PortAudioDeviceInfoMBS

3.1.1 class PortAudioDeviceInfoMBS

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: A class providing information and capabilities of PortAudio devices.

Notes: Devices may support input, output or both input and output.

This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

Blog Entries

- [MBS Real Studio Plugins, version 12.1pr1](#)

3.1.2 Methods

3.1.3 Constructor

Plugin Version: 12.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The private constructor.

3.1.4 Properties

3.1.5 DefaultHighInputLatency as Double

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Default latency values for robust non-interactive applications (eg. playing sound files).

Notes: (Read only property)

3.1.6 DefaultHighOutputLatency as Double

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Default latency values for robust non-interactive applications (eg. playing sound files).

Notes: (Read only property)

3.1.7 DefaultLowInputLatency as Double

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Default latency values for interactive performance.

Notes: (Read only property)

3.1.8 DefaultLowOutputLatency as Double

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Default latency values for interactive performance.

Notes: (Read only property)

3.1.9 DefaultSampleRate as Double

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The default sample rate.

Notes: (Read only property)

3.1.10 HostApiIndex as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The host API index for this device.

Notes: (Read only property)

3.1.11 Index as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The index of this device.

Notes: (Read only property)

3.1.12 MaxInputChannels as Integer

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The number of input channels.

Notes: Returns 0 on any error.

(Read only property)

3.1.13 MaxOutputChannels as Integer

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The number of output channels for this device.

Notes: 0 on any error.

Seems like an iMac returns two here, but the internal microphone has only one channel. So be aware that the memoryblocks in the events do have the actual size of the data that is coming in. So stereo has there a larger buffer.

(Read only property)

3.1.14 Name as String

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The name of this device.

Notes: Returns "" on any error.

(Read only property)

3.2 class PortAudioHostApiInfoMBS

3.2.1 class PortAudioHostApiInfoMBS

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: A class containing information about a particular host API.

Notes: This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

Blog Entries

- [MBS Real Studio Plugins, version 12.1pr1](#)

3.2.2 Methods

3.2.3 Constructor

Plugin Version: 12.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The private constructor.

3.2.4 Properties

3.2.5 defaultInputDevice as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The default input device for this host API.

Notes: The value will be a device index ranging from 0 to (PortAudioHostApiInfoMBS.deviceCount-1), or paNoDevice (-1) if no default input device is available.
(Read only property)

3.2.6 defaultOutputDevice as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The default output device for this host API.

Notes: The value will be a device index ranging from 0 to (PortAudioHostApiInfoMBS.deviceCount-1), or paNoDevice (-1) if no default output device is available.
(Read only property)

3.2.7 deviceCount as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The number of devices belonging to this host API.

Notes: This field may be used in conjunction with `HostApiDeviceIndexToDeviceIndex()` to enumerate all devices for this host API.

(Read only property)

3.2.8 Index as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The index of this host API.

Notes: (Read only property)

3.2.9 Name as String

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: A textual description of the host API for display on user interfaces.

Notes: (Read only property)

3.2.10 Type as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The well known unique identifier of this host API.

Notes: Useful constants for the different types:

(Read only property)

paInDevelopment	=0
paDirectSound	=1
paMME	=2
paASIO	=3
paSoundManager	=4
paCoreAudio	=5
paOSS	=7
paALSA	=8
paAL	=9
paBeOS	=10
paWDMKS	=11
paJACK	=12
paWASAPI	=13
paAudioScienceHPI	=14

3.3 class PortAudioHostErrorInfoMBS

3.3.1 class PortAudioHostErrorInfoMBS

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: A class used to return information about a host error condition.

Notes: This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

Blog Entries

- [MBS Real Studio Plugins, version 12.1pr1](#)

3.3.2 Methods

3.3.3 Constructor

Plugin Version: 12.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The private constructor.

3.3.4 Properties

3.3.5 ErrorCode as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: the error code returned.

Notes: (Read only property)

3.3.6 ErrorText as String

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: A textual description of the error if available, otherwise a zero-length string.

Notes: (Read only property)

3.3.7 HostApiType as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The host API which returned the error code.

Notes: (Read only property)

3.4 class PortAudioMBS

3.4.1 class PortAudioMBS

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: A class to run the opensource PortAudio library in Xojo.

Notes: Constants for error codes:

paNoError	= 0
Plugin parameter error	= -1
paNotInitialized	= -10000,
paUnanticipatedHostError	= -9999
paInvalidChannelCount	= -9998
paInvalidSampleRate	= -9997
paInvalidDevice	= -9996
paInvalidFlag	= -9995
paSampleFormatNotSupported	= -9994
paBadIODeviceCombination	= -9993
paInsufficientMemory	= -9992
paBufferTooBig	= -9991
paBufferTooSmall	= -9990
paNullCallback	= -9989
paBadStreamPtr	= -9988
paTimedOut	= -9987
paInternalError	= -9986
paDeviceUnavailable	= -9985
paIncompatibleHostApiSpecificStreamInfo	= -9984
paStreamIsStopped	= -9983
paStreamIsNotStopped	= -9982
paInputOverflowed	= -9981
paOutputUnderflowed	= -9980
paHostApiNotFound	= -9979
paInvalidHostApi	= -9978
paCannotReadFromACallbackStream	= -9977
paCannotWriteToACallbackStream	= -9976
paCannotReadFromAnOutputOnlyStream	= -9975
paCannotWriteToAnInputOnlyStream	= -9974
paIncompatibleStreamHostApi	= -9973
paBadBufferPtr	= -9972

Initialization and Termination of the PortAudio library are done in background automatically.

Requires libasound.so.2 on Linux to be installed.

Blog Entries

- [New in the MBS Xojo Plugins 20.0](#)
- [MBS Xojo Plugins, version 19.2pr1](#)
- [MBS Real Studio Plugins, version 12.1pr2](#)

3.4.2 Methods

3.4.3 ASIOGetAvailableBufferSizes(DeviceIndex as Integer, byref minBufferSizeFrames as Integer, byref maxBufferSizeFrames as Integer, byref preferredBufferSizeFrames as Integer, byref granularity as Integer) as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve legal native buffer sizes for the specified device, in sample frames.

Notes: device: The global index of the device about which the query is being made.

minBufferSizeFrames: The minimum buffer size value.

maxBufferSizeFrames: The maximum buffer size value.

preferredBufferSizeFrames: The preferred buffer size value.

granularity: The "granularity". This value determines the step size used to compute the legal values between minBufferSizeFrames and maxBufferSizeFrames.

If granularity is -1 then available buffer size values are powers of two.

see ASIOGetBufferSize in the ASIO SDK.

3.4.4 ASIOGetInputChannelName(DeviceIndex as Integer, ChannelIndex as Integer) as String

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Queries name of input channel.

Example:

```
Dim po As New PortAudioMBS

// find ASIO device
Dim defaultASIOInputDevice As Integer

Dim hc As Integer = po.HostApiCount
For hi As Integer = 0 To hc
Dim host As PortAudioHostApiInfoMBS = po.HostApiInfo(hi)
If host <> Nil And host.Type = po.kHostApiASIO Then
defaultASIOInputDevice = host.defaultInputDevice
End If
Next

// show channel names
Dim names As String
```

```

Dim de As PortAudioDeviceInfoMBS = po.DeviceInfo(defaultASIOInputDevice)
For i As Integer = 0 To de.maxInputChannels-1
names.Append po.ASIOGetInputChannelName(defaultASIOInputDevice,i)
Next

```

```
MsgBox Join(names, EndOfLine)
```

Notes: The string will be no longer than 32 characters.

3.4.5 ASIOGetOutputChannelName(DeviceIndex as Integer, ChannelIndex as Integer) as String

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Queries name of output channel.

Example:

```

Dim po As New PortAudioMBS

// find ASIO device
Dim defaultASIOOutputDevice As Integer

Dim hc As Integer = po.HostApiCount
For hi As Integer = 0 To hc
Dim host As PortAudioHostApiInfoMBS = po.HostApiInfo(hi)
If host<>Nil And host.Type = po.kHostApiASIO Then
defaultASIOOutputDevice = host.defaultOutputDevice
End If
Next

// show channel names
D2im names As String
Dim de As PortAudioDeviceInfoMBS = po.DeviceInfo(defaultASIOOutputDevice)
For i As Integer = 0 To de.maxOutputChannels-1
names.Append po.ASIOGetOutputChannelName(defaultASIOOutputDevice,i)
Next

MsgBox Join(names, EndOfLine)

```

Notes: The string will be no longer than 32 characters.

3.4.6 ASIOGetSampleRate(byref rate as double) as Integer

Plugin Version: 19.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Queries current sample rate.

Example:

```
Dim d As Double
Dim n As Integer
```

```
n = PortAudioMBS.ASIOGetSampleRate(d)
```

```
If n = 0 Then
  MsgBox Str(d)
Else
  MsgBox "Error: "+Str(n)
End If
```

Notes: Rate will hold the current sample rate on return.

Returns error code.

If sample rate is unknown, sampleRate will be 0 and ASE_NoClock will be returned.

If no input/output is present ASE_NotPresent (-1000) will be returned.

3.4.7 ASIOShowControlPanel(device as integer, parentWindow as DesktopWindow) as Integer

Plugin Version: 22.0, Platforms: macOS, Linux, Windows, Targets: Desktop only.

Function: Display the ASIO control panel for the specified device.

Notes: device: The global index of the device whose control panel is to be displayed.

parentWindow: On Windows, the calling application's main window handle or nil.

See also:

- 3.4.8 ASIOShowControlPanel(device as integer, parentWindow as window = nil) as Integer 28

3.4.8 ASIOShowControlPanel(device as integer, parentWindow as window = nil) as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: Desktop only.

Function: Display the ASIO control panel for the specified device.

Example:

```
Dim po As New PortAudioMBS
```

```

// find ASIO device
Dim defaultASIOOutputDevice As Integer

Dim hc As Integer = po.HostApiCount
For hi As Integer = 0 To hc
Dim host As PortAudioHostApiInfoMBS = po.HostApiInfo(hi)
If host<>Nil And host.Type = po.kHostApiASIO Then
defaultASIOOutputDevice = host.defaultOutputDevice
End If
Next

// show dialog
Call po.ASIOShowControlPanel(defaultASIOOutputDevice, window1)

```

Notes: device: The global index of the device whose control panel is to be displayed.
parentWindow: On Windows, the calling application's main window handle or nil.
See also:

- 3.4.7 ASIOShowControlPanel(device as integer, parentWindow as DesktopWindow) as Integer 28

3.4.9 CountDevices as Integer

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the number of available devices.

Example:

```

dim pa as new PortAudioMBS

Dim c as Integer = pa.CountDevices
msgbox str(c)+" devices found"

for i as Integer = 0 to c-1
MsgBox pa.DeviceInfo(i).Name
next

```

Notes: The number of available devices may be zero.

Returns a non-negative value indicating the number of available devices or, a PaErrorCode (which are always negative) if PortAudio is not initialized or an error is encountered.

3.4.10 DefaultHostApiIndexd as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the index of the default host API.

Example:

```
dim pa as new PortAudioMBS

dim DefaultHostApiIndexd as Integer = pa.DefaultHostApiIndexd

if DefaultHostApiIndexd >= 0 then
dim d as PortAudioHostApiInfoMBS = pa.HostApiInfo(DefaultHostApiIndexd)
MsgBox "Default host API is: "+d.Name
else
MsgBox "No default host API."
end if
```

Notes: The default host API will be the lowest common denominator host API on the current platform and is unlikely to provide the best performance.

Returns a non-negative value ranging from 0 to (HostApiCount-1) indicating the default host API index or, a PaErrorCode (which are always negative) if PortAudio is not initialized or an error is encountered.

3.4.11 DefaultInputDeviceID as Integer

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the index of the default input device.

Example:

```
dim pa as new PortAudioMBS

dim DefaultInputDeviceID as Integer = pa.DefaultInputDeviceID

if DefaultInputDeviceID >= 0 then
dim d as PortAudioDeviceInfoMBS = pa.DeviceInfo(DefaultInputDeviceID)
MsgBox "Default input device is: "+d.Name
else
MsgBox "No default input device."
end if
```

Notes: The result can be used in the inputDevice parameter to OpenStream().

Returns the default input device index for the default host API, or paNoDevice (-1) if no default input device is available or an error was encountered.

3.4.12 DefaultOutputDeviceID as Integer

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the index of the default output device.

Example:

```
dim pa as new PortAudioMBS

dim DefaultOutputDeviceID as Integer = pa.DefaultOutputDeviceID

if DefaultOutputDeviceID >= 0 then
dim d as PortAudioDeviceInfoMBS = pa.DeviceInfo(DefaultOutputDeviceID)
MsgBox "Default output device is: "+d.Name
else
MsgBox "No default output device."
end if
```

Notes: The result can be used in the outputDevice parameter to OpenStream().

Returns the default output device index for the default host API, or paNoDevice (-1) if no default output device is available or an error was encountered.

On the PC, the user can specify a default device by setting an environment variable. For example, to use device #1.

```
set PA_RECOMMENDED_OUTPUT_DEVICE=1
```

The user should first determine the available device ids by using the supplied application "pa_devs".

3.4.13 DeviceInfo(DeviceIndex as Integer) as PortAudioDeviceInfoMBS

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve an object containing information about the specified device.

Example:

```
dim pa as new PortAudioMBS

Dim u as Integer = pa.CountDevices-1
```

```

for i as Integer = 0 to u
dim d as PortAudioDeviceInfoMBS = pa.DeviceInfo(i)
MsgBox d.Name+" with default "+str(D.DefaultSampleRate)+" Hz"
next

```

Notes: Returns an object of class PortAudioDeviceInfoMBS with the requested information. If the device parameter is out of range the function returns nil.

DeviceIndex: A valid device index in the range 0 to (PortAudioMBS.CountDevices-1)

3.4.14 DisableHostAPI(API as string) as boolean

Plugin Version: 12.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Disables a PortAudio Host API.

Example:

```

if PortAudioMBS.DisableHostAPI("Core Audio") then // for Mac
MsgBox "OK"
else
MsgBox "Failed"
end if

```

Notes: This must be called before using any PortAudio function.

It removes the API from the list of APIs to be used when PortAudio initializes. This way you can avoid loading interfaces you don't need.

API name can be "MME", "Windows DirectSound", "Windows WASAPI", "ASIO", "Core Audio", "ALSA", "OSS".

Returns true on success.

3.4.15 ErrorText(ErrorNumber as Integer) as string

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Translate the error number into a human readable message.

3.4.16 GetSampleSize(Format as Integer) as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Returns the sample size in bytes of the given format.

Example:

```
dim pa as new PortAudioMBS
```

```
const paFloat32 = 1
```

```
MsgBox str(pa.GetSampleSize(paFloat32))+” bytes per sample”
```

3.4.17 HostApiCount as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the number of available host APIs.

Example:

```
dim pa as new PortAudioMBS
```

```
Dim c as Integer = pa.HostApiCount
```

```
msgbox str(c)+” host APIs found”
```

Notes: Even if a host API is available it may have no devices available.

Returns a non-negative value indicating the number of available host APIs or, a PaErrorCode (which are always negative) if PortAudio is not initialized or an error is encountered.

3.4.18 HostApiDeviceIndexToDeviceIndex(hostApiIndex as Integer, hostApiDeviceIndex as Integer) as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Convert a host-API-specific device index to standard PortAudio device index.

Notes: This function may be used in conjunction with the deviceCount field of PaHostApiInfo to enumerate all devices for the specified host API.

hostApiIndex: A valid host API index ranging from 0 to (HostApiCount-1)

hostApiDeviceIndex: A valid per-host device index in the range 0 to (HostApiInfo(hostApi).deviceCount-1)

Returns a non-negative device index ranging from 0 to (DeviceCount-1) or, an error code (which are always negative) if PortAudio is not initialized or an error is encountered.

A `paInvalidHostApi` (-9978) error code indicates that the host API index specified by the `hostApi` parameter is out of range.

A `paInvalidDevice` (-9996) error code indicates that the `hostApiDeviceIndex` parameter is out of range.

3.4.19 `HostApiInfo(hostApiIndex as Integer)` as `PortAudioHostApiInfoMBS`

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve an `PortAudioHostApiInfoMBS` object containing information about a specific host Api.

Example:

```
dim pa as new PortAudioMBS
Dim u as Integer = pa.HostApiCount - 1

for i as Integer = 0 to u
dim d as PortAudioHostApiInfoMBS = pa.HostApiInfo(i)
MsgBox d.name
next
```

Notes: `hostApiIndex`: A valid host API index ranging from 0 to (`HostApiCount`-1)

Returns the information object. If the `hostApi` parameter is out of range or an error is encountered, the function returns `nil`.

3.4.20 `HostApiTypeIdToHostApiIndex(type as Integer)` as `Integer`

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Convert a static host API unique identifier, into a runtime host API index.

Example:

```
dim IndexDirectSound as Integer
dim p as new PortAudioMBS
const paDirectSound=1
IndexDirectSound=p.HostApiTypeIdToHostApiIndex(paDirectSound)
```

Notes: `type`: A unique host API identifier. See `PortAudioHostApiInfoMBS.Type` for the list of constants.

Returns a valid `PaHostApiIndex` ranging from 0 to (`HostApiCount`-1) or, a `PaErrorCode` (which are always

negative) if PortAudio is not initialized or an error is encountered.

The `paHostApiNotFound` (-9979) error code indicates that the host API specified by the type parameter is not available.

3.4.21 `HostError` as `PortAudioHostErrorInfoMBS`

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Return information about the last host error encountered.

Notes: This function is provided as a last resort, primarily to enhance debugging by providing clients with access to all available error information.

Returns an object containing information about the host error. The values in this structure will only be valid if a PortAudio function has previously returned the `paUnanticipatedHostError`.

3.4.22 `IsFormatSupported(input as PortAudioStreamParametersMBS, output as PortAudioStreamParametersMBS, sampleRate as Double)` as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Determine whether it would be possible to open a stream with the specified parameters.

Notes: `input`: An object that describes the input parameters used to open a stream. The `suggestedLatency` field is ignored. `inputParameters` must be nil for output-only streams.

`output`: An object that describes the output parameters used to open a stream. The `suggestedLatency` field is ignored. `outputParameters` must be nil for input-only streams.

`sampleRate`: The required sampleRate. For full-duplex streams it is the sample rate for both input and output

Returns 0 if the format is supported, and an error code indicating why the format is not supported otherwise. The constant `paFormatIsSupported` (0) is provided to compare with the return value for success.

3.4.23 `MacCoreAudioChannelName(DeviceIndex as Integer, ChannelIndex as Integer, Input as Boolean)` as String

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Queries channel name.

3.4.24 `MacCoreAudioGetBufferSizeRange(DeviceIndex as Integer, byref minBufferSizeFrames as Integer, byref maxBufferSizeFrames as Integer) as Integer`

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the range of legal native buffer sizes for the specified device, in sample frames.

Notes: `device`: The global index of the PortAudio device about which the query is being made.

`minBufferSizeFrames`: The minimum buffer size value.

`maxBufferSizeFrames`: The maximum buffer size value.

see `kAudioDevicePropertyBufferFrameSizeRange` in the CoreAudio SDK.

3.4.25 `SampleSize(theFormat as Integer) as Integer`

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Return size in bytes of a single sample in a given sample format or `paSampleFormatNotSupported` (-9994).

Notes: Returns 0 on any error.

Constants for sample format:

```

const paFloat32      = 1
const paInt32        = 2
const paInt24        = 4
const paInt16        = 8
const paInt8         = 16
const paUInt8        = 32
const paCustomFormat = 65536
const paNonInterleaved = negative sign

```

The standard formats `paFloat32`, `paInt16`, `paInt32`, `paInt24`, `paInt8` and `paUInt8` are usually implemented by all implementations.

The floating point representation (`paFloat32`) uses +1.0 and -1.0 as the maximum and minimum respectively.

`paUInt8` is an unsigned 8 bit format where 128 is considered "ground"

The `paNonInterleaved` flag indicates that a multichannel buffer is passed as a set of non-interleaved pointers.

3.4.26 `SetDebugLogFile(File as FolderItem)` as boolean

Plugin Version: 16.5, Platforms: macOS, Linux, Windows, Targets: All.

Function: Sets the debug file to log all PortAudio calls with parameters.

Notes: Pass nil to stop logging.

Returns true on success or false on failure.

3.4.27 `Sleep(msec as Integer)`

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Put the caller to sleep for at least 'msec' milliseconds.

Notes: This function is provided only as a convenience for authors of portable code (such as the tests and examples in the PortAudio distribution.)

The function may sleep longer than requested so don't rely on this for accurate musical timing.

3.4.28 `Version as Integer`

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the release number of the currently running PortAudio build.

Notes: e.g. 1900

3.4.29 `VersionControlRevision as String`

Plugin Version: 16.5, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve a version control revision text.

3.4.30 `VersionText as String`

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve a textual description of the current PortAudio build.

Notes: e.g. "PortAudio V19-devel 13 October 2002"

3.4.31 WinDefaultChannelMask(numChannels as Integer) as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Map a channel count to a speaker channel mask for Windows.

3.4.32 Constants

Constants

Constant	Value	Description
kNoDevice	-1	The constant for no device.

Errors

Constant	Value	Description
kErrorBadBufferPtr	-9972	Bad buffer pointer.
kErrorBadIODeviceCombination	-9993	Bad IO Device combination
kErrorBadStreamPtr	-9988	Bad stream pointer
kErrorBufferTooBig	-9991	Buffer too big
kErrorBufferTooSmall	-9990	Buffer too small
kErrorCanNotReadFromACallbackStream	-9977	Can not read from a callback stream.
kErrorCanNotReadFromAnOutputOnlyStream	-9975	Can not read from an output only stream.
kErrorCanNotWriteToACallbackStream	-9976	Can not write to a callback stream.
kErrorCanNotWriteToAnInputOnlyStream	-9974	Can not write to an input only stream.
kErrorDeviceUnavailable	-9985	Device unavailable.
kErrorHostApiNotFound	-9979	Host API not found.
kErrorIncompatibleHostApiSpecificStreamInfo	-9984	Incompatible host api for specific stream info.
kErrorIncompatibleStreamHostApi	-9973	Incompatible stream for host api.
kErrorInputOverflowed	-9981	Input overflowed.
kErrorInsufficientMemory	-9992	Insufficient memory
kErrorInternalError	-9986	Internal error
kErrorInvalidChannelCount	-9998	Invalid Channel Count
kErrorInvalidDevice	-9996	Invalid Device
kErrorInvalidFlag	-9995	Invalid flag
kErrorInvalidHostApi	-9978	Invalid host API
kErrorInvalidSampleRate	-9997	Invalid sample rate
kErrorNoError	0	No error
kErrorNotInitialized	-10000	Not initialized.
kErrorNullCallback	-9989	Null callback.
kErrorOutputUnderflowed	-9980	Output underflowed.
kErrorSampleFormatNotSupported	-9994	Sampleformat not supported.
kErrorStreamIsNotStopped	-9982	Stream is not stopped.
kErrorStreamIsStopped	-9983	Stream is stopped.
kErrorTimedOut	-9987	Timed out
kErrorUnanticipatedHostError	-9999	Unanticipated Host Error. See HostError function.

Host APIs

Constant	Value	Description
kHostApiAL	9	AL
kHostApiALSA	8	Linux ALSA
kHostApiASIO	3	ASIO
kHostApiAudioScienceHPI	14	AudioScienceHPI
kHostApiBeOS	10	BeOS, not used in MBS Plugin.
kHostApiCoreAudio	5	CoreAudio-specific PortAudio API extension
kHostApiDirectSound	1	Windows DirectSound-specific PortAudio API extension
kHostApiInDevelopment	0	Internally only.
kHostApiJACK	12	Linux Jack
kHostApiMME	2	Windows Multimedia Extension.
kHostApiOSS	7	OSS
kHostApiSoundManager	4	SoundManager (old MacOS Classic)
kHostApiWASAPI	13	WASAPI-specific PortAudio API extension
kHostApiWDMKS	11	WDM Kernel Streaming-specific PortAudio API extension

3.5 class PortAudioStreamBaseMBS

3.5.1 class PortAudioStreamBaseMBS

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: The base class for the portaudio streams.

Notes: This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

Blog Entries

- [News from the MBS Xojo Plugins Version 20.1](#)
- [MBS Xojo Plugins, version 20.1pr1](#)
- [New in the MBS Xojo Plugins 20.0](#)

3.5.2 Methods

3.5.3 Abort as Integer

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Terminates audio processing immediately without waiting for pending buffers to complete.

3.5.4 AsioSetStreamSampleRate(sampleRate as double) as integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Set the sample rate of an open ASIO stream.

Notes: sampleRate: The new sample rate.

Note that this function may fail if the stream is already running and the ASIO driver does not support switching the sample rate of a running stream.

Returns kErrorIncompatibleStreamHostApi if stream is not a paASIO stream.

3.5.5 Close as Integer

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Closes an audio stream.

Notes: If the audio stream is active it discards any pending buffers as if `Abort()` had been called.

3.5.6 Constructor

Plugin Version: 20.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The private constructor.

3.5.7 HostError as PortAudioHostErrorInfoMBS

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Return information about the last host error encountered.

Notes: This function is provided as a last resort, primarily to enhance debugging by providing clients with access to all available error information.

Returns an object containing information about the host error. The values in this structure will only be valid if a PortAudio function has previously returned the `paUnanticipatedHostError`.

3.5.8 Info as PortAudioStreamInfoMBS

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve a `PortAudioStreamInfoMBS` object containing information about the specified stream.

Notes: If the stream parameter invalid, or an error is encountered, the function returns `nil`.

3.5.9 Read(Buffer as Ptr, frameCount as integer) as integer

Plugin Version: 20.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Read samples from an input stream.

Notes: The function doesn't return until the entire buffer has been filled - this may involve waiting for the operating system to supply the data.

buffer: A buffer of sample frames. The buffer contains samples in the format specified by the `input.sampleFormat` field used to open the stream, and the number of channels specified by `input.numChannels`. If non-interleaved samples were requested, `buffer` is a pointer to the first element of an array of non-interleaved buffer pointers, one for each channel.

frameCount: The number of frames to be read into buffer. This parameter is not constrained to a specific range, however high performance applications will want to match this parameter to the framesPerBuffer parameter used when opening the stream.

Returns on success PaNoError will be returned, or PaInputOverflowed (-9981) if input data was discarded by PortAudio after the previous call and before this call.

3.5.10 Start as Integer

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Commences audio processing.

Notes: Returns an error code.

(0 for success, -1 for no stream)

3.5.11 Stop as Integer

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Terminates audio processing.

Notes: It waits until all pending audio buffers have been played before it returns.

3.5.12 WinMMESTreamInputHandle(index as Integer) as Ptr

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve a wave in handle used by a PortAudio WinMME stream.

Notes: handleIndex: The zero based index of the wave in handle to retrieve. This should be in the range [0, WinMMESTreamInputHandleCount-1] .

Returns a valid wave in handle, or nil if an error occurred.

3.5.13 WinMMESTreamInputHandleCount as integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the number of wave in handles used by a PortAudio WinMME stream.

Notes: Returns zero if the stream is output only.

A non-negative value indicating the number of wave in handles or, an error code (which are always negative) if PortAudio is not initialized or an error is encountered.

3.5.14 WinMMESTreamOutputHandle(index as Integer) as Ptr

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve a wave out handle used by a PortAudio WinMME stream.

Notes: handleIndex: The zero based index of the wave out handle to retrieve. This should be in the range [0, WinMMESTreamOutputHandleCount - 1] .

Returns a valid wave out handle, or nil if an error occurred.

3.5.15 WinMMESTreamOutputHandleCount as integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the number of wave out handles used by a PortAudio WinMME stream.

Notes: Returns zero if the stream is input only.

A non-negative value indicating the number of wave out handles or, a PaErrorCode (which are always negative) if PortAudio is not initialized or an error is encountered.

3.5.16 Write(Buffer as Ptr, frameCount as integer) as integer

Plugin Version: 20.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Write samples to an output stream.

Notes: This function doesn't return until the entire buffer has been consumed - this may involve waiting for the operating system to consume the data.

buffer: A buffer of sample frames. The buffer contains samples in the format specified by the outputParameters.sampleFormat field used to open the stream, and the number of channels specified by outputParameters.numChannels. If non-interleaved samples were requested, buffer is a pointer to the first element of an array of non-interleaved buffer pointers, one for each channel.

frameCount: The number of frames to be written from buffer. This parameter is not constrained to a specific range, however high performance applications will want to match this parameter to the framesPerBuffer parameter used when opening the stream.

On success PaNoError (0) will be returned, or paOutputUnderflowed (-9980) if additional output data was inserted after the previous call and before this call.

3.5.17 Properties

3.5.18 CPUload as Double

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve CPU usage information for the specified stream.

Notes: The "CPU Load" is a fraction of total CPU time consumed by a callback stream's audio processing routines including, but not limited to the client supplied stream callback. This function does not work with blocking read/write streams.

This function may be called from the stream callback function or the application.

Returns a floating point value, typically between 0.0 and 1.0, where 1.0 indicates that the stream event is consuming the maximum number of CPU cycles possible to maintain real-time operation. A value of 0.5 would imply that PortAudio and the stream event was consuming roughly 50% of the available CPU time. The return value may exceed 1.0. A value of 0.0 will always be returned for a blocking read/write stream, or if an error occurs.

(Read only property)

3.5.19 IsStreamActive as Integer

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Determine whether the stream is active.

Notes: A stream is active after a successful call to Start(), until it becomes inactive either as a result of a call to Stop() or Abort(), or as a result of a return value other than paContinue from the stream callback. In the latter case, the stream is considered inactive after the last buffer has finished playing.

Returns one (1) when the stream is active (ie playing or recording audio), zero (0) when not playing or, a PaErrorCode (which are always negative) if PortAudio is not initialized or an error is encountered.

(Read only property)

3.5.20 IsStreamStopped as Integer

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Determine whether the stream is stopped.

Notes: A stream is considered to be stopped prior to a successful call to Start and after a successful call to

Stop or Abort.

If a stream value returns a value other than `paContinue` (0) the stream is NOT considered to be stopped.

Returns one (1) when the stream is stopped, zero (0) when the stream is running or, a `PaErrorCode` (which are always negative) if `PortAudio` is not initialized or an error is encountered.

(Read only property)

3.5.21 `MacCoreAudioStreamInputDevice` as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the `AudioDeviceID` of the input device assigned to an open stream.

Notes: Returns a valid `AudioDeviceID`, or 0 if an error occurred.

(Read only property)

3.5.22 `MacCoreAudioStreamOutputDevice` as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the `AudioDeviceID` of the output device assigned to an open stream.

Notes: Returns a valid `AudioDeviceID`, or 0 if an error occurred.

(Read only property)

3.5.23 `ReadAvailable` as Integer

Plugin Version: 20.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the number of frames that can be read from the stream without waiting.

Notes: Returns a non-negative value representing the maximum number of frames that can be read from the stream without blocking or busy waiting or, a `PaErrorCode` (which are always negative) if `PortAudio` is not initialized or an error is encountered.

(Read only property)

3.5.24 `Time` as Double

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Determine the current time for the stream according to the same clock used to generate buffer timestamps.

Notes: This time may be used for synchronising other events to the audio stream, for example synchronizing audio to MIDI.

Returns the stream's current time in seconds, or 0 if an error occurred.
(Read only property)

3.5.25 WriteAvailable as Integer

Plugin Version: 20.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Retrieve the number of frames that can be written to the stream without waiting.

Notes: Returns a non-negative value representing the maximum number of frames that can be written to the stream without blocking or busy waiting or, a PaErrorCode (which are always negative) if PortAudio is not initialized or an error is encountered.

(Read only property)

3.5.26 UseSafeThreading as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Enables or disables thread safe event handling.

Notes: Xojo works normally only on one preemptive thread as the framework is not reentrant and not in general preemptive thread safe.

Still newer Xojo versions get better so you can switch it off and get a better performance.

For most usages you need to turn it off. See the examples. A lot of pragma lines are needed to disable everything which can slow down processing. Also you are limited in a preemptive thread to do only math and no object creating/deleting.

(Read and Write computed property)

3.5.27 Constants

Flags

Constant	Value	Description
kFlagsClipOff	1	Disable default clipping of out of range samples.
kFlagsDitherOff	2	Disable default dithering.
kFlagsNeverDropInput	4	Flag requests that where possible a full duplex stream be processed and flowed input samples without calling the stream callback. This flag is only for full duplex callback streams and only when used in conjunction with paFramesPerBufferUnspecified (0) framesPerBuffer parameter. Incorrectly results in a paInvalidFlag error being returned from paOpen and OpenDefaultStream.
kFlagsNoFlag	0	No flags.
kFlagsPlatformSpecificFlags	&hFFFF0000	A mask specifying the platform specific bits.
kFlagsPrimeOutputBuffersUsingStreamCallback	8	Call the stream callback to fill initial output buffers, instead of the default behavior of priming the buffers with zeros (silence). This flag is only for input-only and blocking read/write streams.

3.6 class PortAudioStreamBufferedMBS

3.6.1 class PortAudioStreamBufferedMBS

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: A portaudio stream class to use an internal buffer to feed its callback.

Notes: Currently this class allows you to add 200 buffers to the internal playlist. The buffer size is not limited. FreeSpace returns you the number of buffers you have currently. Buffers are freed after they are played.

Subclass of the PortAudioStreamBaseMBS class.

Blog Entries

- [MBS Xojo Plugins, version 20.1pr4](#)
- [MBS Xojo Plugins, version 20.0pr8](#)
- [MBS Xojo / Real Studio Plugins, version 15.2pr4](#)

3.6.2 Methods

3.6.3 AddAudio(Data as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, BitSize as Integer=16, ClearBuffers as boolean=false) as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Adds audio to the queue.

Notes: Data: a memoryblock with the sound data

offsetBytes: the number of the bytes to start playing (0=first)

countBytes: the number of bytes to play from offset. If countBytes is zero, the memoryblock's size property is used.

You need to set numOutputChannels to 1 or 2 when opening the stream. For 2 channels, sound data must be interleaved.

Values for bitsize:

This method copies the data to the internal queue. It returns directly.

If ClearBuffers is true, the buffer list will be cleared before this new data is added. This allows to have the next minute in the buffers and still do a change in the stream quick.

7	signed byte
8	unsigned byte
15	signed short
16	unsigned short
24	unsigned medium
31	signed integer
32	unsigned integer

Returns true on success and false on failure (e.g. out of memory).

3.6.4 AddAudioStereo(Data1 as memoryblock, Data2 as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, BitSize as Integer=16, ClearBuffers as boolean=false) as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Adds audio to the queue.

Notes: This is a special version of AddAudio which takes samples from both memoryblocks and interleaves them.

Data1: a memoryblock with the sound data

Data2: a memoryblock with the sound data

offsetBytes: the number of the bytes to start playing (0=first)

countBytes: the number of bytes to play from offset. If countBytes is zero, the memoryblock's size property is used.

The stream must use 2 channels for this method to work correctly.

Values for bitsize:

7	signed byte
8	unsigned byte
15	signed short
16	unsigned short
24	unsigned medium
31	signed integer
32	unsigned integer

This method copies the data to the internal queue. It returns directly.

If `ClearBuffers` is true, the buffer list will be cleared before this new data is added. This allows to have the next minute in the buffers and still do a change in the stream quick.

Returns true on success and false on failure (e.g. out of memory).

3.6.5 AddFloatAudio(FloatData as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, ClearBuffers as boolean=false) as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Adds audio to the queue.

Notes: `FloatData`: a memoryblock with the sound data filled with single values.

`offsetBytes`: the number of the bytes to start playing (0=first)

`countBytes`: the number of bytes to play from offset. If `countBytes` is zero, the memoryblock's size property is used.

You need to set `numOutputChannels` to 1 or 2 when opening the stream. For 2 channels, sound data must be interleaved.

The samples are stored in 32bit float values (`memoryblock.SingleValue`)

This method copies the data to the internal queue. It returns directly.

If `ClearBuffers` is true, the buffer list will be cleared before this new data is added. This allows to have the next minute in the buffers and still do a change in the stream quick.

Returns true on success and false on failure (e.g. out of memory).

3.6.6 AddFloatAudioStereo(FloatData1 as memoryblock, FloatData2 as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, ClearBuffers as boolean=false) as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Adds audio to the queue.

Notes: This is a special version of `AddFloatAudio` which takes samples from both memoryblocks and interleaves them.

FloatData1: a memoryblock with the sound data filled with single values.

FloatData2: a memoryblock with the sound data filled with single values.

offsetBytes: the number of the bytes to start playing (0=first)

countBytes: the number of bytes to play from offset. If countBytes is zero, the memoryblock's size property is used.

The samples are stored in 32bit float values (memoryblock.SingleValue)

This method copies the data to the internal queue. It returns directly.

The stream must use 2 channels for this method to work correctly.

If ClearBuffers is true, the buffer list will be cleared before this new data is added. This allows to have the next minute in the buffers and still do a change in the stream quick.

Returns true on success and false on failure (e.g. out of memory).

3.6.7 Constructor

Plugin Version: 20.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The constructor.

3.6.8 FreeSpace as Integer

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Returns the number of buffer entries available in the queue.

Notes: The size of the buffers is not limited except your available memory.

3.6.9 HasFreeSpace as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Returns true if the internal sound buffer has free space.

Notes: Returns true if freespace returns a value greater than zero.

This function was named IsQueueEmpty in plugin version 7.4.

3.6.10 `OpenDefaultStream(numOutputChannels as Integer, sampleRate as Double) as Integer`

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: A simplified version of `OpenStream()` that opens the default input and/or output devices.

Notes: `Sampleformat` is always 32bit float in this class. All data you add the queue is converted to float internally.

`numOutputChannels`: The number of channels of sound to be delivered to the stream callback or passed to `Write`. It can range from 1 to the value of `maxOutputChannels` in the `PortAudioDeviceInfoMBS` object for the default output device. If 0 the stream is opened as an output-only stream.

`sampleRate`: Same as `OpenStream` parameter of the same name.

Returns an error code.

3.6.11 `OpenStream(outputParameters as PortAudioStreamParametersMBS, sampleRate as Double, framesPerBuffer as Integer, streamFlags as Integer) as Integer`

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Opens a stream for either input, output or both.

Notes: `Sampleformat` is always 32bit float in this class. All data you add the queue is converted to float internally.

`outputParameters`: A object that describes the output parameters used by the opened stream. See `PortAudioStreamParametersMBS` for a description of these parameters.

`sampleRate`: The desired `sampleRate`. For full-duplex streams it is the sample rate for both input and output

`framesPerBuffer`: The number of frames passed to the stream callback function, or the preferred block granularity for a blocking read/write stream. The special value `paFramesPerBufferUnspecified` (0) may be used to request that the stream callback will receive an optimal (and possibly varying) number of frames based on host requirements and the requested latency settings.

Note: With some host APIs, the use of non-zero `framesPerBuffer` for a callback stream may introduce an additional layer of buffering which could introduce additional latency. `PortAudio` guarantees that the additional latency will be kept to the theoretical minimum however, it is strongly recommended that a non-zero `framesPerBuffer` value only be used when your algorithm requires a fixed number of frames per stream callback.

```
const paFramesPerBufferUnspecified=0
```

streamFlags: Flags which modify the behaviour of the streaming process. This parameter may contain a combination of flags ORed together. Some flags may only be relevant to certain buffer formats.

const paNoFlag	= 0	no flags
const paClipOff	= 1	Disable default clipping of out of range samples.
const paDitherOff	= 2	Flag requests that where possible a full duplex stream will not discard overflowed input samples without calling the stream callback. This flag is only valid for full duplex callback streams and only when used in combination with the paFramesPerBufferUnspecified (0) framesPerBuffer parameter. Using this flag incorrectly results in a paInvalidFlag error being returned from OpenStream and OpenDefaultStream.
const paNeverDropInput	= 4	Flag requests that where possible a full duplex stream will not discard overflowed input samples without calling the stream callback. This flag is only valid for full duplex callback streams and only when used in combination with the paFramesPerBufferUnspecified (0) framesPerBuffer parameter. Using this flag incorrectly results in a paInvalidFlag error being returned from OpenStream and OpenDefaultStream.
const paPrimeOutputBuffersUsingStreamCallback	= 8	Call the stream callback to fill initial output buffers, rather than the default behavior of priming the buffers with zeros (silence). This flag has no effect for input-only and blocking read/write streams.

Upon success `OpenStream()` returns `paNoError` and places a pointer to a valid `PaStream` in the stream argument. The stream is inactive (stopped).

If a call to `OpenStream()` fails, a non-zero error code is returned (see `PaError` for possible error codes) and the value of stream is invalid.

3.6.12 PlayAudio(Data as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, BitSize as Integer=16, ClearBuffers as boolean=false) as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Adds audio to the queue and starts playback.

Notes: Data: a memoryblock with the sound data

offsetBytes: the number of the bytes to start playing (0=first)

countBytes: the number of bytes to play from offset. If countBytes is zero, the memoryblock's size property is used.

You need to set `numOutputChannels` to 1 or 2 when opening the stream. For 2 channels, sound data must be interleaved.

Values for bitsize:

This method copies the data to the internal queue. It returns directly.

- 7 signed byte
- 8 unsigned byte
- 15 signed short
- 16 unsigned short
- 24 unsigned medium
- 31 signed integer
- 32 unsigned integer

If `ClearBuffers` is true, the buffer list will be cleared before this new data is added. This allows to have the next minute in the buffers and still do a change in the stream quick.

3.6.13 PlayAudioStereo(Data1 as memoryblock, Data2 as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, BitSize as Integer=16, ClearBuffers as boolean=false) as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Adds audio to the queue and starts playback.

Notes: This is a special version of `AddAudio` which takes samples from both memoryblocks and interleaves them.

Data1: a memoryblock with the sound data

Data2: a memoryblock with the sound data

offsetBytes: the number of the bytes to start playing (0=first)

countBytes: the number of bytes to play from offset. If countBytes is zero, the memoryblock's size property is used.

The stream must use 2 channels for this method to work correctly.

Values for bitsize:

This method copies the data to the internal queue. It returns directly.

If `ClearBuffers` is true, the buffer list will be cleared before this new data is added. This allows to have the next minute in the buffers and still do a change in the stream quick. #

7	signed byte
8	unsigned byte
15	signed short
16	unsigned short
24	unsigned medium
31	signed integer
32	unsigned integer

3.6.14 PlayFloatAudio(FloatData as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, ClearBuffers as boolean=false) as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Adds audio to the queue and starts playback.

Notes: FloatData: a memoryblock with the sound data filled with single values.

offsetBytes: the number of the bytes to start playing (0=first)

countBytes: the number of bytes to play from offset. If countBytes is zero, the memoryblock's size property is used.

You need to set numOutputChannels to 1 or 2 when opening the stream. For 2 channels, sound data must be interleaved.

The samples are stored in 32bit float values (memoryblock.SingleValue)

This method copies the data to the internal queue. It returns directly.

If ClearBuffers is true, the buffer list will be cleared before this new data is added. This allows to have the next minute in the buffers and still do a change in the stream quick.##

3.6.15 PlayFloatAudioStereo(FloatData1 as memoryblock, FloatData2 as memoryblock, offsetBytes as Integer=0, countBytes as Integer=0, ClearBuffers as boolean=false) as boolean

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Adds audio to the queue and starts playback.

Notes: This is a special version of AddFloatAudio which takes samples from both memoryblocks and interleaves them.

FloatData1: a memoryblock with the sound data filled with single values.

FloatData2: a memoryblock with the sound data filled with single values.

offsetBytes: the number of the bytes to start playing (0=first)

countBytes: the number of bytes to play from offset. If countBytes is zero, the memoryblock's size property is used.

The samples are stored in 32bit float values (memoryblock.SingleValue)

This method copies the data to the internal queue. It returns directly.

The stream must use 2 channels for this method to work correctly.

If ClearBuffers is true, the buffer list will be cleared before this new data is added. This allows to have the next minute in the buffers and still do a change in the stream quick.

3.6.16 Properties

3.6.17 HadUnderflow as Boolean

Plugin Version: 7.5, Platforms: macOS, Linux, Windows, Targets: All.

Function: A flag set if a data underflow was found while NoUnderflow is true.

Notes: You may want to set this to false after your application recovered from a data underflow.
(Read and Write property)

3.6.18 NoUnderflow as Boolean

Plugin Version: 7.5, Platforms: macOS, Linux, Windows, Targets: All.

Function: Whether underflows should be prevented.

Notes: If no audio data is there and NoUnderflow=true, the flag HadUnderflow is set to true and 0 values (Silence) is played.

Switching from sound to no sound and back may add some noise.

(Read and Write property)

3.6.19 OutputPosition as Double

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: The current position in the playing stream.

Notes: May point between samples.

(Read only property)

3.6.20 OutputPositionRelative as Double

Plugin Version: 7.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: The current position in the playing buffer.

Notes: May point between samples.

Will reset to 0 when a new buffer is used.

(Read only property)

3.6.21 Events

3.6.22 Finished

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: .

Function: This event is implemented by PortAudio clients.

Notes: Once registered they are called when the stream becomes inactive (ie once a call to Stop() will not block).

A stream will become inactive after the stream callback returns non-zero, or when Stop or Abort is called. For a stream providing audio output, if the stream callback returns paComplete, or Stop is called, the stream finished callback will not be called until all generated sample data has been played.

3.7 class PortAudioStreamInfoMBS

3.7.1 class PortAudioStreamInfoMBS

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: A class to hold time information of the current stream.

Notes: This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

Blog Entries

- [MBS Real Studio Plugins, version 12.1pr1](#)

3.7.2 Methods

3.7.3 Constructor

Plugin Version: 12.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The private constructor.

3.7.4 Properties

3.7.5 InputLatency as Double

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The input latency of the stream in seconds.

Notes: This value provides the most accurate estimate of input latency available to the implementation. It may differ significantly from the suggestedLatency value passed to `OpenStream()`.

The value of this field will be zero (0.) for output-only streams.

(Read only property)

3.7.6 OutputLatency as Double

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The output latency of the stream in seconds.

Notes: This value provides the most accurate estimate of output latency available to the implementation. It may differ significantly from the suggestedLatency value passed to `OpenStream()`.

The value of this field will be zero (0.) for input-only streams.

(Read only property)

3.7.7 SampleRate as Double

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The sample rate of the stream in Hertz (samples per second).

Notes: In cases where the hardware sample rate is inaccurate and PortAudio is aware of it, the value of this field may be different from the sampleRate parameter passed to `OpenStream()`. If information about the actual hardware sample rate is not available, this field will have the same value as the sampleRate parameter passed to `OpenStream()`.

(Read only property)

3.8 class PortAudioStreamMBS

3.8.1 class PortAudioStreamMBS

Plugin Version: 6.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: A single PortAudioStreamMBS can provide multiple channels of real-time streaming audio input and output to a client application.

Notes: A stream provides access to audio hardware represented by one or more devices. Depending on the underlying Host API, it may be possible to open multiple streams using the same device, however this behavior is implementation defined. Portable applications should assume that a device may be simultaneously used by at most one PortAudioStreamMBS.

You can use this class in two ways:

- with Callback event: Get event call when new data is needed or received.
- without Callback event: Use read/write methods to access buffers and move samples.

Subclass of the PortAudioStreamBaseMBS class.

Blog Entries

- [MBS Xojo Plugins, version 20.1pr4](#)
- [MBS Xojo Plugins, version 20.1pr1](#)
- [MBS Xojo Plugins, version 19.2pr3](#)

3.8.2 Methods

3.8.3 Constructor

Plugin Version: 20.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The constructor.

3.8.4 OpenDefaultStream(numInputChannels as Integer, numOutputChannels as Integer, sampleFormat as Integer, sampleRate as Double, framesPerBuffer as Integer, Flags as Integer) as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: A simplified version of OpenStream() that opens the default input and/or output devices.

Notes: numInputChannels: The number of channels of sound that will be supplied to the stream callback

or returned by `ReadStream`. It can range from 1 to the value of `maxInputChannels` in the `PaDeviceInfo` record for the default input device. If 0 the stream is opened as an output-only stream.

`numOutputChannels`: The number of channels of sound to be delivered to the stream callback or passed to `Write`. It can range from 1 to the value of `maxOutputChannels` in the `PaDeviceInfo` record for the default output device. If 0 the stream is opened as an output-only stream.

`sampleFormat`: The sample format of both the input and output buffers provided to the callback or passed to and from `Read` and `Write`.

`sampleFormat` may be any of the formats described by the `PaSampleFormat` enumeration.

`sampleRate`: Same as `OpenStream` parameter of the same name.

`framesPerBuffer`: Same as `OpenStream` parameter of the same name.

constants for the flags value:

<code>const paNoFlag</code>	= 0	no flags
<code>const paClipOff</code>	= 1	Disable default clipping of out of range samples.
<code>const paDitherOff</code>	= 2	Flag requests that where possible a full duplex stream will not discard overflowed input samples without calling the stream callback. This flag is only valid for full duplex callback streams and only when used in combination with the <code>paFramesPerBufferUnspecified</code> (0) <code>framesPerBuffer</code> parameter. Using this flag incorrectly results in a <code>paInvalidFlag</code> error being returned from <code>OpenStream</code> and <code>OpenDefaultStream</code> .
<code>const paNeverDropInput</code>	= 4	Flag requests that where possible a full duplex stream will not discard overflowed input samples without calling the stream callback. This flag is only valid for full duplex callback streams and only when used in combination with the <code>paFramesPerBufferUnspecified</code> (0) <code>framesPerBuffer</code> parameter. Using this flag incorrectly results in a <code>paInvalidFlag</code> error being returned from <code>OpenStream</code> and <code>OpenDefaultStream</code> .
<code>const paPrimeOutputBuffersUsingStreamCallback</code>	= 8	Call the stream callback to fill initial output buffers, rather than the default behavior of priming the buffers with zeros (silence). This flag has no effect for input-only and blocking read/write streams.

Returns an error code.

3.8.5 `OpenStream(inputParameters as PortAudioStreamParametersMBS, outputParameters as PortAudioStreamParametersMBS, sampleRate as Double, framesPerBuffer as Integer, streamFlags as Integer) as Integer`

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Opens a stream for either input, output or both.

Notes: `inputParameters`: A object that describes the input parameters used by the opened stream. See `PortAudioStreamParametersMBS` for a description of these parameters. `inputParameters` must be nil for output-only streams.

outputParameters: A object that describes the output parameters used by the opened stream. See PortAudioStreamParametersMBS for a description of these parameters. outputParameters must be nil for input-only streams.

sampleRate: The desired sampleRate. For full-duplex streams it is the sample rate for both input and output

framesPerBuffer: The number of frames passed to the stream callback function, or the preferred block granularity for a blocking read/write stream. The special value paFramesPerBufferUnspecified (0) may be used to request that the stream callback will receive an optimal (and possibly varying) number of frames based on host requirements and the requested latency settings.

Note: With some host APIs, the use of non-zero framesPerBuffer for a callback stream may introduce an additional layer of buffering which could introduce additional latency. PortAudio guarantees that the additional latency will be kept to the theoretical minimum however, it is strongly recommended that a non-zero framesPerBuffer value only be used when your algorithm requires a fixed number of frames per stream callback.

const paFramesPerBufferUnspecified=0

streamFlags: Flags which modify the behaviour of the streaming process. This parameter may contain a combination of flags ORed together. Some flags may only be relevant to certain buffer formats.

const paNoFlag	= 0	no flags
const paClipOff	= 1	Disable default clipping of out of range samples.
const paDitherOff	= 2	Flag requests that where possible a full duplex stream will not discard overflowed input samples without calling the stream callback. This flag is only valid for full duplex callback streams and only when used in combination with the paFramesPerBufferUnspecified (0) framesPerBuffer parameter. Using this flag incorrectly results in a paInvalidFlag error being returned from OpenStream and OpenDefaultStream.
const paNeverDropInput	= 4	Flag requests that where possible a full duplex stream will not discard overflowed input samples without calling the stream callback. This flag is only valid for full duplex callback streams and only when used in combination with the paFramesPerBufferUnspecified (0) framesPerBuffer parameter. Using this flag incorrectly results in a paInvalidFlag error being returned from OpenStream and OpenDefaultStream.
const paPrimeOutputBuffersUsingStreamCallback	= 8	Call the stream callback to fill initial output buffers, rather than the default behavior of priming the buffers with zeros (silence). This flag has no effect for input-only and blocking read/write streams.

If this the callback event is left empty the stream will be opened in 'blocking read/write' mode. In blocking mode, the client can receive sample data using Read and write sample data using Write, the number of samples that may be read or written without blocking is returned by ReadAvailable and WriteAvailable respectively.

Upon success OpenStream() returns paNoError and places a pointer to a valid PaStream in the stream

argument. The stream is inactive (stopped).

If a call to `OpenStream()` fails, a non-zero error code is returned (see `PaError` for possible error codes) and the value of `stream` is invalid.

3.8.6 Events

3.8.7 Callback(`InputBuffer` as `memoryblock`, `outputBuffer` as `memoryblock`, `FrameCount` as `Integer`, `inputBufferAdcTime` as `Double`, `currentTime` as `Double`, `outputBufferDacTime` as `Double`, `statusFlags` as `Integer`) as `Integer`

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: .

Function: The event called when new data is needed or received.

Notes: This event is implemented by `PortAudio` clients. They consume, process or generate audio in response to requests from an active `PortAudio` stream.

`InputBuffer` and `outputBuffer` are arrays of interleaved samples, the format, packing and number of channels used by the buffers are determined by parameters to `OpenStream()`.

`frameCount`: The number of sample frames to be processed by the stream callback.

`inputBufferAdcTime`, `currentTime` and `outputBufferDacTime`: The time in seconds when the first sample of the input buffer was received at the audio input, the time in seconds when the first sample of the output buffer will begin being played at the audio output, and the time in seconds when the stream callback was called.

`statusFlags`: Flags indicating whether input and/or output buffers have been inserted or will be dropped to overcome underflow or overflow conditions.

Returns the stream callback should return one of the values in the `PaStreamCallbackResult` enumeration. To ensure that the callback continues to be called, it should return `paContinue` (0). Either `paComplete` or `paAbort` can be returned to finish stream processing, after either of these values is returned the callback will not be called again. If `paAbort` is returned the stream will finish as soon as possible. If `paComplete` is returned, the stream will continue until all buffers generated by the callback have been played.

This may be useful in applications such as soundfile players where a specific duration of output is required. However, it is not necessary to utilise this mechanism as `Stop()`, `Abort()` or `Close()` can also be used to stop the stream. The callback must always fill the entire output buffer irrespective of its return value.

With the exception of `CpuLoad()` it is not permissible to call `PortAudio` API functions from within the stream callback.

Flag bit constants for the `statusFlags` to `Callback`:

paInputUnderflow = 1

In a stream opened with paFramesPerBufferUnspecified, indicates that input data is all silence (zeros) because no real data is available. In a stream opened without paFramesPerBufferUnspecified, it indicates that one or more zero samples have been inserted into the input buffer to compensate for an input underflow.

paInputOverflow = 2

In a stream opened with paFramesPerBufferUnspecified, indicates that data prior to the first sample of the input buffer was discarded due to an overflow, possibly because the stream callback is using too much CPU time. Otherwise indicates that data prior to one or more samples in the input buffer was discarded.

paOutputUnderflow = 4

Indicates that output data (or a gap) was inserted, possibly because the stream callback is using too much CPU time.

paOutputOverflow = 8

Indicates that output data will be discarded because no room is available.

paPrimingOutput = 16

Some of all of the output data will be used to prime the stream, input data may be zero.

Allowable return values for the callback: (PaStreamCallbackResult)

```
const paContinue    = 0
const paComplete   = 1
const paAbort      = 2
```

3.8.8 Finished

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: .

Function: This event is implemented by PortAudio clients.

Notes: Once registered they are called when the stream becomes inactive (ie once a call to Stop() will not block).

A stream will become inactive after the stream callback returns non-zero, or when Stop or Abort is called. For a stream providing audio output, if the stream callback returns paComplete, or Stop is called, the stream finished callback will not be called until all generated sample data has been played.

3.9 class PortAudioStreamParametersMBS

3.9.1 class PortAudioStreamParametersMBS

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Parameters for one direction (input or output) of a stream.

Blog Entries

- [MBS Xojo Plugins, version 20.1pr6](#)

3.9.2 Properties

3.9.3 ASIOFlags as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The flags for ASIO stream.

Notes: Can include kAsioUseChannelSelectors constant.

(Read and Write property)

3.9.4 ChannelCount as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The requested channel count.

Notes: The number of channels of sound to be delivered to the stream callback or accessed by Read() or Write(). It can range from 1 to the value of maxInputChannels in the DeviceInfo object for the device specified by the device parameter.

(Read and Write property)

3.9.5 Device as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The device ID to be used.

Notes: A valid device index in the range 0 to (PortAudioMBS.CountDevices-1) specifying the device to be used or the special constant paUseHostApiSpecificDeviceSpecification which indicates that the actual device(s) to use are specified in hostApiSpecificStreamInfo.

This field must not be set to paNoDevice (-1).

(Read and Write property)

3.9.6 MacCoreAudioChannelMapSize as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Channel map for HAL channel mapping.

Notes: Should be number of values.

(Read and Write property)

3.9.7 MacCoreAudioFlags as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The flags for CoreAudio.

Notes: (Read and Write property)

3.9.8 SampleFormat as Integer

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The sample format of the buffer provided to the stream callback, Read() or Write().

Notes: Constants for sample format:

```
const paFloat32      = 1
const paInt32        = 2
const paInt24        = 4
const paInt16        = 8
const paInt8         = 16
const paUInt8        = 32
const paCustomFormat = 65536
const paNonInterleaved = negative sign
```

The standard formats paFloat32, paInt16, paInt32, paInt24, paInt8 and aUInt8 are usually implemented by all implementations.

The floating point representation (paFloat32) uses +1.0 and -1.0 as the maximum and minimum respectively.

paUInt8 is an unsigned 8 bit format where 128 is considered "ground"

The paNonInterleaved flag indicates that a multichannel buffer is passed as a set of non-interleaved pointers. (Read and Write property)

3.9.9 SuggestedLatency as Double

Plugin Version: 7.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The desired latency in seconds.

Notes: Where practical, implementations should configure their latency based on these parameters, otherwise they may choose the closest viable latency instead. Unless the suggested latency is greater than the absolute upper limit for the device implementations should round the suggestedLatency up to the next practical value - ie to provide an equal or higher latency than suggestedLatency wherever possible.

Actual latency values for an open stream may be retrieved using the inputLatency and outputLatency fields of the PortAudioStreamInfoMBS object returned by PortAudioStreamMBS.Info().

(Read and Write property)

3.9.10 WASChannelMask as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Support for WAVEFORMATEXTENSIBLE channel masks.

Notes: If flags contains kWinWasapiUseChannelMask this allows you to specify which speakers to address in a multichannel stream. Will be used only if kWinWasapiUseChannelMask flag is specified.

See kWinChannelMask* constants.

(Read and Write property)

3.9.11 WASFlags as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The flags.

Notes: Can be e.g. kWinWasapiUseChannelMask to use channel mask.

(Read and Write property)

3.9.12 WASStreamCategory as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Stream category.

Notes: See constants.

(Read and Write property)

3.9.13 WASStreamOption as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Stream option.

Notes: See constants.

(Read and Write property)

3.9.14 WASThreadPriority as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Specifies thread priority explicitly. Will be used only if paWinWasapiThreadPriority flag is specified.

Notes: Please note, if Input/Output streams are opened simultaneously (Full-Duplex mode) you shall specify same value for threadPriority or otherwise one of the values will be used to setup thread priority.

(Read and Write property)

3.9.15 WinDirectSoundChannelMask as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The channel mask.

Notes: support for WAVEFORMATEXTENSIBLE channel masks. If flags contains kWinDirectSoundUseChannelMask this allows you to specify which speakers to address in a multichannel stream.

See kWinChannelMask* constants.

(Read and Write property)

3.9.16 WinDirectSoundFlags as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The flags for Direct Sound.

Notes: Enable other features of this parameters.

(Read and Write property)

3.9.17 WinDirectSoundFramesPerBuffer as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Low-level latency setting support.

Notes: Sets the size of the DirectSound host buffer.

When `flags` contains the `kWinDirectSoundUseLowLevelLatencyParameters` this size will be used instead of interpreting the generic latency parameters to `Pa_OpenStream()`. If the flag is not set this value is ignored.

If the stream is a full duplex stream the implementation requires that the values of `framesPerBuffer` for input and output match (if both are specified).

(Read and Write property)

3.9.18 WinMMEBufferCount as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Number of buffers.

Notes: (Read and Write property)

3.9.19 WinMMEChannelMask as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The channel mask.

Notes: Support for `WAVEFORMATEXTENSIBLE` channel masks. If `flags` contains `kWinMmeUseChannelMask` this allows you to specify which speakers to address in a multichannel stream.

See `kWinChannelMask*` constants.

(Read and Write property)

3.9.20 WinMMEDeviceCount as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The device count.

Notes: (Read and Write property)

3.9.21 WinMMEFlags as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The field for flags for Win MME.

Notes: (Read and Write property)

3.9.22 WinMMEFramesPerBuffer as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Low-level latency setting support.

Notes: These settings control the number and size of host buffers in order to set latency. They will be used instead of the generic parameters to `OpenStream()` if flags contains the `kWinMmeUseLowLevelLatencyParameters` flag.

If `PortAudioStreamParametersMBS` object with `kWinMmeUseLowLevelLatencyParameters` are supplied for both input and output in a full duplex stream, then the input and output `framesPerBuffer` must be the same, or the larger of the two must be a multiple of the smaller, otherwise a `kErrorIncompatibleHostApiSpecificStreamInfo` error will be returned from `OpenStream()`.

(Read and Write property)

3.9.23 WinWDMKSChannelMask as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The channel mask for WDM/KS.

Notes: If `kWinWDMKSUseGivenChannelMask` bit is set in flags, use this as `channelMask` instead of default.

See `kWinChannelMask*` constants.

(Read and Write property)

3.9.24 WinWDMKSFlags as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Flags indicate which fields are valid.

Notes: (Read and Write property)

3.9.25 WinWDMKSNoOfPackets as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The number of packets to use for `WaveCyclic` devices, range is [2, 8] .

Notes: Set to zero for default value of 2.

(Read and Write property)

3.9.26 ASIOChannelSelectors(Index as Integer) as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Support for opening only specific channels of an ASIO device.

Notes: If the `kAsioUseChannelSelectors` flag is set, `channelSelectors` is a pointer to an array of integers specifying the device channels to use.

When used, the length of the `channelSelectors` array must match the corresponding `channelCount` parameter to `OpenStream()` otherwise a crash may result.

The values in the selectors array must specify channels within the range of supported channels for the device or `kErrorInvalidChannelCount` will result.

(Read and Write computed property)

3.9.27 MacCoreAudioChannelMap(Index as Integer) as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Channel map size for HAL channel mapping.

Example:

```
Dim pasp As New PortAudioStreamParametersMBS
pasp.ChannelCount = 1 // we produce one channel
pasp.MacCoreAudioChannelMap(0) = 0 // put our mono channel on Left
pasp.MacCoreAudioChannelMap(1) = 0 // put our mono channel on Right
pasp.MacCoreAudioChannelMapSize = 2
```

Notes: This property is used to map input channels from an input (source) to a destination. The number of channels represented in the channel map is the number of channels of the destination. The channel map entries contain a channel number of the source that should be mapped to that destination channel. If -1 is specified, then that destination channel will not contain any channel from the source (so it will be silent)

Please set `MacCoreAudioChannelMapSize` to make this map to have effect.

(Read and Write computed property)

3.9.28 WinMMEDevicesChannelCount(Index as Integer) as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Multiple devices per direction support.

Notes: If flags contains the PaWinMmeUseMultipleDevices flag, this functionality will be used, otherwise the device parameter to `OpenStream()` will be used instead.

If devices are specified here, the corresponding device parameter to `OpenStream()` should be set to `kUseHostApiSpecificDeviceSpecification`, otherwise an `kErrorInvalidDevice` error will result.

The total number of channels accross all specified devices must agree with the corresponding `channelCount` parameter to `OpenStream()` otherwise a `kErrorInvalidChannelCount` error will result.

Please always set `WinMMEDevicesChannelCount` and `WinMMEDevicesDevice` together.
(Read and Write computed property)

3.9.29 WinMMEDevicesDevice(Index as Integer) as Integer

Plugin Version: 20.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Multiple devices per direction support.

Notes: If flags contains the PaWinMmeUseMultipleDevices flag, this functionality will be used, otherwise the device parameter to `OpenStream()` will be used instead.

If devices are specified here, the corresponding device parameter to `OpenStream()` should be set to `kUseHostApiSpecificDeviceSpecification`, otherwise an `kErrorInvalidDevice` error will result.

The total number of channels accross all specified devices must agree with the corresponding `channelCount` parameter to `OpenStream()` otherwise a `kErrorInvalidChannelCount` error will result.

Please always set `WinMMEDevicesChannelCount` and `WinMMEDevicesDevice` together.
(Read and Write computed property)

3.9.30 Constants

Constants

Constant	Value	Description
<code>kAsioUseChannelSelectors</code>	1	One of the ASIO flags. Set to enable channel selectors.

Stream Category

Constant	Value	Description
kWASAudioCategoryAlerts	4	Alert sounds.
kWASAudioCategoryCommunications	3	Real-time communications, such as VOIP or chat.
kWASAudioCategoryGameChat	8	Game chat audio. Similar to kWASAudioCategoryCommunications except kWASAudioCategoryGameChat will not attenuate other streams.
kWASAudioCategoryGameEffects	6	Game sound effects.
kWASAudioCategoryGameMedia	7	Background audio for games.
kWASAudioCategoryMedia	11	Stream that includes audio without dialog.
kWASAudioCategoryMovie	10	Stream that includes audio with dialog.
kWASAudioCategoryOther	0	Other audio stream.
kWASAudioCategorySoundEffects	5	Sound effects.
kWASAudioCategorySpeech	9	Speech.

WAS Flags

Constant	Value	Description
kWASFlagExclusive	1	Puts WASAPI into exclusive mode.
kWASFlagPolling	8	selects non-Event driven method of data read/write Note: WASAPI Event driven core is capable of 2ms latency!!!, but Polling method can only provide 15-20ms latency.
kWASFlagRedirectHostProcessor	2	Allows to skip internal PA processing completely.
kWASFlagThreadPriority	16	forces custom thread priority setting, must be used if kWasapiStream-Info::threadPriority is set to a custom value.
kWASFlagUseChannelMask	4	Assigns custom channel mask.

Stream Options

Constant	Value	Description
kWASStreamOptionMatchFormat	2	Force WASAPI Audio Engine into a stream format, supported since Windows 10
kWASStreamOptionNone	0	Default
kWASStreamOptionRaw	1	Bypass WASAPI Audio Engine DSP effects, supported since Windows 8.1

Thread Priorities

Constant	Value	Description
kWASThreadPriorityAudio	1	Audio. Default for Shared mode.
kWASThreadPriorityCapture	2	Capture
kWASThreadPriorityDistribution	3	Distribution
kWASThreadPriorityGames	4	Games
kWASThreadPriorityNone	0	
kWASThreadPriorityPlayback	5	Playback
kWASThreadPriorityProAudio	6	ProAudio. Default for Exclusive mode.
kWASThreadPriorityWindowManager	7	Window Manager

Windows Channel Mask

Constant	Value	Description
kWinChannelMask5Point1	63	5.1 Speakers without side speakers.
kWinChannelMask5Point1Surround	1551	5.1 Speakers with side speakers.
kWinChannelMask7Point1	255	7.1 Speakers without side speakers.
kWinChannelMask7Point1Surround	1599	7.1 Speakers with side speakers.
kWinChannelMaskAll	2147483648	Used to specify that any possible permutation of speaker configuration is possible.
kWinChannelMaskBackCenter	256	Back Center.
kWinChannelMaskBackLeft	16	Back Left.
kWinChannelMaskBackRight	32	Back Right.
kWinChannelMaskDirectout	0	no speakers
kWinChannelMaskFrontCenter	4	Front center.
kWinChannelMaskFrontLeft	1	Front left
kWinChannelMaskFrontLeftOfCenter	64	Front Left or Center.
kWinChannelMaskFrontRight	2	Front right.
kWinChannelMaskFrontRightOfCenter	128	Front Right or Center.
kWinChannelMaskGroundFrontCenter	4	DVD Speaker Positions: Ground Front Center
kWinChannelMaskGroundFrontLeft	1	DVD Speaker Positions: Ground Front Left
kWinChannelMaskGroundFrontRight	2	DVD Speaker Positions: Ground Front Right
kWinChannelMaskGroundRearLeft	16	DVD Speaker Positions: Ground Rear Left
kWinChannelMaskGroundRearRight	32	DVD Speaker Positions: Ground Rear Right
kWinChannelMaskLowFrequency	8	Low frequency speaker (bass)
kWinChannelMaskMono	4	Mono goes to center speaker, or if not available to left and right.
kWinChannelMaskQuad	51	Left and right in front and back.
kWinChannelMaskReserved	2147221504	Bit mask locations reserved for future use.
kWinChannelMaskSideLeft	512	Side speaker on left
kWinChannelMaskSideRight	1024	Side speaker on right.
kWinChannelMaskStereo	3	Left and right speakers.
kWinChannelMaskSuperWoofer	8	DVD Speaker Positions: Super Woofer
kWinChannelMaskSurround	263	Front left and right, front and back center.
kWinChannelMaskTopBackCenter	65536	Top back center.
kWinChannelMaskTopBackLeft	32768	Top back left.
kWinChannelMaskTopBackRight	131072	Top back right.
kWinChannelMaskTopCenter	2048	Top center
kWinChannelMaskTopFrontCenter	8192	Top front center
kWinChannelMaskTopFrontLeft	4096	Top front left.
kWinChannelMaskTopFrontRight	16384	Top front right.
kWinChannelMaskTopMiddle	2048	DVD Speaker Positions: Top Middle

Direct Sound Flags

Constant	Value	Description
kWinDirectSoundUseChannelMask	4	The flag indicates that the WinDirectSoundChannelMask field is set.
kWinDirectSoundUseLowLevelLatencyParameters	1	Indicates WinDirectSoundFramesPerBuffer field is set.

Win MME Flags

Constant	Value	Description
kWinMmeDontThrottleOverloadedProcessingThread	8	By default, the mme implementation drops the processing to <code>THREAD_PRIORITY_NORMAL</code> and sleeps the thread if the CPU usage exceeds 100%. This flag disables any priority throttling. The thread will always run at <code>THREAD_PRIORITY_TIME_CRITICAL</code> .
kWinMmeUseChannelMask	4	Use channel mask.
kWinMmeUseLowLevelLatencyParameters	1	Use low level latency.
kWinMmeUseMultipleDevices	2	Use multiple devices.
kWinMmeWaveFormatDolbyAc3Spdif	16	Flags for non-PCM spdif passthrough.
kWinMmeWaveFormatWmaSpdif	32	Flags for non-PCM spdif passthrough.

Flags for Win WDM/KS

Constant	Value	Description
kWinWDMKSOverrideFramesize	1	Makes WDMKS use the supplied latency figures instead of relying on the framesize reported by the WaveCyclic device. Use at own risk!
kWinWDMKSUseGivenChannelMask	2	Makes WDMKS (output stream) use the given channelMask instead of default.

Sample Formats

Constant	Value	Description
paCustomFormat	65536	Custom format. Not supported by plugin.
paFloat32	1	Uses +1.0 and -1.0 as the maximum and minimum respectively.
paInt16	8	Signed 16 bit.
paInt24	4	Packed 24 bit format
paInt32	2	Signed 32 bit.
paInt8	16	8 bit integer.
paNonInterleaved	&h80000000	Non interleaved. The paNonInterleaved flag indicates that audio data is passed as an array of pointers to separate buffers, one buffer for each channel. Usually, when this flag is not used, audio data is passed as a single buffer with all channels interleaved.
paNonInterleavedFloat32	&h80000001	Non interleaved, Uses +1.0 and -1.0 as the maximum and minimum respectively.
paNonInterleavedInt16	&h80000008	Non interleaved, signed 16 bit.
paNonInterleavedInt24	&h80000004	Non interleaved, Packed 24 bit format
paNonInterleavedInt32	&h80000002	Non interleaved, signed 32 bit.
paNonInterleavedInt8	&h80000010	Non interleaved, 8 bit integer.
paNonInterleavedUInt8	&h80000020	Non interleaved, unsigned 8 bit format where 128 is considered "ground".
paUInt8	32	unsigned 8 bit format where 128 is considered "ground"

3.10 class PortAudioStreamRecorderMBS

3.10.1 class PortAudioStreamRecorderMBS

Plugin Version: 9.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: A portaudio stream class to use an internal buffer to record audio.

Notes: This class has a ring buffer to store the audio samples which they are being recorded. Your application can in a timer or thread process this samples.

Subclass of the PortAudioStreamBaseMBS class.

Blog Entries

- [MBS Xojo Plugins, version 24.1pr1](#)
- [MBS Xojo / Real Studio Plugins, version 16.1pr2](#)

3.10.2 Methods

3.10.3 Constructor(BufferSize as Integer)

Plugin Version: 9.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Creates a new object using a buffer of the given size.

Notes: The buffer must be a power of 2. For example one Megabyte (2^{20}). This defines the ring buffer used to buffer samples between data coming from sound device and you call ReadFrames method.

Automatically we take paFloat32 as format for sample buffer.

At 44100 Hz, and 4 bytes per value and 2 channels, you will need 352800 bytes per second on storage.

3.10.4 Flush

Plugin Version: 10.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Clears the buffer and discards all current samples.

3.10.5 OpenDefaultStream(numInputChannels as Integer, sampleRate as Double) as Integer

Plugin Version: 9.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: A simplified version of `OpenStream()` that opens the default input devices.

Notes: `Sampleformat` is always 32bit float in this class. (use `memoryblock.singlevalue`)

`numInputChannels`: The number of channels of sound to be delivered. It can range from 1 to the value of `maxInputChannels` in the `PortAudioDeviceInfoMBS` object for the default output device. If 0 the stream is opened as an output-only stream.

`sampleRate`: Same as `OpenStream` parameter of the same name.

Returns an error code.

Error -2 is from the plugin and reports that the buffer was not created before.

3.10.6 `OpenStream(inputParameters as PortAudioStreamParametersMBS, sampleRate as Double, framesPerBuffer as Integer, streamFlags as Integer) as Integer`

Plugin Version: 9.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Opens a stream for input.

Notes: `Sampleformat` is always 32bit float in this class. (use `memoryblock.singlevalue`)

`outputParameters`: A object that describes the input parameters used by the opened stream. See `PortAudioStreamParametersMBS` for a description of these parameters.

`sampleRate`: The desired `sampleRate`.

`framesPerBuffer`: The number of frames passed to the stream callback function, or the preferred block granularity for a blocking read/write stream. The special value `paFramesPerBufferUnspecified` (0) may be used to request that the stream callback will receive an optimal (and possibly varying) number of frames based on host requirements and the requested latency settings.

Note: With some host APIs, the use of non-zero `framesPerBuffer` for a callback stream may introduce an additional layer of buffering which could introduce additional latency. `PortAudio` guarantees that the additional latency will be kept to the theoretical minimum however, it is strongly recommended that a non-zero `framesPerBuffer` value only be used when your algorithm requires a fixed number of frames per stream callback.

`const paFramesPerBufferUnspecified=0`

`streamFlags`: Flags which modify the behaviour of the streaming process. This parameter may contain a combination of flags ORed together. Some flags may only be relevant to certain buffer formats.

const paNoFlag	= 0	no flags
const paClipOff	= 1	Disable default clipping of out of range samples.
const paDitherOff	= 2	Flag requests that where possible a full duplex stream will not discard overflowed input samples without calling the stream callback. This flag is only valid for full duplex callback streams and only when used in combination with the paFramesPerBufferUnspecified (0) framesPerBuffer parameter. Using this flag incorrectly results in a paInvalidFlag error being returned from OpenStream and OpenDefaultStream.
const paNeverDropInput	= 4	Call the stream callback to fill initial output buffers, rather than the default behavior of priming the buffers with zeros (silence). This flag has no effect for input-only and blocking read/write streams.
const paPrimeOutputBuffersUsingStreamCallback	= 8	Call the stream callback to fill initial output buffers, rather than the default behavior of priming the buffers with zeros (silence). This flag has no effect for input-only and blocking read/write streams.

Upon success `OpenStream()` returns `paNoError` and places a pointer to a valid `PaStream` in the stream argument. The stream is inactive (stopped).

If a call to `OpenStream()` fails, a non-zero error code is returned (see `PaError` for possible error codes) and the value of stream is invalid.

Error -2 is from the plugin and reports that the buffer was not created before.

3.10.7 ReadFrames(mem as memoryblock, SizeInBytes as Integer) as Integer

Plugin Version: 9.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Reads frames into the memoryblock.

Example:

```
dim s as PortAudioStreamRecorderMBS
```

```
dim m as memoryblock
```

```
m=newmemoryblock(1024*1024)
```

```
// initialize
```

```
dim frames as Integer
```

```
frames=s.ReadFrames(m,m.size)
```

```
msgbox "we got "+str(frames)+" frames."
```

Notes: You pass a memoryblock and the size of this memoryblock in bytes.

Values are stored in floats (`memoryblock.singlevalue`) so you get at maximum `SizeInBytes/4` values. And if you use more than one channel, you will receive them interleaved.

`ReadFrames` uses a mutex to access share data, so this call is expensive. Use a big buffer.

3.10.8 ResizeBuffer(BufferSize as Integer)

Plugin Version: 9.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Resizes the buffer.

Notes: Do not resize while you are recording (this can crash).

The buffer must be a power of 2. For example one Megabyte (2^{20}).

At 44100 Hz, and 4 bytes per value and 2 channels, you will need 352800 bytes per second on storage.

3.10.9 Properties

3.10.10 Buffer as Memoryblock

Plugin Version: 10.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Returns a memoryblock which points to the ring buffer used in the recorder object.

Notes: This memoryblock has no size.

It is only for debugging and only valid as long as the PortAudioStreamRecorderMBS object is living.
(Read only property)

3.10.11 BufferReadIndex as Integer

Plugin Version: 10.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The read index inside the ring buffer.

Notes: Only for debugging.

(Read only property)

3.10.12 BufferSize as Integer

Plugin Version: 10.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The size of the ring buffer in bytes.

Notes: (Read only property)

3.10.13 BufferWriteIndex as Integer

Plugin Version: 10.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The write index inside the ring buffer.

Notes: Only for debugging.

(Read only property)

3.10.14 FramesAvailable as Integer

Plugin Version: 9.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The number of frames available in the buffer.

Notes: FramesAvailable uses a mutex to access share data, so this call is expensive. Do not call it to decide whether to call ReadFrames. ReadFrames calls FramesAvailable itself.

(Read only property)

3.10.15 NumInputChannels as Integer

Plugin Version: 9.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The number of input channels used with the OpenStream function.

Notes: (Read only property)

3.11 class WindowsAudioMixerMBS

3.11.1 class WindowsAudioMixerMBS

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: The Windows Audio Mixer is a device to control the volume and mute state of all attached audio devices.

Notes: Not all devices are present on all Windows machines.

What device is source and destination is a bit unlogic from Microsoft.

3.11.2 Methods

3.11.3 DeviceCount as Integer

Plugin Version: 7.0, Platform: Windows, Targets: All.

Function: Number of Mixer devices found in the system.

3.11.4 DeviceName(index as Integer) as string

Plugin Version: 7.0, Platform: Windows, Targets: All.

Function: Name of the device with the given index.

Notes: Index goes from 0 to DeviceCount-1.

Returns "" on invalid index.

3.11.5 Properties

3.11.6 DeviceIndex as Integer

Plugin Version: 7.0, Platform: Windows, Targets: All.

Function: The index of the current used device.

Notes: Default is 0.

(Read and Write property)

3.11.7 Lasterror as Integer

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: The last error code reported.

Notes: (Read and Write property)

3.11.8 DestinationDigitalMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether digital device is muted.

Notes: Audio line is a digital destination (for example, digital input to a DAT or CD audio device).

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.9 DestinationDigitalVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of digital device.

Notes: Audio line is a digital destination (for example, digital input to a DAT or CD audio device).

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.10 DestinationHeadPhonesMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether head phones are muted.

Notes: Audio line is an adjustable (gain and/or attenuation) destination intended to drive headphones.

Most audio cards use the same audio destination line for speakers and headphones, in which case the mixer device simply uses the DestinationSpeakers.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.11 DestinationHeadPhonesVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of head phones.

Notes: Audio line is an adjustable (gain and/or attenuation) destination intended to drive headphones. Most audio cards use the same audio destination line for speakers and headphones, in which case the mixer device simply uses the DestinationSpeakers.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.12 DestinationLineMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether line is muted.

Notes: Audio line is a line level destination (for example, line level input from a CD audio device) that will be the final recording source for the analog-to-digital converter (ADC). Because most audio cards for personal computers provide some sort of gain for the recording audio source line, the mixer device will use the DestinationWaveIn.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.13 DestinationLineVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of line.

Notes: Audio line is a line level destination (for example, line level input from a CD audio device) that will be the final recording source for the analog-to-digital converter (ADC). Because most audio cards for personal computers provide some sort of gain for the recording audio source line, the mixer device will use the DestinationWaveIn.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.14 DestinationMonitorMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether audio monitor is muted.

Notes: Audio line is a destination used for a monitor.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.15 DestinationMonitorVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of audio monitor.

Notes: Audio line is a destination used for a monitor.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.16 DestinationSpeakersMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether speakers are muted.

Notes: Audio line is an adjustable (gain and/or attenuation) destination intended to drive speakers. This is the typical component type for the audio output of audio cards for personal computers.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.17 DestinationSpeakersVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of speakers.

Notes: Audio line is an adjustable (gain and/or attenuation) destination intended to drive speakers. This is the typical component type for the audio output of audio cards for personal computers.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.18 DestinationTelephoneMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether telephone is muted.

Notes: Audio line is a destination that will be routed to a telephone line.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.19 DestinationTelephoneVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of telephone.

Notes: Audio line is a destination that will be routed to a telephone line.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.20 DestinationVoiceInMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether voice input is muted.

Notes: Audio line is a destination that will be the final recording source for voice input. This component type is exactly like DestinationWaveIn but is intended specifically for settings used during voice recording/recognition. Support for this line is optional for a mixer device. Many mixer devices provide only DestinationWaveIn.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.21 DestinationVoiceInVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of voice input.

Notes: Audio line is a destination that will be the final recording source for voice input. This component type is exactly like DestinationWaveIn but is intended specifically for settings used during voice recording/recognition. Support for this line is optional for a mixer device. Many mixer devices provide only DestinationWaveIn.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.22 DestinationWaveInMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether wave in is muted.

Notes: Audio line is a destination that will be the final recording source for the waveform-audio input (ADC). This line typically provides some sort of gain or attenuation. This is the typical component type for the recording line of most audio cards for personal computers.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.23 DestinationWaveInVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of wave input device.

Notes: Audio line is a destination that will be the final recording source for the waveform-audio input (ADC). This line typically provides some sort of gain or attenuation. This is the typical component type for the recording line of most audio cards for personal computers.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.24 SourceAnalogMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether analog device is muted.

Notes: Audio line is an analog source (for example, analog output from a video-cassette tape).

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.25 SourceAnalogVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of analog device.

Notes: Audio line is an analog source (for example, analog output from a video-cassette tape).

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.26 SourceAuxiliaryMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether auxiliary is muted.

Notes: Audio line is a source originating from the auxiliary audio line. This line type is intended as a source with gain or attenuation that can be routed to the DestinationSpeakers destination and/or recorded from the DestinationWaveIn destination.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.27 SourceAuxiliaryVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of auxiliary.

Notes: Audio line is a source originating from the auxiliary audio line. This line type is intended as a source with gain or attenuation that can be routed to the DestinationSpeakers destination and/or recorded from the DestinationWaveIn destination.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.28 SourceCompactDiscMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether the CD device is muted.

Notes: Audio line is a source originating from the output of an internal audio CD. This component type is provided for audio cards that provide an audio source line intended to be connected to an audio CD (or CD-ROM playing an audio CD).

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.29 SourceCompactDiscVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of CD device.

Notes: Audio line is a source originating from the output of an internal audio CD. This component type is provided for audio cards that provide an audio source line intended to be connected to an audio CD (or CD-ROM playing an audio CD).

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.30 SourceDigitalMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether digital is muted.

Notes: Audio line is a digital source (for example, digital output from a DAT or audio CD).

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.31 SourceDigitalVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of digital device.

Notes: Audio line is a digital source (for example, digital output from a DAT or audio CD).

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.32 SourceLineMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether line is muted.

Notes: Audio line is a line-level source (for example, line-level input from an external stereo) that can be used as an optional recording source. Because most audio cards for personal computers provide some sort

of gain for the recording source line, the mixer device will use the SourceAuxiliary type.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.33 SourceLineVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of line.

Notes: Audio line is a line-level source (for example, line-level input from an external stereo) that can be used as an optional recording source. Because most audio cards for personal computers provide some sort of gain for the recording source line, the mixer device will use the SourceAuxiliary type.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.34 SourceMicrophoneMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether microphone is muted.

Notes: Audio line is a microphone recording source. Most audio cards for personal computers provide at least two types of recording sources: an auxiliary audio line and microphone input. A microphone audio line typically provides some sort of gain. Audio cards that use a single input for use with a microphone or auxiliary audio line should use the SourceMicrophone component type.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.35 SourceMicrophoneVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of microphone.

Notes: Audio line is a microphone recording source. Most audio cards for personal computers provide at least two types of recording sources: an auxiliary audio line and microphone input. A microphone audio line typically provides some sort of gain. Audio cards that use a single input for use with a microphone or auxiliary audio line should use the `SourceMicrophone` component type.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.36 SourcePCSpeakerMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether PC Speaker is muted.

Notes: Audio line is a source originating from personal computer speaker. Several audio cards for personal computers provide the ability to mix what would typically be played on the internal speaker with the output of an audio card. Some audio cards support the ability to use this output as a recording source.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.37 SourcePCSpeakerVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of PC Speakers.

Notes: Audio line is a source originating from personal computer speaker. Several audio cards for personal computers provide the ability to mix what would typically be played on the internal speaker with the output of an audio card. Some audio cards support the ability to use this output as a recording source.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.38 SourceSynthesizerMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether synthesizer is muted.

Notes: Audio line is a source originating from the output of an internal synthesizer. Most audio cards for personal computers provide some sort of MIDI synthesizer (for example, an Adlib@-compatible or OPL/3 FM synthesizer).

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.39 SourceSynthesizerVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of synthesizer.

Notes: Audio line is a source originating from the output of an internal synthesizer. Most audio cards for personal computers provide some sort of MIDI synthesizer (for example, an Adlib@-compatible or OPL/3 FM synthesizer).

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.40 SourceTelephoneMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Whether telephone is muted.

Notes: Audio line is a source originating from an incoming telephone line.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.41 SourceTelephoneVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of telephone.

Notes: Audio line is a source originating from an incoming telephone line.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.11.42 SourceWaveOutMute as boolean

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of wave device.

Notes: Audio line is a source originating from the waveform-audio output digital-to-analog converter (DAC).

Most audio cards for personal computers provide this component type as a source to the DestinationSpeakers destination. Some cards also allow this source to be routed to the DestinationWaveIn destination.

Lasterror is set.

Value is true if device is muted, else false.

On any error or non Windows platforms value is always false.

(Read and Write computed property)

3.11.43 SourceWaveOutVolume as Double

Plugin Version: 6.2, Platform: Windows, Targets: All.

Function: Volume of wave out device.

Notes: Audio line is a source originating from the waveform-audio output digital-to-analog converter (DAC).

Most audio cards for personal computers provide this component type as a source to the DestinationSpeakers destination. Some cards also allow this source to be routed to the DestinationWaveIn destination.

Lasterror is set.

Range is from 0 for no volume to 1.0 for maximum volume.

On any error or non Windows platforms the value is always 0.

(Read and Write computed property)

3.12 class WindowsMCIMBS

3.12.1 class WindowsMCIMBS

Platform: Windows, Targets: All.

Function: Access to the Video for Windows API.

Example:

```
// open the CD Device and set time format to Track:Minute:Second:Frame
```

```
dim v as new WindowsMCIMBS
v.Command="open cdaudio"
v.run
```

```
v.Command="set cdaudio time format TMSF"
v.run
```

Notes: Without QuickTime you can't play a movie in Windows with the Movieplayer control. This class allows you to play movies.

Possible devices:

```
vcr (ME, 98)
videodisc (ME, 98)
overlay
cdaudio (2000, ME, 98)
dat
scanner
animation
digitalvideo
waveaudio (2000, ME, 98)
sequencer (2000, ME, 98)
avivideo (2000, ME, 98)
mpegvideo (2000, ME, 98)
```

(I added on which OS I find the devices on my installation.)

On Windows 2000 we have this connection between devices and file extensions:

You can find this list in the Registry on Windows 2000 at "HKEY_LOCAL_MACHINE\Software\Mi-
crosoft\Windows NT\Currentversion\MCI Extensions".

vcr:
videodisc:
overlay:
cdaudio: cda.
dat:
scanner:
animation:
digitalvideo:
waveaudio: wav.
sequencer: mdi, midi, rmi.
avivideo: avi.
mpegvideo: aif*, asx, asf, au, dat, ivf, m1v, m3z, mov, mp*, qt, snd, wax, wm, wma, wmv,
 wvx.

Possible states of a device:

not ready
stopped
playing
recording
seeking
paused
open

Possible time units:

milliseconds - Default
hms - Hour:Minute:Second
msf - Minute:Second:Frame
frames
smpte 24
smpte 25
smpte 30
smpte 30 drop
bytes
samples
tmsf - Track:Minute:Second:Frame ->use for CD

A list of all commands can be found on the Microsoft Website at:

http://msdn.microsoft.com/library/en-us/multimed/mmcmdstr_85uz.asp

3.12.2 Methods

3.12.3 Run

Platform: Windows, Targets: All.

Function: Executes a command.

Example:

```
dim v as new WindowsMCIMBS
```

```
v.command="pause cdaudio" // pauses the CD  
v.run
```

3.12.4 Properties

3.12.5 Command as string

Platform: Windows, Targets: All.

Function: Here you can store the next Command for the MCI.

Example:

```
dim v as new WindowsMCIMBS
```

```
v.command="pause cdaudio" // pauses the CD  
v.run
```

Notes: (Read and Write property)

3.12.6 Errorcode as Integer

Platform: Windows, Targets: All.

Function: The error code for the last error.

Example:

```
dim v as new WindowsMCIMBS
```

```
msgbox str(v.errorcode)+" "+v.errorstring
```

Notes: This property can be set to make a list of possible error messages like in the example "List MCI Errormessages".

(Read and Write property)

3.12.7 Errorstring as string

Platform: Windows, Targets: All.

Function: The error description for the last error.

Example:

```
dim v as new WindowsMCIMBS
```

```
msgbox str(v.errorcode)+" "+v.errorstring
```

Notes: Here is a list of some error messages:

(Read and Write property)

3.12.8 Result as string

Platform: Windows, Targets: All.

Function: The result of the last operation.

Example:

```
dim v as WindowsMCIMBS
```

```
// get the current position, track and track count to display for the CD Audio.
```

```
v.Command="Status cdaudio Current Track"
```

```
v.run
```

```
MsgBox v.result
```

```
v.command="Status cdaudio Number of Tracks"
```

```
v.run
```

```
MsgBox v.result
```

```
v.command="Status cdaudio position"
```

```
v.run
```

```
MsgBox v.result
```

3.12. CLASS WINDOWSMCIMBS

Notes: (Read and Write property)

- 0 The specified command was carried out.
- 1 Undefined external error.
- 2 A device ID has been used that is out of range for your system.
- 3 The driver was not enabled.
- 4 The specified device is already in use. Wait until it is free, and then try again.
- 5 The specified device handle is invalid.
- 6 There is no driver installed on your system.
- 7 There is not enough memory available for this task. Quit one or more applications to increase available memory, and then try again.
- 8 This function is not supported. Use the Capabilities function to determine which functions and messages the driver supports.
- 9 An error number was specified that is not defined in the system.
- 10 An invalid flag was passed to a system function.
- 11 An invalid parameter was passed to a system function.
- 12 Handle being used simultaneously on another thread (eg callback).
- 13 Specified alias not found in WIN.INI.
- 14 The registry database is corrupt.
- 15 The specified registry key was not found.
- 16 The registry could not be opened or could not be read.
- 17 The registry could not be written to.
- 18 The specified registry key could not be deleted.
- 19 The specified registry key value could not be found.
- 20 The driver did not generate a valid OPEN callback.
- 32 The specified format is not supported or cannot be translated. Use the Capabilities function to determine the supported formats.
- 33 Cannot perform this operation while media data is still playing. Reset the device, or wait until the data is finished playing.
- 34 The wave header was not prepared. Use the Prepare function to prepare the header, and then try again.
- 35 Cannot open the device without using the WAVE_ALLOWSYNC flag. Use the flag, and then try again.
- 64 The MIDI header was not prepared. Use the Prepare function to prepare the header, and then try again.
- 65 Cannot perform this operation while media data is still playing. Reset the device, or wait until the data is finished playing.
- 66 A MIDI map was not found. There may be a problem with the driver, or the MIDIMAP.CFG file may be corrupt or missing.
- 67 The port is transmitting data to the device. Wait until the data has been transmitted, and then try again.
- 68 The current MIDI Mapper setup refers to a MIDI device that is not installed on the system. Use MIDI Mapper to edit the setup.
- 69 The current MIDI setup is damaged. Copy the original MIDIMAP.CFG file to the Windows SYSTEM directory, and then try again.
- 70 A MIDI call was made which is invalid with the current open mode. Reopen the device with the correct mode.
- 71 Driver condition - do not callback this input event
- 257 Invalid MCI device ID. Use the ID returned when opening the MCI device.
- 259 The driver cannot recognize the specified command parameter.

3.13 class WindowsPlayerDeviceMBS

3.13.1 class WindowsPlayerDeviceMBS

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: This class describes the capabilities of a waveform-audio output device.

Example:

```
// fill devices into a popupmenu
Dim c As Integer = WindowsPlayerMBS.DeviceCount
For i As Integer = 0 To c-1
Dim d As WindowsPlayerDeviceMBS = WindowsPlayerMBS.Device(i)

PopupMenu1.AddRow d.Name+" " +Str(d.Channels)
PopupMenu1.RowTag(i) = d
Next
```

Blog Entries

- [New in the MBS Xojo Plugins 20.0](#)
- [MBS Xojo Plugins, version 20.0pr7](#)

3.13.2 Properties

3.13.3 Channels as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Number specifying whether the device supports mono (1) or stereo (2) output.

Notes: (Read only property)

3.13.4 DriverVersion as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Version number of the device driver for the device.

Notes: The high-order byte is the major version number, and the low-order byte is the minor version number.

(Read only property)

3.13.5 Formats as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Standard formats that are supported.

Notes: Combination of kFormat* constants.
(Read only property)

3.13.6 Index as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: The device index.

Notes: (Read only property)

3.13.7 ManufacturerID as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Manufacturer identifier for the device driver for the device.

Notes: Manufacturer identifiers are defined in Manufacturer and Product Identifiers:
<https://docs.microsoft.com/en-us/previous-versions/ms709440%28v%3dvs.85%29>
(Read only property)

3.13.8 Name as String

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Product name.

Notes: (Read only property)

3.13.9 ProductID as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Product identifier for the device.

Notes: (Read only property)

3.13.10 Support as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Optional functionality supported by the device.

Notes: Combination of kSupport* constants.

(Read only property)

3.13.11 Constants

Format Constants

Constant	Value	Description
kFormat1M08	&h00000001	11.025 kHz, mono, 8-bit
kFormat1M16	&h00000004	11.025 kHz, mono, 16-bit
kFormat1S08	&h00000002	11.025 kHz, stereo, 8-bit
kFormat1S16	&h00000008	11.025 kHz, stereo, 16-bit
kFormat2M08	&h00000010	22.05 kHz, mono, 8-bit
kFormat2M16	&h00000040	22.05 kHz, stereo, 8-bit
kFormat2S08	&h00000020	22.05 kHz, mono, 16-bit
kFormat2S16	&h00000080	22.05 kHz, stereo, 16-bit
kFormat44M08	&h00000100	44.1 kHz, mono, 8-bit
kFormat44M16	&h00000400	44.1 kHz, mono, 16-bit
kFormat44S08	&h00000200	44.1 kHz, stereo, 8-bit
kFormat44S16	&h00000800	44.1 kHz, stereo, 16-bit
kFormat48M08	&h00001000	48 kHz, mono, 8-bit
kFormat48M16	&h00004000	48 kHz, mono, 16-bit
kFormat48S08	&h00002000	48 kHz, stereo, 8-bit
kFormat48S16	&h00008000	48 kHz, stereo, 16-bit
kFormat96M08	&h00010000	96 kHz, mono, 8-bit
kFormat96M16	&h00040000	96 kHz, mono, 16-bit
kFormat96S08	&h00020000	96 kHz, stereo, 8-bit
kFormat96S16	&h00080000	96 kHz, stereo, 16-bit
kFormatInvalid	0	Invalid value.

Support Flags

Constant	Value	Description
kSupportLRVolume	8	Supports separate left and right volume control.
kSupportPitch	1	Supports pitch control.
kSupportPlaybackRate	2	Supports playback rate control.
kSupportSampleAccurate	32	Returns sample-accurate position information.
kSupportSync	16	The driver is synchronous and will block while playing a buffer.
kSupportVolume	4	Supports volume control.

3.14 class WindowsPlayerMBS

3.14.1 class WindowsPlayerMBS

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: The Windows MP3 Player class.

Notes: This is a little class to play a MP3 file (or data in memory).

Written for 44100 Hz, 2 channel MP3 files.

With plugin version 16.1 this class should work fine with any sample rate, any channel count and other formats as long as Microsoft drivers support them.

Blog Entries

- [New in the MBS Xojo Plugins 20.0](#)
- [MonkeyBread Software Releases the MBS Xojo Plugins in version 20.0](#)
- [MBS Xojo Plugins, version 20.0pr7](#)
- [MBS Xojo Plugins, version 17.4pr3](#)
- [MBS Releases the MBS Xojo / Real Studio plug-ins in version 16.1](#)
- [MBS Xojo / Real Studio Plugins, version 16.1pr2](#)
- [MBS Xojo / Real Studio Plugins, version 15.2pr8](#)
- [MonkeyBread Software Releases the MBS Xojo / Real Studio plug-ins in version 15.0](#)
- [MBS Xojo / Real Studio Plugins, version 15.0pr8](#)
- [MBS Xojo / Real Studio Plugins, version 15.0pr7](#)

3.14.2 Methods

3.14.3 Constructor(data as MemoryBlock)

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Initializes the class with given data.

See also:

- [3.14.4 Constructor\(data as String\)](#) 105
- [3.14.5 Constructor\(file as folderitem\)](#) 105

3.14. CLASS WINDOWSPLAYERMBS 105

3.14.4 Constructor(data as String)

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Initializes the class with given data.

See also:

- 3.14.3 Constructor(data as MemoryBlock) 104
- 3.14.5 Constructor(file as folderitem) 105

3.14.5 Constructor(file as folderitem)

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Initializes the class with a given file.

See also:

- 3.14.3 Constructor(data as MemoryBlock) 104
- 3.14.4 Constructor(data as String) 105

3.14.6 Device(index as Integer) as WindowsPlayerDeviceMBS

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Retrieves the capabilities of a given audio output device.

Example:

```
// fill devices into a popupmenu
Dim c As Integer = WindowsPlayerMBS.DeviceCount
For i As Integer = 0 To c-1
Dim d As WindowsPlayerDeviceMBS = WindowsPlayerMBS.Device(i)

PopupMenu1.AddRow d.Name+" " +Str(d.Channels)
PopupMenu1.RowTag(i) = d
Next
```

Notes: Index in range from 0 to DeviceCount-1.

You can use index -1 for the wave mapper.

3.14.7 GetVolume(byref VolumeLeft as Double, byref VolumeRight as Double)

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Queries left and right volume.

Notes: Range is from 0.0 for no sound to 1.0 for full sound.

3.14.8 Pause

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Pauses current playback.

3.14.9 Play(offset as Double = 0.0)

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Starts playing the sound.

Notes: With offset you can define the start point in seconds from beginning of sound. Range from 0 seconds to duration-1.

3.14.10 Resume

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Resumes current playback.

3.14.11 SetVolume(VolumeLeft as Double, VolumeRight as Double)

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Sets the left and right volume independent.

Notes: Range is from 0.0 for no sound to 1.0 for full sound.

3.14.12 Stop

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Stops current playback.

3.14.13 Properties

3.14.14 Buffer as MemoryBlock

Plugin Version: 16.1, Platform: Windows, Targets: All.

Function: The buffer with audio samples.

Notes: You get a copy of the buffer as memoryblock.

Please use BufferLength, SampleRate and ChannelCount to read it.

Data is always 16 bit with $2 * \text{ChannelCount} * \text{SampleRate}$ bytes per second.

(Read only property)

3.14.15 BufferLength as Integer

Plugin Version: 16.1, Platform: Windows, Targets: All.

Function: The buffer length for audio samples.

Notes: (Read only property)

3.14.16 ChannelCount as Integer

Plugin Version: 16.1, Platform: Windows, Targets: All.

Function: The channel count of the audio file.

Notes: (Read only property)

3.14.17 ChannelMask as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: The channel mask.

Example:

```
dim p as WindowsPlayerMBS // your player
p.DeviceID = 3 // 4th device
p.ChannelMask = 1 // left channel
```

Notes: 1 is left, 2 is right, 3 is center and so on.

Default is zero for automatic.

see list here:

<https://docs.microsoft.com/en-us/previous-versions/ms713496%28v%3dvs.85%29>
(Read and Write property)

3.14.18 DeviceCount as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: Retrieves the number of audio output devices present in the system.

Notes: A return value of zero means that no devices are present or that an error occurred.
(Read only property)

3.14.19 DeviceID as Integer

Plugin Version: 20.0, Platform: Windows, Targets: All.

Function: The device ID to use.

Example:

```
dim p as WindowsPlayerMBS // your player
p.DeviceID = 3 // 4th device
p.ChannelMask = 1 // left channel
```

Notes: Please set before calling Play method.
Default is -1 to use WAVE MAPPER device.
(Read and Write property)

3.14.20 Duration as Double

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Returns duration of sound in seconds.

Notes: (Read only property)

3.14.21 Lasterror as Integer

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: The last error code.

Notes: (Read and Write property)

3.14.22 Pitch as Double

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: The pitch for the waveform-audio output device.

Notes: Default 1.0.

pass e.g. 0.5 for half pitch or 2.0 to double pitch.

(Read and Write property)

3.14.23 Position as Double

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: Returns current position.

Notes: (Read only property)

3.14.24 Rate as Double

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: The rate for the waveform-audio output device.

Notes: Default 1.0.

pass e.g. 0.5 for half speed or 2.0 to double speed.

(Read and Write property)

3.14.25 SampleRate as Integer

Plugin Version: 16.1, Platform: Windows, Targets: All.

Function: The sample rate of the audio file.

Notes: (Read only property)

3.14.26 Volume as Double

Plugin Version: 15.0, Platform: Windows, Targets: All.

Function: The volume setting.

Notes: Range is from 0.0 for no sound to 1.0 for full sound.

(Read and Write property)

Chapter 4

MIDI

4.1 class PortMidiDeviceInfoMBS

4.1.1 class PortMidiDeviceInfoMBS

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: A class for device information.

Blog Entries

- [MBS Xojo / Real Studio Plugins, version 16.3pr5](#)

4.1.2 Properties

4.1.3 HasInput as Boolean

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: True if input is available.

Notes: (Read only property)

4.1.4 HasOutput as Boolean

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: True if output is available.

Notes: (Read only property)

4.1.5 InterfaceName as String

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Underlying MIDI API.

Notes: e.g. MMSystem, DirectX or CoreMidi.
(Read only property)

4.1.6 Name as String

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The device name.

Notes: e.g. USB MidiSport 1x1
(Read only property)

4.2 class PortMidiEventMBS

4.2.1 class PortMidiEventMBS

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The class for a piece of midi data.

Notes: See this website for a list of Midi status codes:

<https://www.midi.org/specifications-old/item/table-2-expanded-messages-list-status-bytes>

Blog Entries

- [MBS Xojo Plugins, version 17.1pr3](#)
- [MBS REALbasic Plugins, version 11.0pr14](#)

4.2.2 Methods

4.2.3 Set(status as Integer, data1 as Integer, data2 as Integer)

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Sets the value to the given data.

4.2.4 SetRaw(data0 as Integer, data1 as Integer, data2 as Integer, data3 as Integer)

Plugin Version: 11.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Sets the raw data by setting all 4 bytes together.

4.2.5 Properties

4.2.6 CurrentEvent as PortMidiEventMBS

Plugin Version: 17.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: The current event played.

Notes: You can use this to show current note playing.

(Read only property)

4.2.7 Data1 as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The first data value in the midi event.

Notes: (Read and Write property)

4.2.8 Data2 as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The second data value in the midi event.

Notes: (Read and Write property)

4.2.9 RawData0 as Integer

Plugin Version: 11.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The first byte of the raw data in this event.

Notes: Same as Status property.

(Read and Write property)

4.2.10 RawData1 as Integer

Plugin Version: 11.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The second byte of the raw data in this event.

Notes: Same as Data1 property.

(Read and Write property)

4.2.11 RawData2 as Integer

Plugin Version: 11.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The third byte of the raw data in this event.

Notes: Same as Data2 property.

(Read and Write property)

4.2.12 RawData3 as Integer

Plugin Version: 11.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: The forth byte of the raw data in this event.

Notes: (Read and Write property)

4.2.13 RawMessage as Integer

Plugin Version: 5.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: The raw content of the event as a integer.

Notes: Take care about platform differences like the byte order.

(Read and Write property)

4.2.14 Status as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The status value.

Notes: (Read and Write property)

4.2.15 When as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The time value of this midi data.

Notes: Should be milliseconds.

(Read and Write property)

4.3 class PortMidiMBS

4.3.1 class PortMidiMBS

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The PortMidi library wrapped for use in Xojo.

Notes: Error codes:

```
const pmNoError          = 0
const pmHostError       = -10000
const pmInvalidDeviceId = -9999
const pmInsufficientMemory = -9998
const pmBufferTooSmall  = -9997
const pmBufferOverflow  = -9996
const pmBadPtr          = -9995
const pmBadData         = -9994
const pmInternalError   = -9993
const pmBufferMaxSize   = -9992
```

Requires libasound.so.2 on Linux to be installed.

Blog Entries

- [MBS Xojo Plugins, version 21.2pr5](#)
- [MBS Xojo / Real Studio Plugins, version 16.3pr4](#)

4.3.2 Methods

4.3.3 CountDevices as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Counts the devices.

Example:

```
dim pa as new PortMidiMBS
```

```
Dim u as Integer = pa.CountDevices-1
for i as Integer = 0 to u
dim d as PortMidiDeviceInfoMBS = pa.DeviceInfo(i)
MsgBox d.Name+", "+D.InterfaceName
next
```

Notes: Returns 0 on any error.

4.3.4 DefaultInputDeviceID as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Returns the default device ID or pmNoDevice (-1) if there are no devices.

Notes: On the PC, the user can specify a default device by setting an environment variable. For example, to use device #1.

```
set PM_RECOMMENDED_OUTPUT_DEVICE=1
```

The user should first determine the available device ID by using the supplied application "testin" or "testout".

In general, the registry is a better place for this kind of info, and with USB devices that can come and go, using integers is not very reliable for device identification. Under Windows, if PM_RECOMMENDED_OUTPUT_DEVICE (or PM_RECOMMENDED_INPUT_DEVICE) is **NOT** found in the environment, then the default device is obtained by looking for a string in the registry under: HKEY_LOCAL_MACHINE/SOFTWARE/PortMidi/Recommended_Input_Device and HKEY_LOCAL_MACHINE/SOFTWARE/PortMidi/Recommended_Output_Device for a string. The number of the first device with a substring that matches the string exactly is returned. For example, if the string in the registry is "USB", and device 1 is named "In USB MidiSport 1x1", then that will be the default input because it contains the string "USB".

In addition to the name, PmDeviceInfo has the member "interf", which is the interface name. (The "interface" is the underlying software system or API used by PortMidi to access devices. Examples are MMSystem, DirectX (not implemented), ALSA, OSS (not implemented), etc.)
At present, the only Win32 interface is "MMSystem", the only Linux interface is "ALSA", and the only Mac OS X interface is "CoreMIDI".

To specify both the interface and the device name in the registry, separate the two with a comma and a space, e.g.:

```
MMSystem, In USB MidiSport 1x1
```

In this case, the string before the comma must be a substring of the "interf" string, and the string after the space must be a substring of the "name" name string in order to match the device.

Note: in the current release, the default is simply the first device (the input or output device with the lowest PmDeviceID).

4.3.5 DefaultOutputDeviceID as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Returns the default device ID or pmNoDevice (-1) if there are no devices.

Notes: On the PC, the user can specify a default device by setting an environment variable. For example,

to use device #1.

```
set PM_RECOMMENDED_OUTPUT_DEVICE=1
```

The user should first determine the available device ID by using the supplied application "testin" or "testout".

In general, the registry is a better place for this kind of info, and with USB devices that can come and go, using integers is not very reliable for device identification. Under Windows, if `PM_RECOMMENDED_OUTPUT_DEVICE` (or `PM_RECOMMENDED_INPUT_DEVICE`) is **NOT** found in the environment, then the default device is obtained by looking for a string in the registry under: `HKEY_LOCAL_MACHINE/SOFTWARE/PortMidi/Recommended_Input_Device` and `HKEY_LOCAL_MACHINE/SOFTWARE/PortMidi/Recommended_Output_Device` for a string. The number of the first device with a substring that matches the string exactly is returned. For example, if the string in the registry is "USB", and device 1 is named "In USB MidiSport 1x1", then that will be the default input because it contains the string "USB".

In addition to the name, `PmDeviceInfo` has the member "interf", which is the interface name. (The "interface" is the underlying software system or API used by `PortMidi` to access devices. Examples are `MMSystem`, `DirectX` (not implemented), `ALSA`, `OSS` (not implemented), etc.) At present, the only Win32 interface is "MMSystem", the only Linux interface is "ALSA", and the only Mac OS X interface is "CoreMIDI".

To specify both the interface and the device name in the registry, separate the two with a comma and a space, e.g.:

```
MMSystem, In USB MidiSport 1x1
```

In this case, the string before the comma must be a substring of the "interf" string, and the string after the space must be a substring of the "name" name string in order to match the device.

Note: in the current release, the default is simply the first device (the input or output device with the lowest `PmDeviceID`).

4.3.6 DeviceInfo(DeviceID as Integer) as PortMidiDeviceInfoMBS

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Returns information about a certain device.

Example:

```
dim pa as new PortMidiMBS
```

```
Dim u as Integer = pa.CountDevices-1
```

```
for i as Integer = 0 to u
```

```
dim d as PortMidiDeviceInfoMBS = pa.DeviceInfo(i)
```

```
MsgBox d.Name+", "+D.InterfaceName
```

```
next
```

Notes: Returns nil on any error.

4.3.7 ErrorText(ErrorNumber as Integer) as string

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The error text for the given error code.

Notes: Returns "" on any error.

4.3.8 Initialize as Integer

Plugin Version: 16.3, Platforms: macOS, Linux, Windows, Targets: All.

Function: Initializes the PortMidi functions.

Notes: You call this manually to trigger initialization now.

Or you just let the plugin do it automatically when you call one of the portmidi functions.

Returns the error code. (0 = okay)

4.3.9 ReInitialize as Integer

Plugin Version: 9.4, Platforms: macOS, Linux, Windows, Targets: All.

Function: Shuts down PortMidi and initializes it again.

Notes: As PortMidi does not recognize the attachment of new MIDI devices, you can only reinitialize.

Returns a PortMidi error code.

4.3.10 Constants

Constants

Constant	Value	Description
pmBadData	-9994	One of the PortMidi errors. illegal midi data, e.g. missing EOX
pmBadPtr	-9995	One of the PortMidi errors.
pmBufferMaxSize	-9992	One of the PortMidi errors. buffer is already as large as it can be.
pmBufferOverflow	-9996	One of the PortMidi errors.
pmBufferTooSmall	-9997	One of the PortMidi errors.
pmHostError	-10000	One of the PortMidi errors.
pmInsufficientMemory	-9998	One of the PortMidi errors.
pmInternalError	-9993	One of the PortMidi errors.
pmInvalidDeviceId	-9999	One of the PortMidi errors. out of range or output device when input is requested or input device when output is requested or device is already opened.
pmNoDevice	-1	One of the PortMidi errors.
pmNoError	0	One of the PortMidi errors.

4.4 class PortMidiStreamMBS

4.4.1 class PortMidiStreamMBS

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The Xojo class to represent a PortMidi stream.

Notes: A single PortMidiStream is a descriptor for an open MIDI device.

See also macOS specific classes AVMIDIPlayerMBS, MidiPlaybackMBS and MidiClientMBS.

Blog Entries

- [MonkeyBread Software Releases the MBS Xojo plug-ins in version 17.0](#)
- [MBS Xojo / Real Studio Plugins, version 17.0pr4](#)
- [MBS Xojo / Real Studio Plugins, version 17.0pr1](#)

Xojo Developer Magazine

- [15.2, page 10: News](#)

4.4.2 Methods

4.4.3 Abort as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Terminates outgoing messages immediately.

Notes: The caller should immediately close the output port; this call may result in transmission of a partial midi message. There is no abort for Midi input because the user can simply ignore messages in the buffer and close an input device at any time.

Returns an error code.

4.4.4 Close

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The destructor.

Notes: There is no need to call this method except you want to free all resources of this object now without waiting for Xojo to do it for you.

4.4.5 `currentTimeStamp` as Integer

Plugin Version: 17.0, Platforms: macOS, Linux, Windows, Targets: All.

Function: Queries current time stamp.

4.4.6 `ErrorText(ErrorNumber as Integer)` as string

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: The error message for this error number.

4.4.7 `HostError` as string

Plugin Version: 13.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Queries host error string.

Example:

```
dim s as new PortMidiStreamMBS
// do something that causes an error
MsgBox "HostError: "+s.HostError
```

Notes: Clears error.

4.4.8 `OpenInput(DeviceID as Integer, BufferSize as Integer)` as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Opens a device for reading.

Notes: DeviceID is the id of the device used for input.

For input, the buffersize specifies the number of input events to be buffered waiting to be read using `Pm_Read()`.

(In some cases – see below – PortMidi does not buffer output at all and merely passes data to a lower-level API, in which case buffersize is ignored.)

return value:

Upon success `OpenInput` returns `PmNoError`.

If a call to `OpenInput` fails a nonzero error code is returned (see `PMError` above) and the value of port is

invalid.

4.4.9 OpenOutput(DeviceID as Integer, BufferSize as Integer, Latency as Integer) as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Opens a device for writing.

Notes: DeviceID is the id of the device used for input.

For output, buffersize specifies the number of output events to be buffered waiting for output. (In some cases – see below – PortMidi does not buffer output at all and merely passes data to a lower-level API, in which case buffersize is ignored.)

Latency is the delay in milliseconds applied to timestamps to determine when the output should actually occur. (If latency is <0, 0 is assumed.)

If latency is zero, timestamps are ignored and all output is delivered immediately. If latency is greater than zero, output is delayed until the message timestamp plus the latency. (NOTE: time is measured relative to the time source indicated by time_proc. Timestamps are absolute, not relative delays or offsets.) In some cases, PortMidi can obtain better timing than your application by passing timestamps along to the device driver or hardware. Latency may also help you to synchronize midi data to audio data by matching midi latency to the audio buffer latency.

Due to the way timers work on Windows, the latency is limited there.

return value:

Upon success OpenInput returns PmNoError.

If a call to OpenInput fails a nonzero error code is returned (see PMError above) and the value of port is invalid.

4.4.10 Poll as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Tests whether input is available,

Notes: Returns 1 on success and 0 on failure.

4.4.11 Read(byref data as PortMidiEventMBS) as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Reads midi data.

Notes: Returns the number of read items.
(0 for error and 1 for success)

Read retrieves midi data into a buffer, and returns the number of events read. Result is a non-negative number unless an error occurs, in which case a PmError value will be returned.

Buffer Overflow

The problem: if an input overflow occurs, data will be lost, ultimately because there is no flow control all the way back to the data source. When data is lost, the receiver should be notified and some sort of graceful recovery should take place, e.g. you shouldn't resume receiving in the middle of a long sysex message.

With a lock-free fifo, which is pretty much what we're stuck with to enable portability to the Mac, it's tricky for the producer and consumer to synchronously reset the buffer and resume normal operation.

Solution: the buffer managed by PortMidi will be flushed when an overflow occurs. The consumer (Read()) gets an error message (pmBufferOverflow) and ordinary processing resumes as soon as a new message arrives. The remainder of a partial sysex message is not considered to be a "new message" and will be flushed as well.

4.4.12 SetChannelMask(mask as Integer) as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Filters incoming messages based on channel.

Example:

```
dim s as PortMidiStreamMBS // your midi stream
```

```
call s.SetChannelMask(1+4) // Channel 1 and 3.
```

Notes: The mask is a 16-bit bitfield corresponding to appropriate channels
All channels are allowed by default.
Returns an error code.

4.4.13 SetFilter(filters as Integer) as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: SetFilter() sets filters on an open input stream to drop selected input types.

Notes: By default, only active sensing messages are filtered.

To prohibit, say, active sensing and sysex messages, call `SetFilter(FilterActive + FilterSysEx)`;

Filtering is useful when midi routing or midi thru functionality is being provided by the user application. For example, you may want to exclude timing messages (clock, MTC, start/stop/continue), while allowing note-related messages to pass.

Or you may be using a sequencer or drum-machine for MIDI clock information but want to exclude any notes it may play.

Returns an error code.

4.4.14 Write(data as PortMidiEventMBS) as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Writes midi data from a buffer.

Notes: This may contain:

- short messages or
- sysex messages that are converted into a sequence of PortMidiStreamMBS objects, e.g. sending data from a file or forwarding them from midi input.

Use `WriteSysEx()` to write a sysex message stored as a contiguous array of bytes.

Sysex data may contain embedded real-time messages.

Returns an error code.

4.4.15 WriteShort(When as Integer, message as Integer) as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Writes a timestamped non-system-exclusive midi message.

Notes: Messages are delivered in order as received, and timestamps must be non-decreasing. (But timestamps are ignored if the stream was opened with `latency = 0`.)

4.4.16 WriteSysEx(When as Integer, message as memoryblock, offset as Integer) as Integer

Plugin Version: 9.1, Platforms: macOS, Linux, Windows, Targets: All.

Function: Writes a timestamped system-exclusive midi message.

Notes: The data is taken from the memoryblock at the given offset.

The message must be 0 terminated.

This message must be valid and contain the special start value and a EOX value on the end.

See also:

- 4.4.17 WriteSysEx(When as Integer, message as string) as Integer 126

4.4.17 WriteSysEx(When as Integer, message as string) as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: All.

Function: Writes a timestamped system-exclusive midi message.

Notes: This message must be valid and contain the special start value and a EOX value on the end.

See also:

- 4.4.16 WriteSysEx(When as Integer, message as memoryblock, offset as Integer) as Integer 125

4.4.18 Properties

4.4.19 ChannelMask as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: Desktop only.

Function: The channel mask used.

Notes: Use SetChannelMask to change it.

(Read only property)

4.4.20 DeviceID as Integer

Plugin Version: 17.0, Platforms: macOS, Linux, Windows, Targets: Desktop only.

Function: The device ID.

Notes: The ID of the device the stream is connected to.

(Read only property)

4.4.21 DeviceName as String

Plugin Version: 17.0, Platforms: macOS, Linux, Windows, Targets: Desktop only.

Function: The device name.

Notes: The name of the device the stream is connected to.

(Read only property)

4.4.22 Filters as Integer

Plugin Version: 5.2, Platforms: macOS, Linux, Windows, Targets: Desktop only.

Function: The filters setting.

Notes: Use SetFilters to change it.

(Read only property)

4.4.23 Constants

Constants

Constant	Value	Description
FilterActive	&h4000	One of the PortMidi filter constants. filter active sensing messages (&hFE)
FilterAftertouch	&h6000000	One of the PortMidi filter constants. filter both channel and poly aftertouch
FilterChannelAftertouch	&h20000000	One of the PortMidi filter constants. filter channel aftertouch (most midi controllers use this) (&hD0-&hDF)
FilterClock	&h1D00	One of the PortMidi filter constants. filter clock messages (CLOCK &hF8, START &hFA, STOP &hFC, and CONTINUE &hFB)
FilterControl	&h8000000	One of the PortMidi filter constants. Control Changes (CC's) (&hB0-&hBF)
FilterFD	&h2000	One of the PortMidi filter constants. filter undefined FD messages
FilterMTC	2	One of the PortMidi filter constants. MIDI Time Code (&hF1)
FilterNote	&h3000000	One of the PortMidi filter constants. filter note-on and note-off (&h90-&h9F and &h80-&h8F)
FilterPitchBend	&h40000000	One of the PortMidi filter constants. Pitch Bender (&hE0-&hEF)
FilterPlay	&h400	One of the PortMidi filter constants. filter play messages (start &hFA, stop &hFC, continue &hFB)
FilterPolyAftertouch	&h4000000	One of the PortMidi filter constants. per-note aftertouch (&hA0-&hAF)
FilterProgram	&h10000000	One of the PortMidi filter constants. Program changes (&hC0-&hCF)
FilterRealTime	&hFF01	One of the PortMidi filter constants. filter all real-time messages
FilterReset	&h8000	One of the PortMidi filter constants. filter reset messages (&hFF)
FilterSongPosition	4	One of the PortMidi filter constants. Song Position (&hF2)
FilterSongSelect	8	One of the PortMidi filter constants. Song Select (&hF3)
FilterSysEx	1	One of the PortMidi filter constants. filter system exclusive messages (&hF0)
FilterSystemCommon	&h4E	One of the PortMidi filter constants. All System Common messages (mtc, song position, song select, tune request)
FilterTick	&h200	One of the PortMidi filter constants. filter tick messages (&hF9)
FilterTune	&h40	One of the PortMidi filter constants. Tuning request (&hF6)
FilterUndefined	&h2000	One of the PortMidi filter constants. filter undefined real-time messages

4.5 class WindowsMidiInputInfoMBS

4.5.1 class WindowsMidiInputInfoMBS

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: A class for information about a certain Midi Device.

4.5.2 Properties

4.5.3 DriverVersion as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Version number of the device driver for the MIDI input device.

Notes: The high-order byte is the major version number, and the low-order byte is the minor version number.

(Read only property)

4.5.4 Flags as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Some flags.

Notes: Currently unused in Windows XP.

(Read only property)

4.5.5 ManufacturerID as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Manufacturer identifier of the device driver for the MIDI input device.

Notes: (Read only property)

4.5.6 Name as String

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Product name.

Notes: Currently an ANSI string.

(Read only property)

4.5.7 ProductID as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Product identifier of the MIDI input device.

Notes: (Read only property)

4.6 class WindowsMidiInputMBS

4.6.1 class WindowsMidiInputMBS

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: A class to represent an open Midi Input device in Xojo.

Notes: Subclass of the WindowsMidiMBS class.

Blog Entries

- [MBS Xojo Plugins, version 18.5pr2](#)
- [MBS Real Studio Plugins, version 13.1pr9](#)

4.6.2 Methods

4.6.3 Close

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Closes the device.

Notes: First stops recording, second resets midi output device and third Closes the device with waiting till device is done.

Handle is set to 0 and lasterror is set.

4.6.4 Idle

Plugin Version: 9.7, Platform: Windows, Targets: All.

Function: Processes events.

Notes: Midi events are buffered in data structures. This method dispatches them to the Xojo event handlers.

Call this method as often as you need events to fire. For example every 100ms in a timer.

same as WindowsMidiMBS.Idle

4.6.5 InputErrorText(errorcode as Integer) as string

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Translates an error number into a human readable text.

Notes: Returns "" on unknown errors.

String returned has Windows ANSI text encoding.

4.6.6 Open(DeviceID as Integer, BufferSize as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Opens a Midi device.

Notes: DeviceID is from 0 to NumberOfMidiInputDevices-1.

Buffersize is the maximum size to allocate for each SysEx receive buffer.

Minimum is 256 bytes. Windows does not handle SysEx messages bigger than 64K.

Lasterror is set.

On success the handle property is non zero.

4.6.7 Reset

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Resets the device.

Notes: Lasterror is set.

4.6.8 Start

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Starts listening for events.

Notes: Lasterror is set.

Please do not call from Open event as that's too early.

4.6.9 Stop

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Stops recording.

Notes: Lasterror is set.

You should not need this and just call close or let the object die.

4.6.10 Events

4.6.11 DeviceClose

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: An event called whenever the output device is closed.

Notes: Called when you call close.

4.6.12 DeviceData(timestamp as Integer, status as Integer, data1 as Integer, data2 as Integer, RawData as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: A simple Midi message has been received.

Notes: Process this event fast to avoid losing events.

Status, Data1 and Data2 are all 8 bit values.

The time stamp is specified in milliseconds, beginning at zero when the Start function was called.

4.6.13 DeviceError(timestamp as Integer, status as Integer, data1 as Integer, data2 as Integer, RawData as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: A bad Midi message has been received.

Notes: Process this event fast to avoid losing events.

Status, Data1 and Data2 are all 8 bit values.

The time stamp is specified in milliseconds, beginning at zero when the Start function was called.

4.6.14 DeviceLongData(timestamp as Integer, data as string, dataMemory as memoryblock)

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: SysEx data was received.

Notes: If data is "" no free buffer was available to store the data.

The time stamp is specified in milliseconds, beginning at zero when the Start function was called.

4.6.15 DeviceLongError(timestamp as Integer, data as string, dataMemory as memoryblock)

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: Bad SysEx data was received.

Notes: If data is "" no free buffer was available to store the data.

The time stamp is specified in milliseconds, beginning at zero when the Start function was called.

4.6.16 DeviceOpen

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: An event called whenever the output device is opened.

Notes: Called when you call open.

Please do not call Start from Open event as that's too early.

4.7 class WindowsMidiMBS

4.7.1 class WindowsMidiMBS

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Windows Midi base class.

Example:

```

dim midi as WindowsMidiMBS // your midi object

Sub Open()
dim i as WindowsMidiInputInfoMBS
dim o as WindowsMidiOutputInfoMBS
dim c,n as Integer

midi=new WindowsMidiMBS

c=midi.NumberOfMidiInputDevices-1

for n=0 to c
i=midi.InputDevice(n)

listbox1.AddRow str(n+1)
listbox1.Cell(listbox1.LastIndex,1)=i.Name
listbox1.Cell(listbox1.LastIndex,2)=hex(i.DriverVersion)

next

c=midi.NumberOfMidiOutputDevices-1

for n=0 to c
o=midi.OutputDevice(n)

listbox2.AddRow str(n+1)
listbox2.Cell(listbox2.LastIndex,1)=o.Name
listbox2.Cell(listbox2.LastIndex,2)=hex(o.DriverVersion)

next

End Sub

```

Notes: See also PortMidiMBS class for cross platform Midi handling.

Blog Entries

- [MBS Real Studio Plugins, version 13.1pr9](#)

4.7.2 Methods

4.7.3 Connect(output as WindowsMidiOutputMBS)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The Connect function connects a MIDI input device to a MIDI thru or output device, or connects a MIDI thru device to a MIDI output device.

Notes: self must be a MIDI input device or a MIDI thru device.
output must be the MIDI output or thru device.

After calling this function, the MIDI input device receives event data in an DeviceData event whenever a message with the same event data is sent to the output device driver.

A thru driver is a special form of MIDI output driver. The system will allow only one MIDI output device to be connected to a MIDI input device, but multiple MIDI output devices can be connected to a MIDI thru device. Whenever the given MIDI input device receives event data in an DeviceData event, a message with the same event data is sent to the given output device driver (or through the thru driver to the output drivers).

Lasterror is set.

4.7.4 DataLost as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Number of data blocks lost.

Notes: The buffers in the plugins have a certain size.

In case midi events are coming fast in and the Idle method is not called often enough events are lost.

In that case increase the frequency of calling Idle or request the buffer size to be increased in the next plugin version.

4.7.5 Disconnect(output as WindowsMidiOutputMBS)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The Disconnect function disconnects a MIDI input device from a MIDI thru or output device, or disconnects a MIDI thru device from a MIDI output device.

Notes: self must be a MIDI input device or a MIDI thru device.
output must be the MIDI output device to be disconnected.

MIDI input, output, and thru devices can be connected by using the Connect function. Thereafter, whenever the MIDI input device receives event data in an DeviceData event, a message with the same event data is

sent to the output device driver (or through the thru driver to the output drivers).

Lasterror is set.

4.7.6 EventsLost as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Number of events lost.

Notes: The buffers in the plugins have a certain size.

In case midi events are coming fast in and the Idle method is not called often enough events are lost.

In that case increase the frequency of calling Idle or request the buffer size to be increased in the next plugin version.

4.7.7 Idle

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Processes events.

Notes: Midi events are buffered in data structures. This method dispatches them to the Xojo event handlers.

Call this method as often as you need events to fire. For example every 100ms in a timer.

4.7.8 InputDevice(index as Integer) as WindowsMidiInputInfoMBS

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The InputDevice function queries a specified MIDI input device to determine its capabilities.

Example:

```
dim midi as WindowsMidiMBS // your midi object
dim n,c as Integer
dim i as WindowsMidiInputInfoMBS

c=midi.NumberOfMidiInputDevices-1

for n=0 to c
i=midi.InputDevice(n)

listbox1.AddRow str(n+1)
listbox1.Cell(listbox1.LastIndex,1)=i.Name
listbox1.Cell(listbox1.LastIndex,2)=hex(i.DriverVersion)
```

[next](#)

Notes: Index is from 0 to NumberOfMidiInputDevices-1.

4.7.9 NumberOfMidiInputDevices as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Returns the number of MIDI input devices present in the system.

Example:

```
dim midi as new WindowsMidiMBS
MsgBox str(midi.NumberOfMidiInputDevices)
```

Notes: A return value of zero means that there are no devices.

4.7.10 NumberOfMidiOutputDevices as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Returns the number of MIDI output devices present in the system.

Example:

```
dim midi as new WindowsMidiMBS
MsgBox str(midi.NumberOfMidiOutputDevices)
```

Notes: A return value of zero means that there are no devices.

4.7.11 OutputDevice(index as Integer) as WindowsMidiOutputInfoMBS

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The OutputDevice function queries a specified MIDI output device to determine its capabilities.

Example:

```
dim midi as WindowsMidiMBS // your midi object
dim c,n as Integer
dim o as WindowsMidiOutputInfoMBS
```

```
c=midi.NumberOfMidiOutputDevices-1

for n=0 to c
o=midi.OutputDevice(n)

listbox2.AddRow str(n+1)
listbox2.Cell(listbox2.LastIndex,1)=o.Name
listbox2.Cell(listbox2.LastIndex,2)=hex(o.DriverVersion)

next
```

Notes: Index is from 0 to NumberOfMidiOutputDevices-1.

4.7.12 Properties

4.7.13 Handle as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The handle for this Midi input or output port.

Notes: Depending on which Xojo class this is, value is a HMIDI, HMIDIIN or HMIDIOUT handle.
(Read only property)

4.7.14 Lasterror as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The last error code reported.

Notes: 0 is no error and -1 is parameter error from the plugin.
(Read only property)

4.8 class WindowsMidiOutputInfoMBS

4.8.1 class WindowsMidiOutputInfoMBS

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: A class for information about a certain Midi Device.

4.8.2 Properties

4.8.3 ChannelMask as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Channels that an internal synthesizer device responds to, where the least significant bit refers to channel 0 and the most significant bit to channel 15.

Notes: Port devices that transmit on all channels set this member to &hFFFF.
(Read only property)

4.8.4 DriverVersion as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Version number of the device driver for the MIDI input device.

Notes: The high-order byte is the major version number, and the low-order byte is the minor version number.
(Read only property)

4.8.5 Flags as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Optional functionality supported by the device.

Notes: It can be one or more of the following:

MIDICAPS_CACHE	= 4	Supports patch caching.
MIDICAPS_LRVOLUME	= 2	Supports separate left and right volume control.
MIDICAPS_STREAM	= 8	Provides direct support for the midiStreamOut function.
MIDICAPS_VOLUME	= 1	Supports volume control.

If a device supports volume changes, the MIDICAPS_VOLUME flag will be set for the dwSupport member.

If a device supports separate volume changes on the left and right channels, both the MIDICAPS_VOLUME and the MIDICAPS_LRVOLUME flags will be set for this member.
(Read only property)

4.8.6 ManufacturerID as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Manufacturer identifier of the device driver for the MIDI input device.

Notes: (Read only property)

4.8.7 Name as String

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Product name.

Notes: Currently an ANSI string.

(Read only property)

4.8.8 Notes as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Maximum number of simultaneous notes that can be played by an internal synthesizer device.

Notes: If the device is a port, this member is not meaningful and is set to 0.

(Read only property)

4.8.9 ProductID as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Product identifier of the MIDI input device.

Notes: (Read only property)

4.8.10 Technology as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Type of the MIDI output device.

Notes: This value can be one of the following:

```
MOD_MIDIPORT    = 1  // output port
MOD_SYNTH       = 2  // generic internal synth
MOD_SQSYNTH    = 3  // square wave internal synth
MOD_FMSYNTH    = 4  // FM internal synth
MOD_MAPPER      = 5  // MIDI mapper
MOD_WAVETABLE  = 6  // hardware wavetable synth
MOD_SWSYNTH    = 7  // software synth
```

(Read only property)

4.8.11 Voices as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Number of voices supported by an internal synthesizer device.

Notes: If the device is a port, this member is not meaningful and is set to 0.

(Read only property)

4.8.12 Volume as Boolean

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Whether volume control is available.

Notes: True if yes and False if no.

(Read only property)

4.8.13 VolumeStereo as Boolean

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Whether the device can control volume on two independent channels.

Notes: True if stereo, False if mono.

(Read only property)

4.9 class WindowsMidiOutputMBS

4.9.1 class WindowsMidiOutputMBS

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: A class to represent a Midi Output device.

Notes: Subclass of the WindowsMidiMBS class.

Blog Entries

- [MBS Xojo Plugins, version 18.5pr2](#)

4.9.2 Methods

4.9.3 Close

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Closes the output device.

Notes: Closes the device with waiting till device is done.

Handle is set to 0 and lasterror is set.

4.9.4 Open(DeviceID as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Opens the midi device with the given index.

Notes: DeviceID is from 0 to NumberOfMidiOutputDevices-1.

Lasterror is set.

4.9.5 OpenDefault

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Opens the Midi mapper which opens the device the user selected as the default midi device.

Notes: If only one midi output device is available this one is opened.

On success the handle property is not zero.

Lasterror is set.

4.9.6 OutputErrorText(errorcode as Integer) as string

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Translates an error number into a human readable text.

Notes: Returns "" on unknown errors.

String returned has Windows ANSI text encoding.

4.9.7 Reset

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Resets the output device.

Notes: Lasterror is set.

4.9.8 SendData(data as memoryblock)

Plugin Version: 12.5, Platform: Windows, Targets: All.

Function: Sends sysex data.

Notes: Lasterror is set.

See also

[http://msdn.microsoft.com/en-us/library/windows/desktop/dd798474\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/dd798474(v=vs.85).aspx)

See also:

- 4.9.9 SendData(data as memoryblock, size as Integer) 144
- 4.9.10 SendData(data as string) 145

4.9.9 SendData(data as memoryblock, size as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Sends sysex data.

Example:

```
dim m as MemoryBlock
```

```
dim o as WindowsMidiOutputMBS // your midi output
```

```
m=NewMemoryBlock(8)
```

```
m.Byte(0)=&hF0
```

```
m.Byte(1)=&h7F
```

```

m.Byte(2)=&h7F
m.Byte(3)=&h04
m.Byte(4)=&h01
m.Byte(5)=&h7F
m.Byte(6)=&h7F
m.Byte(7)=&hF7

```

```
o.SendData m
```

Notes: Lasterror is set.

size is the size of the memoryblock to use. A wrong value will crash the application.

See also

[http://msdn.microsoft.com/en-us/library/windows/desktop/dd798474\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/dd798474(v=vs.85).aspx)

See also:

- 4.9.8 SendData(data as memoryblock) 144
- 4.9.10 SendData(data as string) 145

4.9.10 SendData(data as string)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Sends sysex data.

Notes: Lasterror is set.

See also

[http://msdn.microsoft.com/en-us/library/windows/desktop/dd798474\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/dd798474(v=vs.85).aspx)

The plugin prepares MIDIHDR structure and uses your data there.

See also:

- 4.9.8 SendData(data as memoryblock) 144
- 4.9.9 SendData(data as memoryblock, size as Integer) 144

4.9.11 SendMessage(message as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Sends a short midi message immediately.

Example:

```

dim o as WindowsMidiOutputMBS // your windows midi output
// &h90 = Note down

```

```
// &h43 = the note number
// &h40 = the velocity
o.SendMessage &h40&390
```

Notes: The message is stored in one 32bit integer.
lowest 8 bit is status, second 8 bit is data1, third 8 bit is data2 and highest 8 bit is left 0.

Between sending note on and off messages, you need to leave time for actual playback.
LastError is set.

See also
[http://msdn.microsoft.com/en-us/library/windows/desktop/dd798481\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/dd798481(v=vs.85).aspx)
See also:

- 4.9.12 SendMessage(status as Integer, data1 as Integer, data2 as Integer) 146

4.9.12 SendMessage(status as Integer, data1 as Integer, data2 as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Sends a short midi message immediately.

Example:

```
dim o as WindowsMidiOutputMBS // your windows midi output
// &h90 = Note down
// &h3C = the note number
// &h40 = the velocity
o.SendMessage &h90, &h3C, &h40
```

Notes: SetLastError is set.
Between sending note on and off messages, you need to leave time for actual playback.

see also
[http://msdn.microsoft.com/en-us/library/windows/desktop/dd798481\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/dd798481(v=vs.85).aspx)
See also:

- 4.9.11 SendMessage(message as Integer) 145

4.9.13 Properties

4.9.14 Volume as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The volume to be used for this device.

Example:

```
dim m as WindowsMidiOutputMBS // your midi output
```

```
m.Volume=0 // all silent
```

```
m.Volume=&hFFFF0000 // right only
```

```
m.Volume=&h0000FFFF // left only or max volume for mono device
```

```
m.Volume=&h7FFF7FFF // half volume for both channels
```

Notes: Not all devices can set the volume.

Lasterror is set.

The low-order word contains the left-channel volume setting, and the high-order word contains the right-channel setting. A value of &hFFFF represents full volume, and a value of &h0000 is silence.

If a device does not support both left and right volume control, the low-order word of dwVolume specifies the mono volume level, and the high-order word is ignored.

(Read and Write computed property)

4.9.15 Events

4.9.16 DeviceClose

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: An event called when the device is closed.

Notes: Should be called when you call close or the object dies.

4.9.17 DeviceDataSent

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: An event called whenever SysEx data was sent.

4.9.18 DeviceOpen

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: An event called whenever the device was opened successfully.

4.9.19 DevicePositionCallback

Plugin Version: 6.1, Platform: Windows, Targets: .

Function: Called when a MEVT_F_CALLBACK Midi event is about to be executed.

Notes: A way to track progress in playback.

4.10 class WindowsMidiStreamMBS

4.10.1 class WindowsMidiStreamMBS

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: A class for a Windows Midi Stream.

4.10.2 Methods

4.10.3 Close

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Closes the Midi stream.

4.10.4 Open(DeviceID as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Opens a MIDI stream for output.

Notes: By default, the device is opened in paused mode.

Lasterror is set.

DeviceID: The device is opened on behalf of the stream and closed again when the stream is closed.

4.10.5 Pause

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Pauses playback of a specified MIDI stream.

Notes: Lasterror is set.

4.10.6 PositionBytes as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Position of the stream in bytes.

Notes: Lasterror is set.

4.10.7 PositionMS as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function:

Position of the stream in milliseconds.

Notes:

Lasterror is set.

4.10.8 PositionSamples as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Position of the stream in samples.

Notes: Lasterror is set.

4.10.9 PositionTicks as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Position of the stream in ticks.

Notes: Lasterror is set.

4.10.10 Restart

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The Restart function restarts a paused MIDI stream.

Notes: Lasterror is set.

4.10.11 SendMessage(message as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Sends a short midi message immediately.

Example:

```
dim o as WindowsMidiStreamMBS // your midi stream
```

```
// &h90 = Note down
// &h43 = the note number
// &h40 = the velocity
o.SendMessage &h404390
```

Notes: The message is stored in one 32bit integer.
lowest 8 bit is status, second 8 bit is data1, third 8 bit is data2 and highest 8 bit is left 0.

Between sending note on and off messages, you need to leave time for actual playback.

Lasterror is set.

See also:

- 4.10.12 SendMessage(status as Integer, data1 as Integer, data2 as Integer)

151

4.10.12 SendMessage(status as Integer, data1 as Integer, data2 as Integer)

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Sends a short midi message immediately.

Example:

```
dim o as WindowsMidiStreamMBS // your midi stream
```

```
// &h90 = Note down
// &h3C = the note number
// &h40 = the velocity
o.SendMessage &h90, &h3C, &h40
```

Notes: Lasterror is set.

Between sending note on and off messages, you need to leave time for actual playback.

See also:

- 4.10.11 SendMessage(message as Integer)

150

4.10.13 Stop

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The Stop function turns off all notes on all MIDI channels for the specified MIDI output device.

Notes: Lasterror is set.

4.10.14 Properties

4.10.15 Handle as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The handle for the midi stream.

Notes: Type is HMIDISTRM.

(Read only property)

4.10.16 Lasterror as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The last error code reported by one of the class functions.

Notes: (Read only property)

4.10.17 Tempo as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Tempo of the stream, in microseconds per quarter note.

Notes: The tempo is honored only if the time division for the stream is specified in quarter note format.

Lasterror is set.

(Read and Write computed property)

4.10.18 TimeDiv as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: Time division for this stream, in the format specified in the Standard MIDI Files 1.0 specification.

Notes: The low 16 bits of this integer value contain the time division.

Lasterror is set.

(Read and Write computed property)

4.10.19 Volume as Integer

Plugin Version: 6.1, Platform: Windows, Targets: All.

Function: The volume to be used for this stream.

Example:

```
dim m as WindowsMidiStreamMBS // your midi stream
```

```
m.Volume=0 // all silent
```

```
m.Volume=&hFFFF0000 // right only
```

```
m.Volume=&h0000FFFF // left only or max volume for mono device
```

```
m.Volume=&h7FFF7FFF // half volume for both channels
```

Notes: Not all devices can set the volume.

Lasterror is set.

The low-order word contains the left-channel volume setting, and the high-order word contains the right-channel setting. A value of &hFFFF represents full volume, and a value of &h0000 is silence.

If a device does not support both left and right volume control, the low-order word of dwVolume specifies the mono volume level, and the high-order word is ignored.

Lasterror is set.

(Read and Write computed property)

Chapter 5

List of Questions in the FAQ

- 6.0.1 Can anyone help me convert seconds to time in this format hh:mm:ss? 165
- 6.0.2 Do you have plugins for Android? 166
- 6.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 166
- 6.0.4 How to catch delete key? 167
- 6.0.5 How to convert cmyk to rgb? 168
- 6.0.6 How to delete a folder? 169
- 6.0.7 How to detect if CPU is 64bit processor? 170
- 6.0.8 How to query variant type string for a variant? 171
- 6.0.9 How to refresh a htmlviewer on Windows? 172
- 6.0.10 Is there an example for vector graphics in Xojo? 173
- 6.0.11 Picture functions do not preserve resolution values? 174
- 6.0.12 A toolbox call needs a rect - how do I give it one? 174
- 6.0.13 API client not supported? 174
- 6.0.14 Can I access Access Database with Java classes? 175
- 6.0.15 Can I create PDF from Xojo Report using DynaPDF? 176
- 6.0.16 Can I use AppleScripts in a web application? 176
- 6.0.17 Can I use graphics class with DynaPDF? 176
- 6.0.18 Can I use sockets on a web application? 177
- 6.0.19 Can I use your ChartDirector plugin on a web application? 177

- 6.0.20 Can I use your DynaPDF plugin on a web application? 178
- 6.0.21 Can I use your plugin controls on a web application? 179
- 6.0.22 Can you get an unique machine ID? 179
- 6.0.23 ChartDirector: Alignment Specification 179
- 6.0.24 ChartDirector: Color Specification 180
- 6.0.25 ChartDirector: Font Specification 183
- 6.0.26 ChartDirector: Mark Up Language 187
- 6.0.27 ChartDirector: Parameter Substitution and Formatting 191
- 6.0.28 ChartDirector: Shape Specification 195
- 6.0.29 Copy styled text? 196
- 6.0.30 Do you have code to validate a credit card number? 197
- 6.0.31 Do you have plugins for X-Rite EyeOne, eXact or i1Pro? 198
- 6.0.32 Does SQL Plugin handle stored procedures with multiple result sets? 198
- 6.0.33 Does the plugin home home? 198
- 6.0.34 folderitem.absolutepath is limited to 255 chars. How can I get longer ones? 199
- 6.0.35 Has anyone played round with using CoreImage to do things like add dissolve transitions say when changing from one tab to another within a window? 199
- 6.0.36 How about Plugin support for older OS X? 200
- 6.0.37 How can I detect whether an Intel CPU is a 64bit CPU? 201
- 6.0.38 How can I disable the close box of a window on Windows? 202
- 6.0.39 How can I get all the environment variables from Windows? 202
- 6.0.40 How can i get similar behavior to Roxio Toast or iTunes where clicking a 'burn' button allows the next inserted blank CD-R to bypass the Finder and be accepted by my application? 203
- 6.0.41 How can I get text from a PDF? 203
- 6.0.42 How can I get text from a Word Document? 203
- 6.0.43 How can I get the item string for a given file creator? 204
- 6.0.44 How can I launch an app using it's creator code? 205
- 6.0.45 How can I learn what shared libraries are required by a plugin on Linux? 205
- 6.0.46 How can I validate an email address? 207
- 6.0.47 How do I decode correctly an email subject? 207

	157
• 6.0.48 How do I enable/disable a single tab in a tabpanel?	208
• 6.0.49 How do I find the root volume for a file?	209
• 6.0.50 How do I get the current languages list?	209
• 6.0.51 How do I get the Mac OS Version?	210
• 6.0.52 How do I get the printer name?	211
• 6.0.53 How do I make a metal window if RB does not allow me this?	212
• 6.0.54 How do I make a smooth color transition?	212
• 6.0.55 How do I read the applications in the dock app?	213
• 6.0.56 How do I truncate a file?	214
• 6.0.57 How do update a Finder's windows after changing some files?	214
• 6.0.58 How to access a USB device directly?	215
• 6.0.59 How to add icon to file on Mac?	215
• 6.0.60 How to ask the Mac for the Name of the Machine?	215
• 6.0.61 How to automatically enable retina in my apps?	216
• 6.0.62 How to avoid leaks with Cocoa functions?	216
• 6.0.63 How to avoid trouble connecting to oracle database with SQL Plugin?	217
• 6.0.64 How to avoid <code>__NSAutoreleaseNoPool</code> console messages in threads?	217
• 6.0.65 How to bring app to front?	218
• 6.0.66 How to bring my application to front?	218
• 6.0.67 How to catch Control-C on Mac or Linux in a console app?	219
• 6.0.68 How to change name of application menu?	219
• 6.0.69 How to change the name in the menubar of my app on Mac OS X?	220
• 6.0.70 How to check if a folder/directory has subfolders?	220
• 6.0.71 How to check if Macbook runs on battery or AC power?	221
• 6.0.72 How to check if Microsoft Outlook is installed?	222
• 6.0.73 How to check on Mac OS which country or language is currently selected?	222
• 6.0.74 How to code sign my app with plugins?	223
• 6.0.75 How to collapse a window?	223
• 6.0.76 How to compare two pictures?	224

- 6.0.77 How to compile PHP library? 226
- 6.0.78 How to convert a `BrowserType` to a `String` with `WebSession.Browser`? 227
- 6.0.79 How to convert a `EngineType` to a `String` with `WebSession.Engine`? 228
- 6.0.80 How to convert a `PlatformType` to a `String` with `WebSession.Platform`? 228
- 6.0.81 How to convert a text to iso-8859-1 using the `TextEncoder`? 229
- 6.0.82 How to convert `ChartTime` back to Xojo date? 230
- 6.0.83 How to convert line endings in text files? 230
- 6.0.84 How to convert picture to string and back? 231
- 6.0.85 How to copy an array? 232
- 6.0.86 How to copy an dictionary? 232
- 6.0.87 How to copy parts of a movie to another one? 232
- 6.0.88 How to create a birthday like calendar event? 233
- 6.0.89 How to create a GUID? 234
- 6.0.90 How to create a Mac picture clip file? 234
- 6.0.91 How to create a PDF file in Xojo? 235
- 6.0.92 How to create `EmailAttachment` for PDF Data in memory? 235
- 6.0.93 How to create PDF for image files? 236
- 6.0.94 How to CURL Options translate to Plugin Calls? 237
- 6.0.95 How to delete file with ftp and curl plugin? 238
- 6.0.96 How to detect display resolution changed? 238
- 6.0.97 How to detect retina? 239
- 6.0.98 How to disable force quit? 239
- 6.0.99 How to disable the error dialogs from Internet Explorer on javascript errors? 239
- 6.0.100 How to display a PDF file in Xojo? 239
- 6.0.101 How to do a lottery in RB? 240
- 6.0.102 How to do an asycron DNS lookup? 241
- 6.0.103 How to draw a dashed pattern line? 241
- 6.0.104 How to draw a nice antialiased line? 242
- 6.0.105 How to dump java class interface? 243

	159
• 6.0.106 How to duplicate a picture with mask or alpha channel?	244
• 6.0.107 How to enable assistive devices?	245
• 6.0.108 How to encrypt a file with Blowfish?	245
• 6.0.109 How to extract text from HTML?	246
• 6.0.110 How to find empty folders in a folder?	246
• 6.0.111 How to find iTunes on a Mac OS X machine fast?	246
• 6.0.112 How to find network interface for a socket by it's name?	247
• 6.0.113 How to find version of Microsoft Word?	248
• 6.0.114 How to fix CURL error 60/53 on connecting to server?	249
• 6.0.115 How to format double with n digits?	249
• 6.0.116 How to get a time converted to user time zone in a web app?	250
• 6.0.117 How to get an handle to the frontmost window on Windows?	250
• 6.0.118 How to get CFAbsoluteTime from date?	251
• 6.0.119 How to get client IP address on web app?	251
• 6.0.120 How to get fonts to load in charts on Linux?	251
• 6.0.121 How to get fonts to load in DynaPDF on Linux?	252
• 6.0.122 How to get GMT time and back?	253
• 6.0.123 How to get good crash reports?	253
• 6.0.124 How to get list of all threads?	254
• 6.0.125 How to get parameters from webpage URL in Xojo Web Edition?	254
• 6.0.126 How to get the color for disabled textcolor?	254
• 6.0.127 How to get the current free stack space?	255
• 6.0.128 How to get the current timezone?	256
• 6.0.129 How to get the current window title?	257
• 6.0.130 How to get the cursor blink interval time?	258
• 6.0.131 How to get the list of the current selected files in the Finder?	259
• 6.0.132 How to get the Mac OS system version?	260
• 6.0.133 How to get the Mac OS Version using System.Gestalt?	260
• 6.0.134 How to get the screensize excluding the task bar?	261

- 6.0.135 How to get the size of the frontmost window on Windows? 261
- 6.0.136 How to get the source code of a HTMLViewer? 262
- 6.0.137 How to get Xojo apps running Linux? 262
- 6.0.138 How to handle really huge images with GraphicsMagick or ImageMagick? 262
- 6.0.139 How to handle tab key for editable cells in listbox? 263
- 6.0.140 How to hard link MapKit framework? 264
- 6.0.141 How to have a PDF downloaded to the user in a web application? 265
- 6.0.142 How to hide all applications except mine? 265
- 6.0.143 How to hide script errors in HTMLViewer on Windows? 266
- 6.0.144 How to hide the grid/background/border in ChartDirector? 266
- 6.0.145 How to hide the mouse cursor on Mac? 266
- 6.0.146 How to insert image to NSTextView or TextArea? 266
- 6.0.147 How to jump to an anchor in a htmlviewer? 267
- 6.0.148 How to keep a movieplayer unclickable? 267
- 6.0.149 How to keep my web app from using 100% CPU time? 268
- 6.0.150 How to kill a process by name? 268
- 6.0.151 How to know how many CPUs are present? 269
- 6.0.152 How to know the calling function? 269
- 6.0.153 How to launch an app using it's creator code? 270
- 6.0.154 How to launch disc utility? 270
- 6.0.155 How to make a lot of changes to a REAL SQL Database faster? 271
- 6.0.156 How to make a NSImage object for my retina enabled app? 271
- 6.0.157 How to make a window borderless on Windows? 271
- 6.0.158 How to make an alias using AppleEvents? 272
- 6.0.159 How to make AppleScripts much faster? 273
- 6.0.160 How to make double clicks on a canvas? 273
- 6.0.161 How to make my Mac not sleeping? 275
- 6.0.162 How to make my own registration code scheme? 276
- 6.0.163 How to make small controls on Mac OS X? 276

	161
• 6.0.164 How to mark my Mac app as background only?	277
• 6.0.165 How to move a file or folder to trash?	277
• 6.0.166 How to move an application to the front using the creator code?	278
• 6.0.167 How to move file with ftp and curl plugin?	279
• 6.0.168 How to normalize string on Mac?	279
• 6.0.169 How to obscure the mouse cursor on Mac?	280
• 6.0.170 How to open icon file on Mac?	280
• 6.0.171 How to open PDF in acrobat reader?	280
• 6.0.172 How to open printer preferences on Mac?	281
• 6.0.173 How to open special characters panel on Mac?	282
• 6.0.174 How to optimize picture loading in Web Edition?	282
• 6.0.175 How to parse XML?	282
• 6.0.176 How to play audio in a web app?	283
• 6.0.177 How to pretty print xml?	284
• 6.0.178 How to print to PDF?	284
• 6.0.179 How to query Spotlight's Last Open Date for a file?	285
• 6.0.180 How to quit windows?	286
• 6.0.181 How to read a CSV file correctly?	286
• 6.0.182 How to read the command line on windows?	287
• 6.0.183 How to render PDF pages with PDF Kit?	287
• 6.0.184 How to restart a Mac?	288
• 6.0.185 How to resume ftp upload with curl plugin?	288
• 6.0.186 How to rotate a PDF page with CoreGraphics?	289
• 6.0.187 How to rotate image with CoreImage?	290
• 6.0.188 How to run a 32 bit application on a 64 bit Linux?	291
• 6.0.189 How to save HTMLViewer to PDF with landscape orientation?	291
• 6.0.190 How to save RTFD?	291
• 6.0.191 How to save RTFD?	292
• 6.0.192 How to scale a picture proportionally with mask?	292

- 6.0.193 How to scale a picture proportionally? 293
- 6.0.194 How to scale/resize a CImageMBS? 294
- 6.0.195 How to scale/resize a picture? 295
- 6.0.196 How to search with regex and use unicode codepoints? 295
- 6.0.197 How to see if a file is invisible for Mac OS X? 296
- 6.0.198 How to set cache size for SQLite or REALSQLDatabase? 297
- 6.0.199 How to set the modified dot in the window? 297
- 6.0.200 How to show a PDF file to the user in a Web Application? 297
- 6.0.201 How to show Keyboard Viewer programmatically? 298
- 6.0.202 How to show the mouse cursor on Mac? 299
- 6.0.203 How to shutdown a Mac? 299
- 6.0.204 How to sleep a Mac? 300
- 6.0.205 How to speed up rasterizer for displaying PDFs with DynaPDF? 300
- 6.0.206 How to use PDFLib in my RB application? 300
- 6.0.207 How to use quotes in a string? 301
- 6.0.208 How to use Sybase in Web App? 301
- 6.0.209 How to use the Application Support folder? 301
- 6.0.210 How to use the IOPMCopyScheduledPowerEvents function in Xojo? 302
- 6.0.211 How to validate a GUID? 305
- 6.0.212 How to walk a folder hierarchie non recursively? 305
- 6.0.213 I got this error: PropVal, QDPictMBS.Name (property value), Type mismatch error. Expected CGDataProviderMBS, but got Variant, Name:QDPictMBS 306
- 6.0.214 I registered the MBS Plugins in my application, but later the registration dialog is shown. 306
- 6.0.215 I want to accept Drag & Drop from iTunes 307
- 6.0.216 I'm drawing into a listbox but don't see something. 309
- 6.0.217 I'm searching for a method or so to move a window from position x.y to somewhere else on the screen. 309
- 6.0.218 If I use one of your plug-ins under windows, would this then impose the use of dll after compilation or my would my compiled soft still be a stand-alone single file software? 309
- 6.0.219 Is the fn key on a powerbook keyboard down? 310
- 6.0.220 Is there a case sensitive Dictionary? 310

- 6.0.221 Is there a way to use the MBS plugin to get only the visible item and folder count on a volume?
311
- 6.0.222 Is there an easy way I can launch the Displays preferences panel? 311
- 6.0.223 List of Windows Error codes? 312
- 6.0.224 Midi latency on Windows problem? 312
- 6.0.225 My Xojo Web App does not launch. Why? 312
- 6.0.226 SQLiteDatabase not initialized error? 313
- 6.0.227 Textconverter returns only the first x characters. Why? 313
- 6.0.228 The type translation between CoreFoundation/Foundation and Xojo data types. 314
- 6.0.229 Uploaded my web app with FTP, but it does not run on the server! 316
- 6.0.230 What classes to use for hotkeys? 316
- 6.0.231 What do I need for Linux to get picture functions working? 316
- 6.0.232 What does the NAN code mean? 317
- 6.0.233 What font is used as a 'small font' in typical Mac OS X apps? 317
- 6.0.234 What is last plugin version to run on Mac OS X 10.4? 318
- 6.0.235 What is last plugin version to run on PPC? 318
- 6.0.236 What is last version of the plugins for macOS 32-bit? 319
- 6.0.237 What is the difference between Timer and WebTimer? 319
- 6.0.238 What is the list of Excel functions? 319
- 6.0.239 What is the replacement for PluginMBS? 320
- 6.0.240 What to do on Xojo reporting a conflict? 320
- 6.0.241 What to do with a NSImageCacheException? 321
- 6.0.242 What to do with MySQL Error 2014? 321
- 6.0.243 What to do with SQL Plugin reporting Malformed string as error? 321
- 6.0.244 Where is CGGetActiveDisplayListMBS? 321
- 6.0.245 Where is CGGetDisplaysWithPointMBS? 322
- 6.0.246 Where is CGGetDisplaysWithRectMBS? 322
- 6.0.247 Where is CGGetOnlineDisplayListMBS? 322
- 6.0.248 Where is GetObjectClassNameMBS? 322
- 6.0.249 Where is NetworkAvailableMBS? 322

- 6.0.250 Where is StringHeight function in DynaPDF? 323
- 6.0.251 Where is XLSDocumentMBS class? 323
- 6.0.252 Where to get information about file formats? 323
- 6.0.253 Where to register creator code for my application? 324
- 6.0.254 Which Mac OS X frameworks are 64bit only? 324
- 6.0.255 Which plugins are 64bit only? 325
- 6.0.256 Why application doesn't launch because of a missing ddraw.dll!? 325
- 6.0.257 Why application doesn't launch because of a missing shlwapi.dll!? 325
- 6.0.258 Why do I hear a beep on keydown? 325
- 6.0.259 Why does folderitem.item return nil? 325
- 6.0.260 Why doesn't showurl work? 325
- 6.0.261 Why don't the picture functions not work on Linux? 326
- 6.0.262 Why have I no values in my chart? 326
- 6.0.263 Will application size increase with using plugins? 326
- 6.0.264 XLS: Custom format string guidelines 326
- 6.0.265 Xojo doesn't work with your plugins on Windows 98. 327
- 6.0.266 Xojo or my RB application itself crashes on launch on Mac OS Classic. Why? 328

Chapter 6

The FAQ

6.0.1 Can anyone help me convert seconds to time in this format hh:mm:ss?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Sure, here's a routine I use (which has an advantage over the previously-posted Date-based solution in that you don't have to rely on the creation of an object – all that happens is some division and string concatenation):

Example:

```
Function SecsToTimeString(timeInSecs as Integer, padHours as boolean, padMinutes as boolean) as string
// Given an amount time (in seconds), generates a string representing that amount
// of time. The padHours and padMinutes parameters determine whether to display
// hours and minutes if their values are zero.
```

```
// Examples:
// timeInSecs = 90, padHours = true; returns "00:01:30"
// timeInSecs = 1, padHours = false, padMinutes = true; returns "00:01"
// timeInSecs = 3601, padMinutes = false; returns "01:00:01"
```

```
dim hours, minutes, seconds as Integer
dim hoursString, minutesString as string
```

```
hours = timeInSecs / 3600
minutes = (timeInSecs mod 3600) / 60
seconds = timeInSecs mod 60
```

```
if hours = 0 then
if padHours then
hoursString = "00:"
else
hoursString = ""
end if
```

```

else
hoursString = Format(hours, "##\:")
end if
if minutes = 0 then
if hours <>0 or padMinutes then
minutesString = "00:"
else
minutesString = ""
end if
else
minutesString = Format(minutes, "00\:")
end if

return hoursString + minutesString + Format(seconds, "00")
End Function

```

Notes: (from the rb mailinglist)

6.0.2 Do you have plugins for Android?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Since there is no plugin SDK for Android, we have no way to make a plugin for Android.

Notes: We support macOS, Windows, Linux and iOS.

6.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use functions from NSColor to get proper highlight color in RGB:

Example:

```

Function ProperHighlightColor(active as Boolean) As Color
#if TargetCocoa
Dim theColor As NSColorMBS
If active Then
theColor = NSColorMBS.alternateSelectedControlColor
Else
theColor = NSColorMBS.secondarySelectedControlColor
End If

```

```

Dim rgbColor As NSColorMBS = theColor.colorUsingColorSpaceName(NSColorSpaceMBS.NSCalibrate-

```

```

dRGBColorSpace)
If rgbColor <>Nil Then
Dim red as Integer = rgbColor.redComponent * 255.0
Dim green as Integer = rgbColor.greenComponent * 255.0
Dim blue as Integer = rgbColor.blueComponent * 255.0
Return RGB(red, green, blue)
Else
Return HighlightColor
End If
#else
return HighlightColor
#endif
End Function

```

Notes: As you see we convert color to Calibrated RGB for best results.
See also:

- 6.0.4 How to catch delete key? 167
- 6.0.5 How to convert cmyk to rgb? 168
- 6.0.6 How to delete a folder? 169
- 6.0.7 How to detect if CPU is 64bit processor? 170
- 6.0.8 How to query variant type string for a variant? 171
- 6.0.9 How to refresh a htmlviewer on Windows? 172

6.0.4 How to catch delete key?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: The following is the code in keydown event catches delete or backspace keys.

Example:

```

Function KeyDown(Key As String) As Boolean
if asc(key) = 8 or asc(key) = 127 then
MsgBox "Delete"
Return true
end if
End Function

```

See also:

- 6.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 166

- 6.0.5 How to convert cmyk to rgb? 168
- 6.0.6 How to delete a folder? 169
- 6.0.7 How to detect if CPU is 64bit processor? 170
- 6.0.8 How to query variant type string for a variant? 171
- 6.0.9 How to refresh a htmlviewer on Windows? 172

6.0.5 How to convert cmyk to rgb?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer:

The following is the code to convert cmyk values to an RGB color datatype.

It's just a basic estimate of the color values. If you are looking for completely color accurate solution, this is not it. It should work for most people. :)

Example:

Function CMYKToRGB(c as Integer, m as Integer, y as Integer, k as Integer) As color

// converts c,m,y,k values (0-100) to color data type RGB

// place this in a method. Supply C,M,Y,K values-

// it returns color datatype

```
dim color_RGB as color
```

```
dim r, g, b as Integer
```

```
r=255-round(2.55*(c+k))
```

```
if r<0 then
```

```
  r=0
```

```
end if
```

```
g=255-round(2.55*(m+k))
```

```
if g<0 then
```

```
  g=0
```

```
end if
```

```
b=255-round(2.55*(y+k))
```

```
if b<0 then
```

```
  b=0
```

```
end if
```

```
color_RGB=RGB(r,g,b)
```

```
return color_RGB
```

```
End Function
```

Notes:

(from the rb mailinglist)
See also:

- 6.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 166
- 6.0.4 How to catch delete key? 167
- 6.0.6 How to delete a folder? 169
- 6.0.7 How to detect if CPU is 64bit processor? 170
- 6.0.8 How to query variant type string for a variant? 171
- 6.0.9 How to refresh a htmlviewer on Windows? 172

6.0.6 How to delete a folder?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: The following is the code that deletes a folder recursively.

Example:

```
Sub deletefolder(f as folderitem)
dim files(-1) as FolderItem

if f=nil then Return

// delete single file
if f.Directory=false then
f.Delete
Return
end if

// get a list of all items in that folder
dim i,c as Integer
c=F.Count
for i=1 to c
files.Append f.TrueItem(i)
next

// delete each item
for each fo as FolderItem in files
if fo=nil then
' ignore
elseif fo.Directory then
deletefolder fo
fo.delete
else ' file
```

```
fo.Delete
end if
next
```

```
f.Delete
End Sub
```

See also:

- 6.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 166
- 6.0.4 How to catch delete key? 167
- 6.0.5 How to convert cmyk to rgb? 168
- 6.0.7 How to detect if CPU is 64bit processor? 170
- 6.0.8 How to query variant type string for a variant? 171
- 6.0.9 How to refresh a htmlviewer on Windows? 172

6.0.7 How to detect if CPU is 64bit processor?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Via CPUID you can ask CPU:

Example:

```
dim c as new CPUIDMBS

if c.Flags(CPUIDMBS.kFeatureLM) then
MsgBox "64-bit CPU"
else
MsgBox "32-bit CPU"
end if
```

Notes: Should work on all intel compatible CPUs.

See also:

- 6.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 166
- 6.0.4 How to catch delete key? 167
- 6.0.5 How to convert cmyk to rgb? 168
- 6.0.6 How to delete a folder? 169
- 6.0.8 How to query variant type string for a variant? 171
- 6.0.9 How to refresh a htmlviewer on Windows? 172

6.0.8 How to query variant type string for a variant?

Plugin Version: 20.5, Platforms: macOS, Linux, Windows.

Answer: The following example function returns type string for variant.

Example:

```
Public Function VariantTypeString(v as Variant) as string
// Xojo's VarType doesn't know Unsigned integers
'Dim type As Integer = VarType(v)

// MBS VarType can detect unsigned integer
Dim type As Integer = GetVariantTypeMBS(v)

Dim IsArray As Boolean = BitwiseAnd(type, Variant.TypeArray) = Variant.TypeArray

// type without array
type = BitwiseAnd(type, Bitwise.OnesComplement(Variant.TypeArray))

// build a dictionary to map types on first call
Static TypeMap As Dictionary
If TypeMap = Nil Then
TypeMap = New Dictionary
TypeMap.Value(Variant.TypeBoolean) = "Boolean"
TypeMap.Value(Variant.TypeCFStringRef) = "CFStringRef"
TypeMap.Value(Variant.TypeColor) = "Color"
TypeMap.Value(Variant.TypeCString) = "CString"
TypeMap.Value(Variant.TypeCurrency) = "Currency"
TypeMap.Value(Variant.TypeDate) = "Date"
TypeMap.Value(Variant.TypeDateTime) = "DateTime"
TypeMap.Value(Variant.TypeDouble) = "Double"
TypeMap.Value(Variant.TypeInt32) = "Int32"
TypeMap.Value(Variant.TypeInt64) = "Int64"
TypeMap.Value(Variant.TypeInteger) = "Integer"
TypeMap.Value(Variant.TypeNil) = "Nil"
TypeMap.Value(Variant.TypeObject) = "Object"
TypeMap.Value(Variant.TypeOSType) = "OSType"
TypeMap.Value(Variant.TypePString) = "PString"
TypeMap.Value(Variant.TypePtr) = "Ptr"
TypeMap.Value(Variant.TypeSingle) = "Single"
TypeMap.Value(Variant.TypeString) = "String"
TypeMap.Value(Variant.TypeStructure) = "Structure"
TypeMap.Value(Variant.TypeText) = "Text"
TypeMap.Value(Variant.TypeWindowPtr) = "WindowPtr"
TypeMap.Value(Variant.TypeWString) = "WString"

// MBS extra types
TypeMap.Value(Variant.TypeInt32+100) = "UInt32"
TypeMap.Value(Variant.TypeInt64+100) = "UInt64"
```

End If

```
// lookup type

#if DebugBuild then
If Not TypeMap.HasKey(type) Then
Break // missing type
End If
#endif

If IsArray Then
Return "Array of " + TypeMap.Lookup(type,"?")
Else
Return TypeMap.Lookup(type,"?")
End If
End Function
```

See also:

- 6.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 166
- 6.0.4 How to catch delete key? 167
- 6.0.5 How to convert cmyk to rgb? 168
- 6.0.6 How to delete a folder? 169
- 6.0.7 How to detect if CPU is 64bit processor? 170
- 6.0.9 How to refresh a htmlviewer on Windows? 172

6.0.9 How to refresh a htmlviewer on Windows?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can ask the browser to reload the website with this code line:

Example:

```
call htmlViewer1.IERunJavaScriptMBS("javascript:document.location.reload()")
```

See also:

- 6.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 166
- 6.0.4 How to catch delete key? 167
- 6.0.5 How to convert cmyk to rgb? 168

- 6.0.6 How to delete a folder? 173
- 6.0.7 How to detect if CPU is 64bit processor? 169
- 6.0.8 How to query variant type string for a variant? 170

6.0.10 Is there an example for vector graphics in Xojo?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Try this example inside the paint event of a window:

Example:

```
dim v as Group2D
dim r as RectShape
dim s as StringShape
```

```
const pi=3.14
```

```
s=new StringShape
s.Text="Hello World!"
s.TextFont="Geneva"
s.TextSize=24
s.FillColor=rgb(0,0,255)
s.Italic=true
s.y=5
s.x=0
```

```
r=new RectShape
```

```
r.X=0
r.y=0
r.Height=100
r.Width=180
r.BorderColor=rgb(255,0,0)
r.FillColor=rgb(0,255,0)
r.BorderWidth=5
r.Border=50
```

```
v=new Group2d
v.Append r
v.Append s
v.Rotation=pi*-20.0/180.0
v.x=150
v.y=150
```

```
g.DrawObject v
```

6.0.11 Picture functions do not preserve resolution values?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Yes, the picture functions return pictures with no/default resolution values.

Example:

```
dim l as Picture = LogoMBS(500)
```

```
l.HorizontalResolution = 300
```

```
l.VerticalResolution = 300
```

```
dim r as Picture = l.Rotate90MBS
```

```
MsgBox str(r.HorizontalResolution)+" x "+str(r.VerticalResolution)
```

```
r.HorizontalResolution = l.HorizontalResolution
```

```
r.VerticalResolution = l.VerticalResolution
```

```
MsgBox str(r.HorizontalResolution)+" x "+str(r.VerticalResolution)
```

Notes: So please fix them yourself after calling a function.

Maybe in the future this changes, but currently you can't really set this easily from plugin code.

6.0.12 A toolbox call needs a rect - how do I give it one?

Plugin Version: all, Platforms: macOS, Windows.

Answer: Fill a memoryblock like this:

Example:

```
Dim MB As Memoryblock
```

```
MB = NewMemoryBlock(8)
```

```
MB.Short(0) = window1.Top
```

```
MB.Short(2) = window1.Left
```

```
MB.Short(4) = window1.Height+window1.Top // bottom
```

```
MB.Short(6) = window1.Width+window1.Left // right
```

6.0.13 API client not supported?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: If you get this exception message on `SQLConnectionMBS.Connect`, we may have a problem.

Notes: First case is that the given thing is not supported (e.g. MS SQL directly on Mac).

Second case is that the plugin compilation went wrong and the support for the database was not linked into the plugin. Like MySQL missing or MS SQL on Windows missing. In that case please contact us to fix the plugin.

6.0.14 Can I access Access Database with Java classes?

Plugin Version: all, Platform: Windows.

Answer: You can use `ucanaccess` to access databases created with Microsoft

Example:

```

dim options(-1) as string

// load all the jar files we have in a folder called java:

dim appFolder as FolderItem = GetFolderItem("")

Dim count as Integer = appFolder.Parent.Child("java").Count
dim libjs() as string
For i as Integer = 1 to count
Dim f As FolderItem = appFolder.Parent.Child("java").item(i)
If f <> Nil and f.Exists Then
libjs.append f.NativePath+";"
End If
Next

// now init virtual machine
dim library as string = Join(libjs, "")
dim vm as new JavaVMMBS(library)

if vm.Handle = 0 then
MsgBox "Failed to initialize virtual machine"
else
// now make a new database connection with ucanaccess
dim d as new JavaDatabaseMBS(vm,"net.ucanaccess.jdbc.UcanaccessDriver")
Dim DbFile as FolderItem = appFolder.Parent.Child("Database11.accdb")
dim j as JavaConnectionMBS = d.getConnection("jdbc:ucanaccess://" + DbFile.NativePath)

// select and show values
dim r as JavaResultSetMBS = j.MySelectSQL("Select * From test")
while r.NextRecord
MsgBox r.getString("FirstName") + " " + r.getString("LastName")
wend

end if

```

Exception e as JavaExceptionMBS
MsgBox e.message+" **errorcode:** "+str(e.ErrorNumber)

Notes: see website:
<http://ucanaccess.sourceforge.net/site.html>

6.0.15 Can I create PDF from Xojo Report using DynaPDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Yes, we have a graphics class integration for DynaPDF.

Notes: Since MBS Plugin in version 19.2, we can integrate reports with Xojo.

6.0.16 Can I use AppleScripts in a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Yes, but they run on the server, not on the client.

Example:

```
dim a as new AppleScriptMBS

// query my application name
a.Compile "tell application ""System Events"" to return name of current application"

// run
a.Execute

// show result
label1.text = a.Result

// shows something like "My Application.fcgi.debug"
```

Notes: This can be useful to control the server from remote, if and only if the your sever is running Mac OS X.

6.0.17 Can I use graphics class with DynaPDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Sorry, no. We can't provide a graphics subclass from plugin.

Notes: This is a feature request to allow graphics subclasses:
Feedback case 11391: [feedback://showreport?report_id=11391](https://feedback.apple.com/feedback/showreport?report_id=11391)

6.0.18 Can I use sockets on a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Yes, but they run on the server, not on the client.

Notes: You can use `HTTPSocket`, `SMTPSocket`, `POP3Socket`, `SMTPSecureSocket`, `SecurePOP3Socket`, `EasyTCPSocket`, `EasyUDPSocket`, `AutoDiscovery`, our Bonjour classes or our `CURL*` classes. But all of them work on the server, not on the client.

This means if you search for a printer with Bonjour, you can find the printers in the local network on your server hosting site. Using `SMTPSocket` may be a good idea for sending emails from the server like notifications.

6.0.19 Can I use your ChartDirector plugin on a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Yes, our ChartDirector plugin works just fine on the Xojo Web Edition.

Example:

```
// The data for the pie chart
dim data(-1) as Double=array(55.0, 18.0, 25.0, 22.0, 18.0, 30.0, 35.0)

// The labels for the pie chart, Words are chosen random to check font!
dim labels(-1) as string=array("Germany", "Italy", "France", "Spain", "UK", "Poland", "Russia")

// The colors to use for the sectors
dim colors(-1) as Integer

colors.Append &h66aaee
colors.Append &heebb22
colors.Append &hbbsbbb
colors.Append &h8844ff

if TargetLinux then
  CDBaseChartMBS.SetFontSearchPath "/usr/share/fonts/truetype/msttcorefonts"
end if

// Create a PieChart object of size 360 x 300 pixels
dim c as new CDPieChartMBS(700, 600)
```

```

c.setBackground(c.linearGradientColor(0, 0, 0, c.getHeight(), &h0000cc, &h000044))
c.setRoundedFrame(&hffffff, 16)
dim tt as CDTextBoxMBS = c.addTitle("ChartDirector Demonstration", "timesbi.ttf", 18)
tt.setMargin(0, 0, 16, 0)
tt.setFontColor(&hFFFFFF)

// Set the center of the pie at (180, 140) and the radius to 100 pixels
c.setPieSize 350,300,150
// Set the sector colors
c.setColors(c.kDataColor, colors)

// Draw the pie in 3D with a pie thickness of 20 pixels
c.set3D(20)

dim t as CDTextBoxMBS = c.setLabelStyle("arialbd.ttf", 10, &h000000)
t.setBackground(CDPieChartMBS.kSameAsMainColor, CDPieChartMBS.kTransparent, CDPieChartMBS.soft-
Lighting(CDPieChartMBS.kRight, 0))
t.setRoundedCorners(8)

// Use local gradient shading for the sectors, with 5 pixels wide
// semi-transparent white (bbffffff) borders
c.setSectorStyle(CDPieChartMBS.kLocalGradientShading, &hbbffffff, 0)

// Set the pie data and the pie labels
c.setData data,labels
call c.setLabelStyle "arialbd.ttf",18

dim pic as picture = c.makeChartPicture
dim wp as new WebPicture(pic, Picture.FormatJPEG) // JPEG makes it smaller and faster

ImageView1.Picture=wp

```

Notes: Be aware that our plugin produces pictures for you, which you assign to ImageViews. Transferring those pictures takes time, so you can optimize that with using WebPicture class. There you can decide between different compressions to improve speed (use JPEG instead of PNG).

e.g. if you use ubuntu, you can install the ttf-mscorefonts-installer package and call this method with "/usr/share/fonts/truetype/msttcorefonts" as the path. No backslash on the end of a path, please.

6.0.20 Can I use your DynaPDF plugin on a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Yes, our DynaPDF plugin works just fine on the Xojo Web Edition.

Notes: PDF files are created on the server. You may want to offer a preview to the user which uses reduced resolution images to reduce the time to download the PDF.

See our Create PDF example for the Xojo Web Edition.

6.0.21 Can I use your plugin controls on a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: No.

6.0.22 Can you get an unique machine ID?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: There is nothing like an unique machine ID.

Notes: 1:

You can use the MAC IDs of the network interfaces.

This can be changed by the user with software tools.

And the list of network interfaces changes if user reorder the interfaces.

2:

You can use the system folder creation date/time.

This may stay equal after cloning machines or after migration to new PC.

3:

You can use the Mac Serialnumber.

Mac only and it can happen that a Mac does not have a serial number.

4:

You can use the x86 CPU ID.

This is x86 CPU only and does not avoid running on the same CPU in different PCs.

6.0.23 ChartDirector: Alignment Specification

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

Answer: ChartDirector: Alignment Specification

Notes: In many ChartDirector objects, you may specify the alignment of the object's content relative to its boundary. For example, for a TextBox object, you may specify the text's alignment relative to the box boundary by using `TextBox.setAlignment`.

The ChartDirector API defines several constants for the alignment options.

ConstantValueDescription

BottomLeft	1	The leftmost point on the bottom line.
BottomCenter	2	The center point on the bottom line.
BottomRight	3	The rightmost point on the bottom line.
Left	4	The leftmost point on the middle horizontal line.
Center	5	The center point on the middle horizontal line.
Right	6	The rightmost point on the middle horizontal line.
TopLeft	7	The leftmost point on the top line.
TopCenter	8	The center point on the top line.
TopRight	9	The rightmost point on the top line.
Bottom	2	The center point on the bottom line. Same as BottomCenter.
Top	8	The center point on the top line. Same as TopCenter.
TopLeft2	10	An alternative top-left position used in <code>Axis.setTitlePos</code> for axis title positioning only. For a vertical axis, TopLeft2 refers to refers to the left of the top side, while TopLeft refers to the top of the left side. The reverse applies for a horizontal axis.
TopRight2	11	An alternative top-right position used in <code>Axis.setTitlePos</code> for axis title positioning only. For a vertical axis, TopRight2 refers to refers to the right of the top side, while TopRight refers to the top of the right side. The reverse applies for a horizontal axis.
BottomLeft2	12	An alternative bottom-left position used in <code>Axis.setTitlePos</code> for axis title positioning only. For a vertical axis, BottomLeft2 refers to refers to the left of the bottom side, while BottomLeft refers to the bottom of the left side. The reverse applies for a horizontal axis.
BottomRight2	13	An alternative bottom-right position used in <code>Axis.setTitlePos</code> for axis title positioning only. For a vertical axis, BottomRight2 refers to refers to the right of the bottom side, while BottomRight refers to the bottom of the right side. The reverse applies for a horizontal axis.

6.0.24 ChartDirector: Color Specification

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

Answer: ChartDirector: Color Specification

Notes: Many functions in the ChartDirector API accept colors as parameters. ChartDirector supports col-

ors specified in web and HTML compatible ARGB format, in which ARGB refers to the Alpha transparency, Red, Green and Blue components of the color.

In addition to ARGB colors, ChartDirector supports "dynamic" colors. A dynamic color is a color that changes depending on the position of the pixels. The "dynamic" colors that ChartDirector supports include "pattern colors", "metal colors", "gradient colors", "zone colors" and "dash line colors".

ChartDirector supports specifying colors indirectly using "palette colors". When a "palette color" is used, the color is specified as an index to a palette. The actual color is looked up from the palette. ARGB Color ARGB color consists of 4 components - alpha transparency, red, green and blue. The four components are encoded as a 32-bit number, with each component occupying 8 bits. In hexadecimal notation, it is AAR-RGGBB, where AA, RR, GG and BB are the alpha transparency, red, green and blue components.

Each component ranges from 00 - FF (0 - 255), representing its intensity. For example, pure red color is 00FF0000, pure green color is 0000FF00, and pure blue color is 000000FF. White color is 00FFFFFF, and black color is 00000000.

Most programming language requires you to put special prefix in front of hexadecimal characters. For C++, the prefix is "0x". For example, the syntax for the hexadecimal number 00FFFFFF is 0x00FFFFFF, or simply 0xFFFFFF.

For the alpha transparency component, a zero value means the color is not transparent at all. This is equivalent to traditional RGB colors. A non-zero alpha transparency means the color is partially transparent. The larger the alpha transparency, the more transparent the color will be. If a partially transparent color is used to draw something, the underlying background can still be seen.

For example, 80FF0000 is a partially transparent red color, while 00FF0000 is a non-transparent red color.

Note that ChartDirector's ARGB color is web and HTML compatible. For example, red is FF0000, the same as in HTML. There are many resources on the web that provide tables in which you can click a color and it will show its HTML color code. These color codes can be used in ChartDirector.

If alpha transparency is FF (255), the color is totally transparent. That means the color is invisible. It does not matter what the RGB components are. So in ChartDirector, only one totally transparent color is used - FF000000. All other colors of the form FFnnnnnn are reserved to represent palette colors and dynamic colors, and should not be interpreted as the normal ARGB colors.

The totally transparent color FF000000 is often used in ChartDirector to disable drawing something. For example, if you want to disable drawing the border of a rectangle, you can set the border color to totally transparent.

For convenience, ChartDirector defines a constant called Transparent, which is equivalent to FF000000. Pattern Color

A pattern color is a dynamic color that changes according to a 2D periodic pattern. When it is used to fill an area, the area will look like being tiled with a wallpaper pattern.

Pattern colors are created using `BaseChart.patternColor`, `BaseChart.patternColor2`, `DrawArea.patternColor` and `DrawArea.patternColor2`. The `patternColor` method creates pattern colors using an array of colors as a bitmap. The `patternColor2` method creates pattern colors by loading the patterns from image files.

These methods return a 32-bit integer acting as a handle to the pattern color. The handle can be used in any `ChartDirector` API that expects a color as its input.

A metal color is a color of which the brightness varies smoothly across the chart surface as to make the surface look shiny and metallic. `ChartDirector` supports using any color as the base color of the metal color. In particular, using yellow and grey as the base colors will result in metal colors that look gold and silver.

Metal colors are most often used as background colors of charts. They are created using `CDBaseChartMBS.metalColor`, `CDBaseChartMBS.goldColor` and `CDBaseChartMBS.silverColor`. The first method allows you to specify an arbitrary base color. The second and third methods use yellow and grey as the base colors, resulting in gold and silver metal colors.

These methods return a 32-bit integer acting as a handle to the gradient color. The handle can be used in any `ChartDirector` API that expects a color as its input.

A gradient color is a color that changes progressively across a direction.

Gradient colors are created using `BaseChart.gradientColor`, `BaseChart.gradientColor2`, `DrawArea.gradientColor` and `DrawArea.gradientColor2`. The `gradientColor` method creates a 2-point gradient color that changes from color A to color B. The `gradientColor2` method creates a multi-point gradient colors that changes from color A to B to C

These methods return a 32-bit integer acting as a handle to the gradient color. The handle can be used in any `ChartDirector` API that expects a color as its input.

One common use of multi-point gradient colors is to define colors that have metallic look and feel. Please refer to `DrawArea.gradientColor2` for details.

A dash line color is a color that switches on and off periodically. When used to draw a line, the line will appear as a dash line.

Dash line colors are created using `BaseChart.dashLineColor` and `DrawArea.dashLineColor`. They accept a line color and a dash pattern code as arguments, and return a 32-bit integer acting as a handle to the dash line color. The handle can be used in any `ChartDirector` API that expects a color as its input.

Zone Colors
A zone color is for XY charts only. It is a color that automatically changes upon reaching a data threshold value along the x-axis or y-axis. Zone colors are created using `Layer.xZoneColor`, `Layer.yZoneColor`, `XYChart.xZoneColor` or `XYChart.yZoneColor`.

Palette Colors
Palette colors are colors of the format `FFFFnnnn`, where the least significant 16 bits (`nnnn`) are the index to the palette. A palette is simply an array of colors. For a palette color, the actual color is obtained by

looking up the palette using the index. For example, the color FFFF0001 is the second color in the palette (first color is index 0).

The colors in the palette can be ARGB colors or "dynamic" colors (pattern, gradient and dash line colors).

The first eight palette colors have special significance. The first three palette colors are the background color, default line color, and default text color of the chart. The 4th to 7th palette colors are reserved for future use. The 8th color is a special dynamic color that is equal to the data color of the "current data set".

The 9th color (index = 8) onwards are used for automatic data colors. For example, in a pie chart, if the sector colors are not specified, ChartDirector will automatically use the 9th color for the first sector, the 10th color for the second sector, and so on. Similarly, for a multi-line chart, if the line colors are not specified, ChartDirector will use the 9th color for the first line, the 10th color for the second line, and so on.

The ChartDirector API defines several constants to facilitate using palette colors.

ConstantValueDescription

Palette	FFFF0000	The starting point of the palette. The first palette color is (Palette + 0). The nth palette color is (Palette + n - 1).
BackgroundColor	FFFF0000	The background color.
LineColor	FFFF0001	The default line color.
TextColor	FFFF0002	The default text color.
[Reserved]	FFFF0003 - FFFF0006	These palette positions are reserved. Future versions of ChartDirector may use these palette positions for colors that have special significance.
SameAsMainColor	FFFF0007	A dynamic color that is equal to the data color of the current data set. This color is useful for objects that are associated with data sets. For example, in a pie chart, if the sector label background color is SameAsMainColor, its color will be the same as the corresponding sector color.
DataColor	FFFF0008	The starting point for the automatic data color allocation.

When a chart is created, it has a default palette. You may modify the palette using BaseChart.setColor, BaseChart.setColors, or BaseChart.setColors2.

The advantages of using palette colors are that you can change the color schemes of the chart in one place. ChartDirector comes with several built-in palettes represented by the following predefined constants.

ConstantDescription

6.0.25 ChartDirector: Font Specification

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

defaultPalette	An array of colors representing the default palette. This palette is designed for drawing charts on white backgrounds (or lightly colored backgrounds).
whiteOnBlackPalette	An array of colors useful for drawing charts on black backgrounds (or darkly colored backgrounds).
transparentPalette	An array of colors useful drawing charts on white backgrounds (or lightly colored backgrounds). The data colors in this palette are all semi-transparent.

Answer: ChartDirector: Font Specification

Notes: Font Name

In ChartDirector, the font name is simply the file name that contains the font. For example, under the Windows platform, the "Arial" font is "arial.ttf", while the "Arial Bold" font is "arialbd.ttf".

NOTE: Mac OS X Specific Information

In Mac OS X, in addition to ".ttf", ChartDirector also supports Mac OS X font file formats, such as Font Suitcase files and Datafork files (.dfont). These files often contain multiple fonts. For example, the "GillSans.dfont" file contains 6 fonts.

So in addition to the file name, an index is needed to determine the font. The index is specified by appending a " | " character to the font name, followed by the index number. For example, the third font in "GillSans.dfont" is denoted as "GillSans.dfont | 2". (Note: The first font starts at 0.) If no index number is provided, the first font is assumed.

ChartDirector also supports using Mac OS X Font Manager names. For example, one may use "Gill Sans Light Italic" instead of using "GillSans.dfont | 1" as the font name. However, the Mac OS X Font Manager is active only if someone has logged into the Mac GUI console, so this method is only recommended for developing applications that run on the GUI console.

The sample programs that come with ChartDirector are designed to run on all operating systems, so they use generic font file names (eg. "arial.ttf") instead of Mac OS X specific names. To allow them to run on Mac OS X, ChartDirector on Mac OS X has a built-in table to map common font file names to Mac OS X font names:

"arial.ttf", "arialbd.ttf", "ariali.ttf" and "arialbi.ttf" are mapped to "Arial | 0" (Arial), "Arial | 1" (Arial Bold), "Arial | 2" (Arial Italic) and "Arial | 3" (Arial Bold Italic)

"times.ttf", "timesbd.ttf", "timesi.ttf" and "timesbi.ttf" are mapped to "Times New Roman | 0" (Times New Roman), "Times New Roman | 1" (Times New Roman Bold), "Times New Roman | 2" (Times New Roman Italic) and "Times New Roman | 3" (Times New Roman Bold Italic)

"cour.ttf", "courbd.ttf", "couri.ttf" and "courbi.ttf" are mapped to "Courier New | 0" (Courier New), "Courier New | 1" (Courier New Bold), "Courier New | 2" (Courier New Italic) and "Courier New | 3" (Courier New Bold Italic)

Font Location

ChartDirector on Windows does not come with any font files. It relies on the operating system's font files in the " [windows] \Fonts" directory. To see what fonts are installed in your operating system and their file names, use the File Explorer to view that directory.

ChartDirector on Windows will also search for the font files in the "fonts" subdirectory (if it exists) under the directory where the ChartDirector DLL "chartdir.dll" is installed. This is useful for private fonts. Also, for some especially secure web servers, the web anonymous user may not have access to the " [windows] \Fonts" directory. In this case, you may copy the font files to the above subdirectory.

ChartDirector on Mac OS X relies on operating system font files in "/Library/Fonts" and "/System/Library/Fonts".

ChartDirector on Linux, FreeBSD and Solaris assume the fonts files are in the "fonts" subdirectory under the directory where the ChartDirector shared object "libchartdir.so" is installed. ChartDirector on Linux, FreeBSD and Solaris come with a number of font files in the "fonts" subdirectory.

To keep the download size small, ChartDirector on Linux, FreeBSD and Solaris only come with some commonly used fonts. You may download additional fonts from the Internet. In particular, the Microsoft fonts at

http://sourceforge.net/project/showfiles.php?group_id=34153&release_id=105355

is highly recommended. Please refer to

<http://www.microsoft.com/typography/faq/faq8.htm>

on how you could use the fonts legally in your system.

ChartDirector supports True Type fonts (.ttf), Type 1 fonts (.pfa and .pfb) and Windows bitmap fonts (.fon). On Mac OS X, ChartDirector also supports Font Suitcase and Datafork (.dfont) files. On Linux, FreeBSD and Solaris, ChartDirector also supports Portable Compiled Fonts (.pcf fonts).

If you want ChartDirector to search other directories for the font files, you may list the directories in an environment variable called "FONTSPATH".

If you specify an absolute path name for the font file, ChartDirector will use the absolute path name and will not search other directories.

Artificial Boldening and Italicizing
Whereas most popular font comes with different styles for "normal", "bold", "italic" and "bold italic", some fonts only come with one style (the normal style). For example, the Monotype Corsiva font that comes with MS Office only has the normal style (mtcorsva.ttf). For these cases, you may append the "Bold" and/or "Italic" words after the font file name (separated with a space) to ask ChartDirector to artificially bolden and/or italicize the font. For example, you may specify the font name as "mtcorsva.ttf Bold".

Font List
Instead of specifying a single font file as the font name, you may specify a list of font files as the font name, separated by semi-colons. This is useful when using international characters that are only available in some fonts.

For example, if you would like to use the Arial font ("arial.ttf") for western characters, and the MingLiu font "mingliu.ttc" for Chinese characters (since the Arial font does not have Chinese characters), you may specify the font name as "arial.ttf;mingliu.ttc". In this case, ChartDirector will try the Arial font first. If it cannot find a certain character there, it will try the MingLiu font.

ChartDirector supports several special keywords for specifying the font name indirectly. When these keywords are used as font names, ChartDirector will look up the actual font names from a font table. The keywords are as follows:

KeywordsDescription

"normal"	This default normal font, which is the first font in the font table. This is initially mapped to "arial.ttf" (Arial).
"bold"	The default bold font, which is the second font in the font table. This is initially mapped to "arialbd.ttf" (Arial Bold).
"italic"	The default italic font, which is the third font in the font table. This is initially mapped to "ariali.ttf" (Arial Italic).
"boldItalic"	The default bold-italic font, which is the fourth font in the font table. This is initially mapped to "arialbi.ttf" (Arial Bold Italic).
"fontN"	The (N + 1)th font in the font table (the first font is "font0").

The font table can be modified using `BaseChart.setFontTable` or `DrawArea.setFontTable`.

The advantage of using indirect font names is that you can change the fonts in your charts in one place.

Most font files contain one font. However, it is possible a font file contains multiple fonts (that is, a font collection). For example, in True Type fonts, font files with extension ".ttc" may represent a font collection.

If a font file contains multiple font, the font index can be used to specify which font to use. By default, the font index is 0, which means the first font in the font file will be used.

The font size decides how big a font will appear in the image. The font size is expressed in a font unit called points. This is the same unit used in common word processors.

Instead of specifying font size, some ChartDirector API (eg. `TextBox.setFontSize`) allow you to specify font height and font width separately. You may use different point sizes for font height and font width to create special effects.

This is the color to draw the font. (See Color Specification on how colors are represented in ChartDirector.)

This is the angle in degrees by which the font should be rotated anti-clockwise.

By default, text are laid out horizontally, with characters being drawn from left to right.

ChartDirector also supports vertical layout, with characters being drawn from top to bottom. For example, you may use `BaseChart.addText` to add text that are laid out vertically. Vertical layout is common for

oriental languages such as Chinese, Japanese and Korean.

6.0.26 ChartDirector: Mark Up Language

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

Answer: ChartDirector: Mark Up Language

Notes: ChartDirector Mark Up Language (CDML) is a language for including formatting information in text strings by marking up the text with tags.

CDML allows a single text string to be rendered using multiple fonts, with different colors, and even embed images in the text. **Font Styles**

You can change the style of the text by using CDML tags. For example, the line:

```
<*font=timesi.ttf,size=16,color=FF0000>Hello <*font=arial.ttf,size=12,color=8000*>world!
```

will result in the following text rendered:

In general, all tags in CDML are enclosed by <*> and *>. Attributes within the tags determine the styles of the text following the tags within the same block.

If you want to include <*> in text without being interpreted as CDML tags, use «* as the escape sequence.

The following table describes the supported font style attributes in CDML. See **Font Specification** for details on various font attributes.

AttributeDescription

Set the following text to be in superscript style. This attribute does not need to have a value. (You may use "super" as the attribute instead of "super=1".)

Note that unlike HTML tags, no double or single quotes are used in the tags. It is because CDML tags are often embedded as string literals in source code. The double or single quotes, if used, will conflict with the string literal quotes in the source code. Therefore in CDML, no quotes are necessary and they must not be used.

Also, unlike HTML tags, CDML uses the comma character as the delimiter between attributes. It is because certain attributes may contain embed spaces (such as the font file name). So space is not used as the delimiter and the comma character is used instead.

Note the font attribute above starts a new style section, while other attributes just modify the current style

font	Starts a new style section, and sets the font name. You may use this attribute without a value (that is, use "font" instead of "font=arial.ttf") to create a new style section without modifying the font name.
size	The font size.
width	The font width. This attribute is used to set the font width and height to different values. If the width and height are the same, use the size attribute.
height	The font height. This attribute is used to set the font width and height to different values. If the width and height are the same, use the size attribute.
color	The text color in hex format.
bgColor	The background color of the text in hex format.
underline	The line width of the line used to underline the following characters. Set to 0 to disable underline.
sub	Set the following text to be in subscript style. This attribute does not need to have a value. (You may use "sub" as the attribute instead of "sub=1".)
super	Set the following text to be in superscript style.
xoffset	Draw the following the text by shifting the text horizontally from the original position by the specified offset in pixels.
yoffset	Draw the following the text by shifting the text vertically from the original position by the specified offset in pixels.
advance	Move the cursor forward (to the right) by the number of pixels as specified by the value this attribute.
advanceTo	Move the cursor forward (to the right) to the position as specified by the value this attribute. The position is specified as the number of pixels to the right of the left border of the block. If the cursor has already passed through the specified position, the cursor is not moved.

section. You may use `</font*>` to terminate a style section, which will restore the font styles to the state before the style section.

Blocks and Lines

In CDML, a text string may contain multiple blocks. A block may contain multiple lines of text by separating them with new line characters ("`\n`") or with `<br*>`. The latter is useful for programming languages that cannot represent new line characters easily.

For example, the line:

```
<*size=15*><*block*><*color=FF*>BLOCK<*br*>ONE<*/*>and <*block*><*color=FF00*>BLOCK<*br*>TWO
```

will result in the following text rendered:

The above example contains a line of text. The line contains two blocks with the characters " and " in between. Each block in turn contains two lines. The blocks are defined using `<*block*>` as the start tag and

`<*/*>` as the end tag.

When a block ends, font styles will be restored to the state before entering the block. Embedding Images
CDML supports embedding images in text using the following syntax:

```
<*img=my_image_file.png*>
where my_image_file.png is the path name of the image file.
```

For example, the line:

```
<*size=20*>A <*img=sun.png*>day
will result in the following text rendered:
```

ChartDirector will automatically detect the image file format using the file extension, which must either png, jpg, jpeg, gif, wbmp or wmp (case insensitive).

Please refer to `BaseChart.setSearchPath` or `DrawArea.setSearchPath` on the directory that ChartDirector will search for the file.

The `<*img*>` tag may optionally contain width and height attributes to specify its pixel width and height. In this case, ChartDirector will stretch or compress the image if necessary to the required width and height. Blocks Attributes

CDML supports nesting blocks, that is, a block can contain other sub-blocks. Attributes are supported in the `<*block*>` tag to control the alignment and orientation of the sub-blocks. The `<*img=my_image_file.png*>` is treated as a block for layout purposes.

For example, the line:

```
<*block,valign=absmiddle*><*img=molecule.png*><*block*>Hydrazino\nMolecule<*/*><*/*>
will result in the following text rendered:
```

The the above starts `<*block,valign=absmiddle*>` which specifies its content should align with each others in the vertical direction using the absolute middle alignment. The block contains an image, followed by a space characters, and then another block which has two lines of text.

The following table describes the supported attributes inside `<*block*>` tag:

Attribute	Description
-----------	-------------

The value `baseline` means the baseline of sub-blocks should align with the baseline of the block. The `baseline`

width	The width of the block in pixels. By default, the width is automatically determined to be the width necessary for the contents of the block. If the width attribute is specified, it will be used as the width of the block. If the width is insufficient for the contents, the contents will be wrapped into multiple lines.
height	The height of the block in pixels. By default, the height is automatically determined to be the height necessary for the contents of the block. If the height attribute is specified, it will be used as the height of the block.
maxwidth	The maximum width of the block in pixels. If the content is wider than maximum width, it will be wrapped into multiple lines.
truncate	The maximum number of lines of the block. If the content requires more than the maximum number of lines, it will be truncated. In particular, if truncate is 1, the content will be truncated if it exceeds the maximum width (as specified by maxwidth or width) without wrapping. The last few characters at the truncation point will be replaced with "...".
linespacing	The spacing between lines as a ratio to the default line spacing. For example, a line spacing of 2 means the line spacing is two times the default line spacing. The default line spacing is the line spacing as specified in the font used.
bgColor	The background color of the block in hex format.
valign	The vertical alignment of sub-blocks. This is for blocks that contain sub-blocks. Supported values are baseline, top, bottom, middle and absmiddle.

is the underline position of text. This is normal method of aligning text, and is the default in CDML. For images or blocks that are rotated, the baseline is the same as the bottom.

The value top means the top line of sub-blocks should align with the top line of the block.

The value bottom means the bottom line of sub-blocks should align with the bottom line of the block.

The value middle means the middle line of sub-blocks should align with the the middle line of the block. The middle line is the middle position between the top line and the baseline.

The value absmiddle means the absolute middle line of sub-blocks should align with the absolute middle line of the block. The absolute middle line is the middle position between the top line and the bottom line.

halign The horizontal alignment of lines. This is for blocks that contain multiple lines. Supported values are left, center and right.

The value left means the left border of each line should align with the left border of the block. This is the default.

The value center means the horizontal center of each line should align with the horizontal center of the block.

The value right means the right border of each line should align with the right border of the block.

angle Rotate the content of the block by an angle. The angle is specified in degrees in counter-clockwise direction.

6.0.27 ChartDirector: Parameter Substitution and Formatting

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

Answer: ChartDirector: Parameter Substitution and Formatting

Notes: ChartDirector charts often contain a lot of text strings. For example, sector labels in pie charts, axis labels for x and y axes, data labels for the data points, HTML image maps, etc, are all text strings.

ChartDirector uses parameter substitution to allow you to configure precisely the information contained in the text and their format.

Format Strings

In parameter substitution, format strings are used to specify the entities to be include into labels and how to format numbers and dates.

For example, when drawing a pie chart with side label layout, the default sector label format string is:

```
" { label } ( { percent } %)"
```

When the sector label is actually drawn, ChartDirector will replace " { label } " with the sector name, and " { percent } " with the sector percentage. So the above label format will result is a sector label similar to "ABC (34.56%)".

You may change the sector label format by changing the format string. For example, you may change it to:

```
" { label } : US$ { value | 2 } K ( { percent } %)"
```

The sector label will then become something like "ABC: US\$ 123.00 (34.56%)".

In general, in ChartDirector parameter substitution, parameters enclosed by curly brackets will be substituted with their actual values when creating the texts.

For parameters that are numbers or dates/times, ChartDirector supports a special syntax in parameter substitution to allow formatting for these values. Please refer to the Number Formatting and Date/Time Formatting sections below for details.

Parameter Expressions

ChartDirector supports numeric expressions in format strings. They are denoted by enclosing the expression with curly brackets and using "=" as the first character. For example:

```
"USD { value } (Euro { = { value } *0.9 } )"
```

In the above, " { value } " will be substituted with the actual value of the sector. The expression " { = { value } *0.9 } " will be substituted with the actual value of the sector multiplied by 0.9.

ChartDirector parameter expressions support operators "+", "-", "*", "/", "%" (modulo) and "^" (exponentiation). Operators "*", "/", "%", "^" is computed first, followed by "+" and "-". Operators of the same precedence are computed from left to right). Parenthesis "(" and ")" can be used to change the computation order.

Parameters for Pie Charts

The following table describes the parameters available for pie charts.

Parameter	Description
sector	The sector number. The first sector is 0, while the nth sector is (n-1).
dataSet	Same as { sector } . See above.
label	The text label of the sector.
dataSetName	Same as { label } . See above.
value	The data value of the sector.
percent	The percentage value of the sector.
fieldN	The (N + 1)th extra field. For example, { field0 } means the first extra field. An extra field is an array of custom elements added using BaseChart.addExtraField or BaseChart.addExtraField2.

Parameters for All XY Chart Layers

The followings are parameters that are apply to all XY Chart layers in general. Some layer types may have additional parameters (see below).

Note that certain parameters are inapplicable in some context. For example, when specifying the aggregate label of a stacked bar chart, the { dataSetName } parameter is inapplicable. It is because a stacked bar is composed of multiple data sets. It does not belong to any particular data set and hence does not have a data set name.

{ fieldN } means the extra field is indexed by the data point number. The Pth data point corresponds to the Pth element of the extra field.

Additional Parameters for Line Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

Additional Parameters for Trend Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

Additional Parameters for Box-Whisker Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

Additional Parameters for HLOC and CandleStick Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

Additional Parameters for Vector Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

Parameters for All Polar Layers

The followings are parameters that are apply to all Polar Chart layers in general. Some layer types may have additional parameters (see below).

{ fieldN } means the extra field is indexed by the data point number. The Pth data point corresponds to the Pth element of the extra field.

Additional Parameters for PolarVector Layers

The followings are parameters that are in additional to the parameters for all Polar Chart layers.

Parameters for Axis

The following table describes the parameters available for pie charts.

Number Formatting

For parameters that are numbers, ChartDirector supports a number of formatting options in parameter substitution.

For example, if you want a numeric field { value } to have a precision of two digits to the right of the decimal point, use ',' (comma) as the thousand separator, and use '.' (dot) as the decimal point, and you may use { value | 2, . } . The number 123456.789 will then be displayed as 123,456.79.

For numbers, the formatting options are specified using the following syntax:

```
{ [ param ] | [ a ] [ b ] [ c ] [ d ] }
```

where:

If this field starts with "E" or "e", followed by a number, it means formatting the value using scientific notation with the specified number of decimal places. If the "E" or "e" is not followed by a number, 3 is assumed.

For example, { value | E4 } will format the value 10.3 to 1.0300E+1, and { value | e4 } will format the same value to 1.0300e+1.

If this field starts with "G" or "g", followed by a number, it means formatting the value using the scientific notation only if the value is large and requires more than the specified number of digits, or the value is less than 0.001. If scientific notation is used, the number following "G" or "g" also specifies the number of significant digits to use. If the "G" or "g" is not followed by a number, 4 is assumed.

For example, consider the format string { value | G4 } . The value 10 will be formatted to 10. The value 100000 will be formatted to 1.000E+5. Similarly, for { value | g4 } , the value 10 will be formatted to 10, while the value 100000 will be formatted to 1.000e+5.

If you skip this argument, ChartDirector will display the exact value using at most 6 decimal places.

You may skip [b] [c] [d] . In this case, the default will be used.

Date/Time Formatting

For parameters that are dates/times, the formatting options can be specified using the following syntax:

```
{ [ param ] | [ datetime_format_string ] }
```

where [datetime_format_string] must start with an english character (A-Z or a-z) that is not "G", "g", "E" or "e", and may contain any characters except ' } '. (If it starts with "G", "g", "E" or "e", it will be considered as a number format string.)

Certain characters are substituted according to the following table. Characters that are not substituted will be copied to the output.

For example, a parameter substitution format of { value | mm-dd-yyyy } will display a date as something similar to 09-15-2002. A format of { value | dd/mm/yy hh:nn:ss a } will display a date as something similar to 15/09/02 03:04:05 pm.

If you want to include characters in the format string without substitution, you may enclose the characters in single or double quotes.

For example, the format { value | mmm '<*color=dd0000*>'yyyy } will display a date as something like Jan <*color=dd0000*>2005 (the <*color=dd0000*> is a CDML tag to specify red text color). Note that the <*color=dd0000*> tag is copied directly without substitution, even it contains "dd" which normally will be substituted with the day of month.

Escaping URL/HTML/CDML characters

Parameter substitution is often used to create HTML image maps. In HTML, some characters has special meanings and cannot be used reliably. For example, the '>' is used to represent the end of an HTML tag.

Furthermore, if the field happens to be used as an URL, characters such as '?', '&' and '+' also have special meanings.

By default, ChartDirector will escape template fields used in URL and query parameters when generating image maps. It will modify URL special characters to the URL escape format "%XX" (eg. "?" will become "%3F"). After that, it will modify HTML special characters to the HTML escape format "&#nn;" (eg. ">" will become ">"). Similarly, it will escape other attributes in the image map using HTML escape format (but not URL escape format).

In addition to escaping HTML and URL special characters, ChartDirector will also remove CDML fields in creating image maps. It is because CDML is only interpreted in ChartDirector, should not be useful outside of ChartDirector (such as in browser tool tips).

In some cases, you may not want ChartDirector to escape the special characters. For example, if the parameters have already been escaped before passing to ChartDirector, you may want to disable ChartDirector from escaping them again.

ChartDirector supports the following special fields to control the escape methods - " { escape_url } ", " { noescape_url } ", " { escape_html } ", " { noescape_html } ", " { escape_cdml } " and " { noescape_cdml } ". These fields enable/disable the escape methods used in the template fields that follow them.

6.0.28 ChartDirector: Shape Specification

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

Answer: ChartDirector: Shape Specification

Notes: Several ChartDirector API accept shape specification as arguments. For example, BarLayer.setBarShape and BarLayer.setBarShape2 can be used to specify shapes of bars in bar charts, while DataSet.setDataSymbol, DataSet.setDataSymbol4, PolarLayer.setDataSymbol and PolarLayer.setDataSymbol4 can be used to specify shapes for data symbols.

Note that in addition to shapes, in many cases ChartDirector also accepts images or custom draw objects for data representation. For example, see DataSet.setDataSymbol2, DataSet.setDataSymbol3, PolarLayer.setDataSymbol2 and PolarLayer.setDataSymbol3.

Built-In Shapes

Built-in shapes are specified as integers. The integers can be explicit constants, or can be generated by a `ChartDirector` method for parameterized shapes. For example, a circle is represented by an explicit constant `CircleShape (=7)`. On the other hand, the number representing a polygon depends on the number of sides the polygon has, so it is generated by using the `PolygonShape` method, passing in the number of sides as argument.

The following table illustrates the various `ChartDirector` shapes:

Custom Shapes

In `ChartDirector`, custom shapes are specified as an array of integers `x0, y0, x1, y1, x2, y2 ...` representing the coordinates of the vertices of the custom polygonal shape.

The polygon should be defined with a bounding square of 1000 x 1000 units, in which the x-axis is from -500 to 500 going from left to right, and the y-axis is from 0 to 1000 going from bottom to top.

`ChartDirector` will automatically scale the polygon so that 1000 units will become to the pixel size as requested by the various `ChartDirector` API.

As an example, the shape of the standard diamond shape in `ChartDirector` is represented as an array with 8 numbers:

```
0, 0, 500, 500, 0, 1000, -500, 500
```

6.0.29 Copy styled text?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: How to quickly copy styled text from one textarea to another?

Example:

```
#if TargetWin32 then
TextArea1.WinRTFDataMBS = TextArea2.WinRTFDataMBS
#elseif TargetMacOS then
TextArea1.NSTextViewMBS.textStorage.setAttributedString TextArea2.NSTextViewMBS.textStorage
#else
TextArea1.StyledText = TextArea2.StyledText
#endif
```

Notes: The code above uses special plugin functions on Mac and Windows and falls back to framework for Linux.

6.0.30 Do you have code to validate a credit card number?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can check the checksum to tell if a credit card number is not valid.

Example:

```
Dim strNumber As String
Dim nLength as Integer
Dim nValue as Integer
Dim nChecksum as Integer
Dim nIndex as Integer

strNumber = EditField1.Text
nLength = Len(strNumber)
nChecksum = 0

For nIndex = 0 To nLength - 2
nValue = Val(Mid(strNumber, nLength - (nIndex + 1), 1)) * (2 - (nIndex Mod 2))
If nValue <10 Then
nChecksum = nChecksum + nValue
Else
nChecksum = nChecksum + (nValue - 9)
End If
Next

If Val(Mid(strNumber, Len(strNumber), 1)) = (10 - (nChecksum Mod 10)) Mod 10 Then
MsgBox("The credit card number looks valid")
Else
MsgBox("The credit card number is invalid")
End IF
```

Notes: Here's some code that will validate the checksum for a credit card. It works for Visa, MasterCard, American Express and Discover. Not sure about others, but I imagine they use the same basic algorithm. Of course, this doesn't actually mean that the credit card is valid, it's only useful for helping the user catch typos.

The above code doesn't have any error checking and it expects that the credit card number will be entered without spaces, dashes or any other non-numeric characters. Addressing those issues will be an exercise left to the reader. :)

(From Mike Stefanik)

6.0.31 Do you have plugins for X-Rite EyeOne, eXact or i1Pro?

Plugin Version: all.

Answer: Our EyeOne plugin is available on request for licensees of the X-Rite SDKs.

Notes: Please first go to X-Rite and get a SDK license.

Then we can talk about the plugin.

6.0.32 Does SQL Plugin handle stored procedures with multiple result sets?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Yes, the plugin can work with multiple recordsets.

Notes: You need to use SQLCommandMBS class. When you get back results, you use FetchNext to walk over all records in the first result set. Then you simply start again with FetchNext to get the second record set.

Even the RecordSet functions should work, just use them twice to get all records from both record sets.

6.0.33 Does the plugin home home?

Plugin Version: all, Platform: macOS.

Answer: Yes, we like to know who is using the plugin, so the plugin may contact our server.

Example:

none.

Notes: Please note that this does not affect your users as the plugin will only do this in the IDE and the relevant plugin part is never included in your applications.

The plugin if used for some hours, does contact our server to provide statistical data about Xojo version and OS versions. This way we know what versions are used. We can return the version number of the current plugin which may be visible in future versions somehow. And we transmit partial licenses data so we can track use of illegal license keys.

If you do not like to have this, you can block Xojo IDE from contacting our website via your Firewall.

Blocking the transfer will not disable the plugin or change the features.

Or contact us for a plugin version which explicitly does not contain this feature.

6.0.34 folderitem.absolutePath is limited to 255 chars. How can I get longer ones?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Paths on a Mac are not unique, so use them only to display them to the user.

Example:

```
Function AbsolutePath(f as FolderItem) As String
Dim s as string
Dim nf as FolderItem
nf = f
s = ""
while nf<>nil
s = nf.name + "." + s
nf = nf.parent
wend
Return s
End Function
```

6.0.35 Has anyone played round with using CoreImage to do things like add dissolve transitions say when changing from one tab to another within a window?

Platform: macOS.

Answer: This code implements animations for a tabpanel change:

Example:

// in a tabpanel.change event:

```
dim r as CGSTransitionRequestMBS
dim co as new CGSConnectionMBS
dim cw as CGSWindowMBS
dim ct as CGSTransitionMBS
static OldTab as Integer

cw=co.CGSWindow(window1)
If cw = Nil Then
return // 10.3...
End If
r=new CGSTransitionRequestMBS
r.TransitionType=r.CGSFlip
r.HasBackGround=false
r.HasBackColor=false
r.Win=cw
```

```

// watch the value of the clicked tab versus the last tab
if tabpanel1.Value=0 or tabpanel1.Value <OldTab then
r.TransitionOption=r.CGSLeft
ct=co.NewTransition(r)
if ct<>Nil then
Refresh
ct.Invoke(1)
ct.Wait(1)
ct.Release
else
MsgBox "Error creating the transition."
end if
else
r.TransitionOption=r.CGSRight
ct=co.NewTransition(r)
if ct<>Nil then
Refresh
ct.Invoke(1)
ct.Wait(1)
ct.Release
else
MsgBox "Error creating the transition."
end if
end if
// Keep track of the last tab clicked
OldTab = tabpanel1.Value

```

Notes: See CGS* classes for more details.

6.0.36 How about Plugin support for older OS X?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: We support in general Mac OS X 10.5 and newer.

Notes: All the 64-bit plugins on Mac require OS X 10.7.

Intel 32-bit plugins on Mac require OS X 10.5 or newer.

Currently the ChartDirector 6, GraphicsMagick and GameKit plugins requires Mac OS X 10.6. Also for SQL Plugin the built in SQLite library requires 10.6.

6.0.37 How can I detect whether an Intel CPU is a 64bit CPU?

Plugin Version: all.

Answer: Look on the CPU family returned by sysctl:

Example:

Function is64bit() As Boolean

```
#if TargetLittleEndian
```

```
dim m as MemoryBlock = NewMemoryBlock(8)
```

```
dim family as Integer
```

```
dim s as string
```

```
m=SystemControlNameToMIBMBS("hw.cpufamily")
```

```
m=SystemControlMBS(m)
```

```
if m<>nil then
```

```
m.LittleEndian=True
```

```
family=m.Long(0)
```

```
const CPUFAMILY_INTEL_6_14 = &h73d67300 /* "Intel Core Solo" and "Intel Core Duo" (32-bit Pentium-M with SSE3) */
```

```
const CPUFAMILY_INTEL_6_15 = &h426f69ef /* "Intel Core 2 Duo" */
```

```
const CPUFAMILY_INTEL_6_23 = &h78ea4fbc /* Penryn */
```

```
const CPUFAMILY_INTEL_6_26 = &h6b5a4cd2 /* Nehalem */
```

```
Select case family
```

```
case CPUFAMILY_INTEL_6_14
```

```
Return false
```

```
case CPUFAMILY_INTEL_6_15
```

```
Return true
```

```
case CPUFAMILY_INTEL_6_23
```

```
Return true
```

```
case CPUFAMILY_INTEL_6_26
```

```
Return true
```

```
// newer CPUs may be missing here
```

```
end Select
```

```
end if
```

```
#endif
```

```
Return false
```

```
Exception
```

```
Return false
```

```
End Function
```

Notes: This code is written for Mac OS X where you only have a limited number of possible CPUs.

6.0.38 How can I disable the close box of a window on Windows?

Plugin Version: all, Platform: Windows.

Answer: The following code will remove the close item from the system menu of the window.

Example:

```
#if TargetWin32 then
Declare Function GetSystemMenu Lib "user32" (hwnd as Integer, bRevert as Integer) as Integer
Declare Function RemoveMenu Lib "user32" (hMenu as Integer, nPosition as Integer, wFlags as Integer) as Integer
Dim hSysMenu as Integer
hSysMenu = GetSystemMenu(me.WinHWND, 0)
RemoveMenu hSysMenu, &HF060, &H0
#endif
```

Notes: The window may not be updated directly.

6.0.39 How can I get all the environment variables from Windows?

Plugin Version: all, Platform: Windows.

Answer: Try this code:

Example:

```
#if targetWin32
declare function GetEnvironmentStrings Lib "kernel32" () as ptr
dim m as memoryBlock
dim n as Integer

m=GetEnvironmentStrings()

n=0
do
msgBox m.cstring(n)
while m.byte(n)<>0
n=n+1
wend
n=n+1
```

```
loop until m.byte(n)=0
#endif
```

Notes: The MBS Plugin has an EnvironmentMBS class for this.

6.0.40 How can i get similar behavior to Roxio Toast or iTunes where clicking a 'burn' button allows the next inserted blank CD-R to bypass the Finder and be accepted by my application?

Plugin Version: all, Platform: macOS.

Answer: You need to get a media reservation.

Example:

```
dim d as DRDeviceMBS // get a device
d.AcquireMediaReservation
```

Notes: Use the plugin function AcquireMediaReservation and later release it using ReleaseMediaReservation.

See plugin examples on how to use it and check Apples DiscRecording framework documentation for more details.

6.0.41 How can I get text from a PDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Crossplatform you can use DynaPDF Pro.

Notes: On Mac OS X you can also use PDFKit for the same job.

While DynaPDF Pro gives you each bit of text with rotation, font information and encoding details, PDFKit gives you only the text string for a PDF page.

6.0.42 How can I get text from a Word Document?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: to get the text string from a doc file, use the NSAttributedStringMBS class.

Notes: The NSAttributedStringMBS class is Mac OS X only and we have currently no solution for Windows or Linux.

Use the `NSAttributedStringMBS initWithDocFormat(data as string)` as boolean method.

6.0.43 How can I get the item string for a given file creator?

Plugin Version: all.

Answer: Try this function:

Example:

```
Sub pullNativeDocs(aCREA As string)
Dim result as Integer
Dim m, k as memoryBlock
Dim f as folderItem
Dim newType as string
Dim anIcon As picture
Dim ofs as Integer
```

```
Declare Function GetFileTypesThatAppCanNativelyOpen Lib "Carbon" (appVRefNumHint as Short, appSignature as OSType, nativeTypes as Ptr) as Short Inline68K("701CABFC")
Declare Function GetDocumentKindString Lib "Carbon" (docVRefNum as Short, docType as OSType, docCreator as OSType, kindString as ptr) as Short Inline68K("7016ABFC")
```

```
listBox1.deleteAllRows
```

```
m = newMemoryBlock(1024)
result = GetFileTypesThatAppCanNativelyOpen(Volume(0).MacVRefNum, aCREA, m)
if result <> 0 then
listBox1.addRow "<Not found.>"
return
end if
```

```
do
if m.byte(ofs*4) = 0 then
exit
else
newType = m.OSTypeMBS(ofs*4)
listBox1.addRow newType
k = newMemoryBlock(64)
result = GetDocumentKindString(Volume(0).MacVRefNum, newType, aCREA, k)
if result = 0 then
listBox1.cell(ofs,1) = k.pString(0)
ofs = ofs + 1
else
listBox1.cell(ofs,1) = "(unknown)"
end if
end if
```

loop

End Sub

Notes: Change "Translation" to "CarbonLib" for Mac OS X.

6.0.44 How can I launch an app using it's creator code?

Plugin Version: all, Platform: macOS.

Answer: Send an AppleEvent "odoc" with the creator code to the Finder ("MACS"):

Example:

```
Function LaunchByCreator(C As String) As Boolean
Dim A As AppleEvent
A = NewAppleEvent("aevt","odoc","MACS")
A.ObjectSpecifierParam("—") = GetUniqueIDObjectDescriptor("appf",nil,C)
return A.Send
End Function
```

6.0.45 How can I learn what shared libraries are required by a plugin on Linux?

Plugin Version: all, Platform: macOS.

Answer: Please use the ldd command in the terminal.

Notes: You build an app on any platform, but for Linux.

For the resulting .so files in the libs folder, you can run the ldd command with the library path as parameter. It shows you references lib files and you can make sure you have those installed.

This is a sample run of our graphicsmagick plugin:

```
cs@Ubuntu32:
textasciitilde /MeinProgramm/MeinProgramm Libs$ ldd libMBSGraphicsMagickPlugin17744.so
linux-gate.so.1 =>(0xb76ee000)
libdl.so.2 =>/lib/i386-linux-gnu/libdl.so.2 (0xb6f0e000)
libgtk-x11-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgtk-x11-2.0.so.0 (0xb6aa6000)
libpthread.so.0 =>/lib/i386-linux-gnu/libpthread.so.0 (0xb6a8a000)
libstdc++.so.6 =>/usr/lib/i386-linux-gnu/libstdc++.so.6 (0xb69a5000)
libm.so.6 =>/lib/i386-linux-gnu/libm.so.6 (0xb6979000)
libgcc_s.so.1 =>/lib/i386-linux-gnu/libgcc_s.so.1 (0xb695b000)
libc.so.6 =>/lib/i386-linux-gnu/libc.so.6 (0xb67b1000)
```

```

/lib/ld-linux.so.2 (0xb76ef000)
libgdk-x11-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgdk-x11-2.0.so.0 (0xb6701000)
libpangocairo-1.0.so.0 =>/usr/lib/i386-linux-gnu/libpangocairo-1.0.so.0 (0xb66f4000)
libX11.so.6 =>/usr/lib/i386-linux-gnu/libX11.so.6 (0xb65c0000)
libXfixes.so.3 =>/usr/lib/i386-linux-gnu/libXfixes.so.3 (0xb65ba000)
libatk-1.0.so.0 =>/usr/lib/i386-linux-gnu/libatk-1.0.so.0 (0xb659a000)
libcairo.so.2 =>/usr/lib/i386-linux-gnu/libcairo.so.2 (0xb64ce000)
libgdk_pixbuf-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgdk_pixbuf-2.0.so.0 (0xb64ad000)
libgio-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgio-2.0.so.0 (0xb6356000)
libpangoft2-1.0.so.0 =>/usr/lib/i386-linux-gnu/libpangoft2-1.0.so.0 (0xb632a000)
libpango-1.0.so.0 =>/usr/lib/i386-linux-gnu/libpango-1.0.so.0 (0xb62e0000)
libfontconfig.so.1 =>/usr/lib/i386-linux-gnu/libfontconfig.so.1 (0xb62ab000)
libgobject-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgobject-2.0.so.0 (0xb625c000)
libglib-2.0.so.0 =>/lib/i386-linux-gnu/libglib-2.0.so.0 (0xb6163000)
libXext.so.6 =>/usr/lib/i386-linux-gnu/libXext.so.6 (0xb6151000)
libXrender.so.1 =>/usr/lib/i386-linux-gnu/libXrender.so.1 (0xb6147000)
libXinerama.so.1 =>/usr/lib/i386-linux-gnu/libXinerama.so.1 (0xb6142000)
libXi.so.6 =>/usr/lib/i386-linux-gnu/libXi.so.6 (0xb6132000)
libXrandr.so.2 =>/usr/lib/i386-linux-gnu/libXrandr.so.2 (0xb6129000)
libXcursor.so.1 =>/usr/lib/i386-linux-gnu/libXcursor.so.1 (0xb611e000)
libXcomposite.so.1 =>/usr/lib/i386-linux-gnu/libXcomposite.so.1 (0xb611a000)
libXdamage.so.1 =>/usr/lib/i386-linux-gnu/libXdamage.so.1 (0xb6115000)
libfreetype.so.6 =>/usr/lib/i386-linux-gnu/libfreetype.so.6 (0xb607b000)
libxcb.so.1 =>/usr/lib/i386-linux-gnu/libxcb.so.1 (0xb605a000)
libpixman-1.so.0 =>/usr/lib/i386-linux-gnu/libpixman-1.so.0 (0xb5fc2000)
libpng12.so.0 =>/lib/i386-linux-gnu/libpng12.so.0 (0xb5f98000)
libxcb-shm.so.0 =>/usr/lib/i386-linux-gnu/libxcb-shm.so.0 (0xb5f93000)
libxcb-render.so.0 =>/usr/lib/i386-linux-gnu/libxcb-render.so.0 (0xb5f89000)
libz.so.1 =>/lib/i386-linux-gnu/libz.so.1 (0xb5f73000)
libgmodule-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgmodule-2.0.so.0 (0xb5f6e000)
libselinux.so.1 =>/lib/i386-linux-gnu/libselinux.so.1 (0xb5f4f000)
libresolv.so.2 =>/lib/i386-linux-gnu/libresolv.so.2 (0xb5f36000)
libexpat.so.1 =>/lib/i386-linux-gnu/libexpat.so.1 (0xb5f0c000)
libffi.so.6 =>/usr/lib/i386-linux-gnu/libffi.so.6 (0xb5f05000)
libpcre.so.3 =>/lib/i386-linux-gnu/libpcre.so.3 (0xb5ec9000)
librt.so.1 =>/lib/i386-linux-gnu/librt.so.1 (0xb5ec0000)
libXau.so.6 =>/usr/lib/i386-linux-gnu/libXau.so.6 (0xb5ebb000)
libXdmcp.so.6 =>/usr/lib/i386-linux-gnu/libXdmcp.so.6 (0xb5eb4000)
cs@Ubuntu32:
textasciitilde /MeinProgramm/MeinProgramm Libs$

```

As you see all library have been found and their load address is printed behind the name. If a library is missing, you usually see the address missing there or being zero.


```

while theRegexMatch <>nil
theStart = theRegexMatch.subExpressionStartB(0) + len(theRegexMatch.subExpressionString(0))

result = result + theRegexMatch.subExpressionString(1)
infoCharset = theRegexMatch.subExpressionString(2)
encodedPart = theRegexMatch.subExpressionString(4)
if theRegexMatch.subExpressionString(3) = "B" then
encodedPart = DecodeBase64(encodedPart)
elseif theRegexMatch.subExpressionString(3) = "Q" then
encodedPart = DecodeQuotedPrintable(encodedPart)
end if
if right(result, 1) = " " then
result = mid(result, 1, len(result)-1)
end if
encodedPart = encodedPart.DefineEncoding(GetInternetTextEncoding(infoCharset))
result = result + encodedPart

theRegex.SearchStartPosition = theStart
theRegexMatch = theRegex.search()
wend

result = result + mid(src, theStart+1)

else
result = src
end if
// theRegexMatch = theRegex.search

msgbox result

```

Notes: May not look nice depending on the controls used.
This is no longer needed when using MimeEmailMBS class which decodes for you.

6.0.48 How do I enable/disable a single tab in a tabpanel?

Plugin Version: all, Platform: macOS.

Answer: Use the TabpanelEnabledMBS method.

Example:

```
TabpanelEnabledMBS(tabpanel1, 1, false)
```

Notes: Use Carbon for MachO and CarbonLib for Mac Carbon and AppearanceLib for Mac OS Classic as

library.

For Cocoa, please use enabled property of NSTabViewItemMBS class.

6.0.49 How do I find the root volume for a file?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Try this function:

Example:

```
Function GetRootVolume(f as FolderItem) as FolderItem
dim root, dum as folderItem
if f <> nil then
root = f // f might be the volume
do
dum = root.parent
if dum <> nil then
root = dum
end if
loop until dum = nil
return root
end if
End Function
```

6.0.50 How do I get the current languages list?

Plugin Version: all, Platform: macOS.

Answer: Try this code:

Example:

```
dim p as new CFPREFERENCESMBS
dim a as CFArrayMBS
dim s as CFStringMBS
dim o as CFOBJECTMBS
dim sa(-1) as string

o=p.CopyAppValue("AppleLanguages", ".GlobalPreferences")

if o<>Nil then
a=CFArrayMBS(o)

dim i,c as Integer
```

```
c=a.Count-1
for i=0 to c
o=a.Item(i)

if o isa CFStringMBS then
s=CFStringMBS(o)
sa.Append s.str
end if
next
end if

MsgBox Join(sa,EndOfLine)
```

Notes: On Mac OS X you can get the list of current languages like this list:

```
de
en
ja
fr
es
it
pt
pt-PT
nl
sv
nb
da
fi
ru
pl
zh-Hans
zh-Hant
ko
```

Which has German (de) on the top for a German user.
This code has been tested on Mac OS X 10.5 only.

6.0.51 How do I get the Mac OS Version?

Plugin Version: all, Platform: macOS.

Answer: Try this code:

Example:

```

dim i as Integer
if system.gestalt("sysv", i) then
//do this in an 'If' in case you don't get any value back at all and system.gestalt returns boolean
if i = &h750 then //If OS is 7.5
//do stuff
elseif i = &h761 then //If OS is 7.6.1
//do stuff
end if
end if

```

Notes: The MBS Plugin has a function SystemInformationMBS.OSVersionString for this.

6.0.52 How do I get the printer name?

Plugin Version: all.

Answer: For Mac OS Classic see the code below and for Mac OS X use the Carbon Print Manager Classes from the MBS Plugin.

Example:

```

dim s as String
dim i as Integer

s=app.ResourceFork.GetResource("STR ",-8192)
if s<>"" then
i=ascb(leftb(s,1))
s=mid(s,2,i)

MsgBox s
end if

```

Notes: A note from Craig Hoyt:

After looking at your example I had a little deja-vu experience. Several years ago I played around with this same code if FutureBasic. I discovered that it did not and still doesn't provide the 'Printer Name', it does return the print driver name. If it returns 'LaserWriter 8' as the print driver you can look into this file and get the 'PAPA' resource #-8192 to get the actual Printer Name. Unfortunately this does not hold true for other printers. My Epson and HP Printers (the Epson has an Ethernet Card and the HP is USB) do not provide this info in their drivers. As far as I can tell it only returns the name by polling the printer itself.

6.0.53 How do I make a metal window if RB does not allow me this?

Plugin Version: all, Platform: macOS.

Answer: The following declare turns any window on Mac OS X 10.2 or newer into a metal one.

Example:

```
declare sub ChangeWindowAttributes lib "Carbon" (win as windowptr, a as Integer, b as Integer)
```

```
ChangeWindowAttributes window1,256,0
```

Notes: May not look nice depending on the controls used.

6.0.54 How do I make a smooth color transition?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer:

I'd like to show in a report some bars, which start with color A and end with color B.

The color change should be very smooth.

My problem: If I would start from 255,0,0 and end by 0,0,0, I would have 255 different colors. If the bars are longer than 255 pixels, would this look nice?

Example:

```
// Window.Paint:
Sub Paint(g As Graphics)
dim w,w1,x,p as Integer
dim c1,c2,c as color
dim p1,p2 as Double

c1=rgb(255,0,0) // start color
c2=rgb(0,255,0) // end color

w=g.Width
w1=w-1

for x=0 to w1
p1=x/w1
p2=1.0-p1
```

```

c=rgb(c1.red*p1+c2.red*p2, c1.green*p1+c2.green*p2, c1.blue*p1+c2.blue*p2)

g.ForeColor=c
g.DrawLine x,0,x,g.Height

next
End Sub

```

Notes:

Try the code above in a window paint event handler.

6.0.55 How do I read the applications in the dock app?

Plugin Version: all, Platform: macOS.

Answer: Use CFPreferencesMBS class like in this example:

Example:

```

// Reads file names from persistent dock applications and puts them into the list

dim pref as new CFPreferencesMBS

dim persistentapps as CFStringMBS = NewCFStringMBS("persistent-apps")
dim ApplicationID as CFStringMBS = NewCFStringMBS("com.apple.dock")
dim tiledata as CFStringMBS = NewCFStringMBS("tile-data")
dim filelabel as CFStringMBS = NewCFStringMBS("file-label")

// get the array of persistent applications from dock preferences
dim o as CObjectMBS = pref.CopyValue(persistentapps, ApplicationID, pref.kCFPreferencesCurrentUser,
pref.kCFPreferencesAnyHost)

if o isa CFArrayMBS then
dim a as CFArrayMBS = CFArrayMBS(o)

// walk over all items in array
dim c as Integer = a.Count-1
for i as Integer = 0 to c

// get dictionary describing item
o = a.Item(i)

if o isa CFDictionaryMBS then
dim d as CFDictionaryMBS = CFDictionaryMBS(o)

```

```

// and pick tile data dictionary
o = d.Value(tiledata)
if o isa CFDictionaryMBS then
d = CFDictionaryMBS(o)

// and pick there the file label
o = d.Value(filelabel)
if o isa CFStringMBS then
// and display it
dim name as string = CFStringMBS(o).str
List.AddRow name
end if
end if
end if

next

else
MsgBox "Failed to read dock preferences."
end if

```

Notes: You can use the `CFPreferencesMBS.SetValue` to change a value and `CFPreferencesMBS.Synchronize` to write the values to disc. You may need to restart the `Dock.app` if you modified things.

6.0.56 How do I truncate a file?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: In a `binarystream` you can set the `length` property to truncate.

6.0.57 How do update a Finder's windows after changing some files?

Plugin Version: all, Platform: macOS.

Answer: Try this code:

Example:

```

dim f as folderitem // some file
dim ae as appleevent
ae=newappleevent("fndr","fupd","MACS")
ae.folderitemparam("—")=f
if not ae.send then
//something went wrong

```

end if

Notes: The `folderitem.finderupdate` from the MBS Plugin does something like this.

6.0.58 How to access a USB device directly?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: First, it depends on the device.

Notes: Some devices can be talked directly from user mode code, but some require a kernel driver.

For some devices you can use plugins to access them like:

- Audio and Video sources using the `QTGrabberClassMBS`
- Mass storage devices using the `folderitem` class.
- Serial devices using the `System.SerialPort` function.
- HID USB devices can be used with `MacHIDMBS`, `WinHIDMBS` or `LinuxHIDInterface` class.
- Any USB device may be used with `MacUSBMBS` or `WinUSBMBS` classes.

In general it is always the best to take the most high level access to have others do the work for the details.

6.0.59 How to add icon to file on Mac?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use `FolderItem.AddCustomIcon` or `NSWorkspaceMBS.setIcon` functions.

Notes: Please close any open stream for the file you want to add an icon.

6.0.60 How to ask the Mac for the Name of the Machine?

Plugin Version: all, Platform: macOS.

Answer: Using Apple Events you can use this code:

Example:

Function `Computername()` *As string*

```

dim theEvent as AppleEvent
dim err as boolean

theEvent = newAppleEvent("mchn","getd","MACS")

err = theEvent.send

return theevent.ReplyString

End Function

```

Notes: Code above is for Mac OS 9!

Also the MBS Plugin has a function for this which may be faster and work also on Macs without Filesharing (which handles this event).

6.0.61 How to automatically enable retina in my apps?

Plugin Version: all, Platform: macOS.

Answer: You can run a build script on each build with this code:

Example:

```

Dim App As String = CurrentBuildLocation + "/" + CurrentBuildAppName + ".app"
Call DoShellCommand("/usr/bin/defaults write " + App + "/Contents/Info ""NSHighResolutionCapable""
YES")

```

Notes: This will set the NSHighResolutionCapable flag to YES.

6.0.62 How to avoid leaks with Cocoa functions?

Plugin Version: all, Platform: macOS.

Answer: You can try this code on Mac OS X:

Example:

```

// in a Timer Action event:
Sub Action()
static LastPool as NSAutoreleasePoolMBS = nil
static CurrentPool as NSAutoreleasePoolMBS = nil

```

```

LastPool = CurrentPool
CurrentPool = new NSAutoreleasePoolMBS

```

End Sub

Notes: With Xojo 2009r4 the code above should not be needed as Xojo runtime does automatically handle the `NSAutoreleasePools` for you. For older Xojo versions you need to use code with a timer with the action event above to avoid memory leaks.

Please do not use Xojo 2009r4 and newer with plugins before version 9.5. You can get crashes there which typically show a line with a `objc_msgSend` call.

6.0.63 How to avoid trouble connecting to oracle database with SQL Plugin?

Plugin Version: all, Platform: macOS.

Answer: For oracle the most important thing is to point the plugin to the libraries from oracle.

Notes: In environment variables, the paths like `ORACLE_HOME` must be defined.

On Mac OS X you also need to define `DYLD_LIBRARY_PATH` to point to the dylib files from oracle.

For that you need to modify `/etc/launchd.conf` for Mac OS X 10.8 and newer.

In older versions those variables in `.MacOSX/environment.plist` file in user's home.

Another way for the case you bundle things inside your app is to use the `LSEnvironment` key in `info.plist`. In `info.plist` it looks like this:

```
<key>LSEnvironment</key>
<dict>
<key>test</key>
<string>Hello World</string>
</dict>
```

6.0.64 How to avoid `___NSAutoreleaseNoPool` console messages in threads?

Plugin Version: all, Platform: macOS.

Answer: You need to use your own `NSAutoreleasePool` on a thread like this:

Example:

```
sub MyThread.run
dim pool as new NSAutoreleasePoolMBS
// do work here

pool=nil
```

end sub

Notes: For more details read here:

http://developer.apple.com/mac/library/documentation/Cocoa/Reference/Foundation/Classes/NSAutoreleasePool_Class/Reference/Reference.html

6.0.65 How to bring app to front?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: On Mac you can use this code:

Example:

```
// First way:
app.FrontMostMBS = true

// second way:
dim p as new ProcessMBS
p.GetCurrentProcess
p.FrontProcess = true

// third way:
NSApplicationMBS.sharedApplication.activateIgnoringOtherApps(true)

// for Windows:
RemoteControlMBS.WinBringWindowToTop
```

Notes: This will bring a Mac app to the front layer.

6.0.66 How to bring my application to front?

Plugin Version: all, Platform: macOS.

Answer: This makes SimpleText (Code txt) to the frontmost application:

Example:

```
Dim A As AppleEvent
A = NewAppleEvent("misc", "actv", "")
If Not A.Send then
Beep
end if
```

Notes: (Code is Mac only)

6.0.67 How to catch Control-C on Mac or Linux in a console app?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use SignalHandlerMBS class for this.

Example:

```
// watch for Control-C on Mac
call SignalHandlerMBS.SetFlagHandler(2)

dim ende as boolean = false
do
if SignalHandlerMBS.IsFlagSet(2) then
Print "Flag 2 set. Existing..."
ende = true
end if

DoEvents 1
loop until ende
```

Notes: The signal is caught, a flag is set and you can ask later in your normal application flow for the result.

6.0.68 How to change name of application menu?

Plugin Version: all, Platforms: macOS, Windows.

Answer: Use this code to change the application menu name on Mac OS X:

Example:

```
dim mb as new MenubarMBS
dim m as MenuMBS = mb.item(1) // 1 is in my tests the app menu
if m<>Nil then
m.MenuTitle = "Hello World"
end if
```

Notes: This code is for Carbon only.

6.0.69 How to change the name in the menubar of my app on Mac OS X?

Plugin Version: all, Platform: macOS.

Answer:

You mean it screws up if the file name of the bundle itself is different than the name of the executable file in the MacOS folder within the bundle? If so, you should find something like this within your Info.plist file (or the 'plst' resource that the RB IDE builds for you):

```
<key>CFBundleExecutable</key>
<string>Executable file name here</string>
```

Just make sure that file name matches.

However, if your question involves how you can change the name of the app that appears in the menu and the dock, that's different. You can make this name different from the file name by changing the CFBundleName key:

```
<key>CFBundleName</key>
<string>Name for menu here</string>
```

Note that if you use my free AppBundler program, this second part is taken care of for you – just fill in a custom name in the right field. You can find AppBundler (from Thomas Reed) at <http://www.bitjuggler.com/products/appbundler/>.

6.0.70 How to check if a folder/directory has subfolders?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use code like this to check all items in a folder:

Example:

```
Function HasSubFolder(folder as FolderItem) As Boolean
dim c as Integer = folder.Count
```

```
for i as Integer = 1 to c
dim item as FolderItem = folder.TrueItem(i)
```

```
if item<>Nil and item.Directory then
Return true
end if
```

next

End Function

Notes: We use trueitem() here to avoid resolving alias/link files. Also we check for nil as we may not have permission to see all items. And if one is a directory, we return without checking the rest.

6.0.71 How to check if Macbook runs on battery or AC power?

Plugin Version: all, Platform: macOS.

Answer: Please use our IOPowerSourcesMBS class like this:

Example:

```
Function PowerSourceState() as Integer
dim p as new IOPowerSourcesMBS

// check all power sources
dim u as Integer = p.Count-1
for i as Integer = 0 to u
dim d as CFDictionaryMBS = p.Item(i)
if d<>nil then
// check if they have a power source state key:
dim o as CFObjectMBS = d.Value(NewCFStringMBS("Power Source State"))
if o isa CFStringMBS then
dim s as string = CFStringMBS(o).str

'MsgBox s

if s = "AC Power" then
Return 1
elseif s = "Battery Power" then
Return 2
end if
end if
end if
next
Return 0 // unknown
End Function
```

Notes: If you want to check the CFDictionaryMBS content, simply use a line like "dim x as dictionary = d.dictionary" and check the contents in the debugger.

6.0.72 How to check if Microsoft Outlook is installed?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: If you need Outlook for Scripting, you should simply check registry for the required Outlook.Application class:

Example:

```
Function OutlookInstalled() As Boolean
    #if TargetWin32 then

    try
    dim r as new RegistryItem("HKEY_CLASSES_ROOT\Outlook.Application\CLSID", false)

    Return true

    catch r as RegistryAccessErrorException
    // not installed
    Return false

    end try

    #else

    // Windows only, so false on other platforms
    Return false

    #endif

End Function
```

6.0.73 How to check on Mac OS which country or language is currently selected?

Plugin Version: all, Platform: macOS.

Answer: The code below returns a country value.

Example:

```
dim result as Integer

IF TargetMacOS THEN

CONST smScriptLang = 28
```

```

CONST smSystemScript = -1

DECLARE FUNCTION GetScriptManagerVariable LIB "Carbon" ( selector as Integer) as Integer
DECLARE FUNCTION GetScriptVariable LIB "Carbon" ( script as Integer, selector as Integer) as Integer

result=GetScriptVariable(smSystemScript, smScriptLang)

END IF

```

Notes: Returns values like:

For more values, check "Script.h" in the frameworks.

6.0.74 How to code sign my app with plugins?

Plugin Version: all, Platform: macOS.

Answer: When you try to code sign the application with plugin dylibs on Mac OS X, you may see error message that there is actually a signature included.

Notes: Please use the -f command line parameter with codesign utility to overwrite our MBS signature. We sign our plugins for MacOS, iOS and Windows to make sure they have not been modified.

In terminal, you do like this:

```
cd <Path to folder of app>
```

```

xattr -cr <Appname>.app
codesign -f -s "Developer ID Application: <Your Name>" <Appname>.app/Contents/Frameworks/*.dylib
codesign -f -s "Developer ID Application: <Your Name>" <Appname>.app/Contents/Frameworks/*.framework
codesign -f -s "Developer ID Application: <Your Name>" <Appname>.app

```

Please use the name of your certificate (See keychain), the name of your app and the path to the app folder. If you have helper apps you need to sign them first.

You can use a build step to automatically sign your app on build.

6.0.75 How to collapse a window?

Plugin Version: all, Platform: macOS.

Answer: Use this function (Mac only):

Example:

```
Sub CollapseRBwindow(w as window, CollapseStatus as boolean)
dim state, err as Integer
dim wh as MemoryBlock
```

```
Declare Function CollapseWindow Lib "Carbon" (window as Integer, collapse as Integer) as Integer
```

```
IF CollapseStatus THEN
state = 1
ELSE
state = 0
END IF
```

```
err = CollapseWindow(w.MacWindowPtr, state)
```

```
End Sub
```

Notes: Also the MBS Plugin has a window.collapsedmbs property you can set. For Windows the MBS Plugin has a window.isiconicmbs property.

6.0.76 How to compare two pictures?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can try this code:

Example:

```
Function ComparePictures(p as picture,q as picture) as Integer
dim r,u as RGBSurface
dim x,y,n,m,h,w as Integer
dim w1,w2,h1,h2,d1,d2 as Integer
dim c1,c2 as color
```

```
h1=p.Height
h2=q.Height
w1=p.Width
w2=q.Width
d1=p.Depth
d2=q.Depth
```

```
if d1<>d2 then
Return 1
elseif w1<>w2 then
```

```

return 2
elseif h1<>h2 then
Return 3
else
r=p.RGBSurface
u=q.RGBSurface

if r=nil or u=nil then
Return -1
else
h=h1-1
w=w1-1
m=min(w,h)

for n=0 to m
c1=r.Pixel(n,n)
c2=u.Pixel(n,n)
if c1<>c2 then
Return 4
end if
next

for y=0 to h
for x=0 to w
c1=r.Pixel(x,y)
c2=u.Pixel(x,y)
if c1<>c2 then
Return 5
end if
next
next

// 0 for equal
// -1 for error (no RGBsurface)
// 1 for different depth
// 2 for different width
// 3 for different height
// 4 for different pixels (fast test)
// 5 for different pixels (slow test)
end if
end if

Exception
Return -1
End Function

```

Notes: Remember that this only works on bitmap pictures, so the `picture.BitmapMBS` function may be useful.

6.0.77 How to compile PHP library?

Plugin Version: all, Platform: macOS.

Answer: You have to download the source code and compile a static version of the library.

Notes: This instructions were written based on PHP 5.2.6 on Mac OS X:

- Best take a new Mac with current Xcode version installed.
- Download the source code archive. e.g. "php-5.2.6.tar.bz2"
- Expand that archive on your harddisc.
- Open terminal window
- change directory to the php directory. e.g. "cd /php-5.2.6"
- execute this two lines to define the supported CPU types and the minimum Mac OS X version:
- export CFLAGS="-arch ppc -arch i386 -mmacosx-version-min=10.3"
- export CXXFLAGS="-arch ppc -arch i386 -mmacosx-version-min=10.3"
- the command "./configure help" does show the configure options.
- use configure with a line like this:
- ./configure --enable-embed --with-curl --enable-ftp --enable-zip --enable-sockets --enable-static --enable-soap --with-zlib --with-bz2 --enable-exif --enable-bcmath --enable-calendar
- start the compilation with "make all"
- other option is to use "make install" which first does the same as "make all" and than does some installation scripts.
- you may get an error about a duplicate symbole __yytext. Search the file "zend_ini_scanner.c", search a line with "char *yytext;" and change it to "extern char *yytext;"
- On the end you get a lot of error messages, but you have a working library (named libphp5.so) file in the invisible ".libs" folder inside your php source folder.

Possible problems and solutions:

- If the path to your files has spaces, you can get into trouble. e.g. "/RB Plugins/PHP" is bad as files will be searched sometimes in "/RB".

- If you have in /usr/local/lib libraries which conflict with the default libraries, you can get into trouble.
- If you installed some open source tools which compiled their own libraries, you can get into conflicts.
- if you have to reconfigure or after a problem, you may need to use "make clean" before you start "make all" again.

Feel free to install additional libraries and add more packages to the configure line.

6.0.78 How to convert a BrowserType to a String with WebSession.Browser?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use code like this:

Example:

```
Function GetBrowserName(s as WebSession.BrowserType) As string
Select case s
case WebSession.BrowserType.Android
Return "Andriod"
case WebSession.BrowserType.Blackberry
Return "Blackberry"
case WebSession.BrowserType.Chrome
Return "Chrome"
case WebSession.BrowserType.ChromeOS
Return "ChromeOS"
case WebSession.BrowserType.Firefox
Return "Firefox"
case WebSession.BrowserType.InternetExplorer
Return "InternetExplorer"
case WebSession.BrowserType.Opera
Return "Opera"
case WebSession.BrowserType.Safari
Return "Safari"
case WebSession.BrowserType.SafariMobile
Return "SafariMobile"
case WebSession.BrowserType.Unknown
Return "Unknown"
else
Return "Unkown: "+str(integer(s))
end Select

End Function
```

6.0.79 How to convert a EngineType to a String with WebSession.Engine?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use code like this:

Example:

```
Function GetRenderingEngineName(s as WebSession.EngineType) As string
Select case s
case WebSession.EngineType.Gecko
Return "Gecko"
case WebSession.EngineType.Presto
Return "Presto"
case WebSession.EngineType.Trident
Return "Trident"
case WebSession.EngineType.Unknown
Return "Unknown"
case WebSession.EngineType.WebKit
Return "WebKit"
else
Return "Unkown: "+str(integer(s))
end Select

End Function
```

6.0.80 How to convert a PlatformType to a String with WebSession.Platform?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use code like this:

Example:

```
Function GetPlatformName(s as WebSession.PlatformType) As string
Select case s
case WebSession.PlatformType.Blackberry
Return "Blackberry"
case WebSession.PlatformType.iPad
Return "iPad"
case WebSession.PlatformType.iPhone
Return "iPhone"
case WebSession.PlatformType.iPodTouch
Return "iPodTouch"
case WebSession.PlatformType.Linux
Return "Linux"
case WebSession.PlatformType.Macintosh
Return "Macintosh"
```

```

case WebSession.PlatformType.PS3
Return "PS3"
case WebSession.PlatformType.Unknown
Return "Unknown"
case WebSession.PlatformType.WebOS
Return "WebOS"
case WebSession.PlatformType.Wii
Return "Wii"
case WebSession.PlatformType.Windows
Return "Windows"
else
Return "Unkown: "+str(integer(s))
end Select

End Function

```

6.0.81 How to convert a text to iso-8859-1 using the TextEncoder?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer:

This code can help you although it's not perfect.
You need to set lc to the current color you use.

Example:

```

dim outstring as string
dim theMac, thePC as textencoding
dim Mac2PC as textconverter

theMac = getTextEncoding(0) // MacRoman
thePC = getTextEncoding(&h0201) // ISOLatin1

Mac2PC = getTextConverter(theMac, thePC)
// if you wanted to do the opposite just create a converter
// PC2Mac = getTextConverter(thePC, theMac)

outstring = Mac2PC.convert("Bj√rn, this text should be converted")
Mac2PC.clear

```

Notes:

You have to call Mac2PC.clear after every conversion to reset the encoding engine.
See also newer TextConverterMBS class.

6.0.82 How to convert ChartTime back to Xojo date?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: We have this example code:

Example:

```
Function ChartTimeToDate(ChartTime as Double) As date
static diff as Double = 0.0
```

```
if diff = 0.0 then
dim d2 as Double = CDBaseChartMBS.chartTime(2015, 1, 1)
dim da as new date(2015, 1, 1)
dim ts as Double = da.TotalSeconds
```

```
diff = ts - d2
end if
```

```
dim d as new date
d.TotalSeconds = diff + ChartTime
```

```
Return d
End Function
```

Notes: As you see we calculate the difference in base date from Date and ChartTime and later use difference to convert.

6.0.83 How to convert line endings in text files?

Plugin Version: all, Platform: macOS.

Answer: You can simply read file with TextInputStream and write with new line endings using TextOutputStream class.

Example:

```
dim inputfile as FolderItem = SpecialFolder.Desktop.Child("test.txt")
dim outputfile as FolderItem = SpecialFolder.Desktop.Child("output.txt")
dim it as TextInputStream = TextInputStream.Open(inputfile)
dim ot as TextOutputStream = TextOutputStream.Create(outputfile)
```

```
ot.Delimiter = EndOfLine.Windows // new line ending
while not it.EOF
ot.WriteLine it.ReadLine
wend
```

Notes: `TextInputStream` will read any input line endings and with `delimiter` property in `TextOutputStream` you can easily define your new delimiter.

6.0.84 How to convert picture to string and back?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use this plugin functions:

Notes: JPEG:

`JPEGStringToPictureMBS(buf as string)` as picture
`JPEGStringToPictureMBS(buf as string,allowdamaged as Boolean)` as picture
`PictureToJPEGStringMBS(pic as picture,quality as Integer)` as string

PNG:

`PictureToPNGStringMBS(pic as picture, gamma as single)` as string
`PictureToPNGStringMBS(pic as picture, mask as picture, gamma as single)` as string
`PictureToPNGStringMBS(pic as picture, gamma as single, Interlace as Boolean, FilterType as Integer)` as string
`PictureToPNGStringMBS(pic as picture, mask as picture, gamma as single, Interlace as Boolean, FilterType as Integer)` as string
`PNGStringToPictureMBS(data as string, gamma as single)` as picture
`PNGStringToPNGPictureMBS(data as string, gamma as single)` as PNGpictureMBS

Tiff:

`TIFFStringToPictureMBS(data as string)` as picture
`TIFFStringToTiffPictureMBS(data as string)` as TiffPictureMBS

BMP:

`BMPStringtoPictureMBS(data as string)` as picture
`Picture.BMPDataMBS(ResolutionValueDPI as Integer=72)` as string

GIF:

`GifStringToGifMBS(data as string)` as GIFMBS
`GifStringToPictureMBS(data as string)` as Picture

6.0.85 How to copy an array?

Plugin Version: all, Platform: macOS.

Answer: You can use a function like this to copy an array:

Example:

```
Function CopyArray(a() as Double) as Double()
dim r() as Double
for each v as Double in a
r.Append v
next
Return r
End Function
```

Notes: If needed make several copies of this method with different data types, not just double. For a deep copy of an array of objects, you need to change code to also make a copy of those objects.

6.0.86 How to copy a dictionary?

Plugin Version: all, Platform: macOS.

Answer: You can use a function like this to copy a dictionary:

Example:

```
Function CopyDictionary(d as Dictionary) As Dictionary
dim r as new Dictionary
for each key as Variant in d.keys
r.Value(key) = d.Value(key)
next
Return r
End Function
```

Notes: If needed make several copies of this method with different data types, not just double. For a deep copy of a dictionary of objects, you need to change code to also make a copy of those objects.

6.0.87 How to copy parts of a movie to another one?

Plugin Version: all, Platforms: macOS, Windows.

Answer: The code below copies ten seconds of the snowman movie to the dummy movie starting at the 5th second.

Example:

```

dim f as FolderItem
dim md as EditableMovie
dim ms as EditableMovie

f=SpecialFolder.Desktop.Child("Our First Snowman.mov")
ms=f.OpenEditableMovie

ms.SelectionStartMBS=5
ms.SelectionLengthMBS=10

f=SpecialFolder.Desktop.Child("dummy.mov")
md=f.CreateMovie

msgbox str(md.AddMovieSelectionMBS(ms))

```

Notes: If result is not 0, the method fails.

6.0.88 How to create a birthday like calendar event?

Plugin Version: all, Platform: macOS.

Answer: Try this code:

Example:

```

// start a connection to the calendar database
dim s as new CalCalendarStoreMBS

// needed for the error details
dim e as NSErrorMBS

dim r as CalRecurrenceRuleMBS = CalRecurrenceRuleMBS.initYearlyRecurrence(1, nil) // repeat every
year without end

dim a as new CalAlarmMBS // add alarm
a.action = a.CalAlarmActionDisplay
a.relativeTrigger = -3600*24 // 24 Hours before

// create a new calendar
dim c as new CalEventMBS

dim d as new date(2011, 04, 20) // the date

dim calendars() as CalCalendarMBS = s.calendars

```

```

// set properties
c.Title="Test Birthday"
c.startDate=d
c.recurrenceRule = r
c.calendar=calendars(0) // add to first calendar
c.addAlarm(a)
c.endDate = d
c.isAllDay = true

// save event
call s.saveEvent(c,s.CalSpanAllEvents, e)
if e<>nil then
MsgBox e.localizedDescription
else
MsgBox "New event was created."
end if

```

Notes: This adds an event to iCal for the given date with alarm to remember you and repeats it every year.

6.0.89 How to create a GUID?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use the UUIDMBS class for this.

6.0.90 How to create a Mac picture clip file?

Plugin Version: all, Platform: Windows.

Answer: You can use code like this one.

Example:

```

dim f As FolderItem
dim p As Picture

f=SpecialFolder.Desktop.Child("Test.pictClipping")
if f=nil then Return

p=new Picture(300,200,32) 'Make a sample picture
p.Graphics.ForeColor=RGB(0,255,255)
p.Graphics.FillOval 0,0,99,99

```

```
p.Graphics.ForeColor=RGB(255,0,0)
p.Graphics.DrawOval 0,0,99,99
```

```
dim r As ResourceFork 'ResourceFork is needed for a clip file
```

```
// Please define a file type Any
r=f.CreateResourceFork("Any")
```

```
// get PICT data using plugin function
dim pictdata as string = p.PicHandleDataMBS
r.AddResource(pictdata,"PICT",256,"Picture")
```

```
dim m as new MemoryBlock(8)
```

```
m.LittleEndian = false
m.Int16Value(0) = 0
m.Int16Value(2) = 0
m.Int16Value(4) = p.Width
m.Int16Value(6) = p.Height
```

```
r.AddResource(m,"RECT",256,"")
```

```
'Values taken from a sample file and irrelevant to the problem
```

```
dim data as string = DecodeBase64("AQAAAAAAAAAAAAAAAAACAFRDRVIAAAABAAAAAAAAAAABUQ0IQAAAAA")
r.AddResource(data,"drag",128,"") 'ditto
r.Close
```

Notes: In general Apple has deprecated this, but a few application still support clippings.

6.0.91 How to create a PDF file in Xojo?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Check our DynaPDF plugin and the examples.

Notes: An alternative can be to use the CoreGraphics and Cocoa functions on Mac OS X. For Windows, we can only suggest our DynaPDF plugin.

6.0.92 How to create EmailAttachment for PDF Data in memory?

Plugin Version: all, Platform: macOS.

Answer: You can use code like the one below:

Example:

Function EmailAttachmentFromPDFData(PDFData as string, filename as string) As EmailAttachment
 dim a as new EmailAttachment

```
a.data = EncodeBase64(PDFData, 76)
a.ContentEncoding = "base64"
a.MIMETYPE = "application/pdf"
a.MacType = "PDF "
a.MacCreator = "prvw"
a.Name = filename
```

Return a

End Function

Notes: Compared to sample code from Xojo documentation, we set the mime type correct for PDF. The MacType/MacCreator codes are deprecated, but you can still include them for older Mac email clients. "prvw" is the creator code for Apple's preview app.

6.0.93 How to create PDF for image files?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use DynaPDF like this:

Example:

```
Function CreatePrintPDF(jpgFiles() as folderitem, pdfFile as FolderItem, PageWidth as Integer, PageHeight as Integer) As Boolean
  // have files?
  If pdfFile = Nil Then Return False
  If jpgFiles = Nil Then Return False

  If jpgFiles.Ubound < 0 Then Return False

  // new DynaPDF
  Dim pdf As New MyDynapdfMBS

  // page width/height in MilliMeter
  Dim pdfWidth as Integer = PageWidth * 72 / 25.4
  Dim pdfHeight as Integer = PageHeight * 72 / 25.4

  // put your license here
  Call pdf.SetLicenseKey "Starter"

  // create pdf
  Call pdf.CreateNewPDF pdfFile
```

```

// set a couple of options
Call pdf.SetPageCoords(MyDynaPDFMBS.kpcTopDown)
Call pdf.SetResolution(300)
Call pdf.SetUseTransparency(False)
Call pdf.SetSaveNewImageFormat(False)
Call pdf.SetGStateFlags(MyDynaPDFMBS.kgfUseImageColorSpace, False)
Call pdf.SetJPEGQuality(100)

// set page size
Call pdf.SetBBox(MyDynaPDFMBS.kpbMediaBox, 0, 0, pdfWidth, pdfHeight)
Call pdf.SetPageWidth(pdfWidth)
Call pdf.SetPageHeight(pdfHeight)

// append pages with one image per page
For i as Integer = 0 To jpgFiles.Ubound
Call pdf.Append
Call pdf.InsertImageEx(0, 0, pdfWidth, pdfHeight, jpgFiles(i), 1)
Call pdf.EndPage
Next

// close
Call pdf.CloseFile

Return True
End Function

```

Notes: This is to join image files in paper size to a new PDF.
e.g. scans in A4 into an A4 PDF.

6.0.94 How to CURL Options translate to Plugin Calls?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Below a few tips on how to translate command line CURL calls to plugin calls.

Notes: `curl -vX PUT http://localhost:5984/appserials/78569238475/DocumentRegister.docx?rev=3-25634563456 -data-binary @DocumentRegister.docx -H "Content-Type: application/msword"`

- The option `-v` means verbose. You can use `OptionVerbose` and listen for messages in the `DebugMessage` event.
- The option `-X PUT` means we want to do a HTTP PUT Request. So set `OptionPut` to true. Also you will want to set `OptionUpload` to true as you upload data.
- We have the URL which you put into `OptionURL` property.

- The `-data-binary` option tells CURL to pass the given data. With the `@` before the data, it is interpreted as a file name, so the data is read from the given file. You'll need to open this file and pass data with the Read event as needed. (See CURLS ftp file upload example project)
- The last option `-H` specifies an additional header for the upload. Pass this additional header with the `SetOptionHTTPHeader` method.

```
curl -X PUT http://127.0.0.1:5984/appserials/f2f4e540bf8bb60f61cfc4328001c59 -d '{ "type": "Product", "description": "Application Serial", "acronym": "AppSerial", "dateAdded": "2011-03-21 14:57:36" } '
```

- Option `-X PUT` like above.
- Pass the URL again in `OptionURL`
- This time data is passed in command line for CURL. You'd put this data in the quotes into a string and make it available in the Read event. (See CURLS ftp upload example project)

6.0.95 How to delete file with ftp and curl plugin?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can set post/pre quotes to have ftp commands executed before or after the download/upload.

Example:

```
dim d as CURLMBS // your curl object
```

```
// delete file
```

```
dim ws() As String
```

```
ws.Append "DELE Temp.txt"
```

```
d.SetOptionPostQuote(ws)
```

Notes: Use `SetOptionPostQuote`, `SetOptionPreQuote` or `SetOptionQuote`.

The ftp commands you pass here are native ftp commands and not the commands you use with ftp applications. To delete use `DELE` and the file path.

6.0.96 How to detect display resolution changed?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: On Mac OS X simply listen for display changed notifications.

Notes: Use the "Distribution Notification Center.rbp" example project as a base and use it to listen to notifications with the name "O3DeviceChanged".

6.0.97 How to detect retina?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Please use Window.BackingScaleFactorMBS to query the factor.

Example:

```
msgbox str(window1.BackingScaleFactorMBS)
```

6.0.98 How to disable force quit?

Plugin Version: all, Platform: macOS.

Answer:

Please visit this website and get the control panel for Mac OS 9 there:

<http://www3.sk.sympatico.ca/tinyjohn/DFQ.html>

For Mac OS X use the MBS Plugin with the SetSystemUIModeMBS method.

Notes:

Please use presentationOptions in NSApplicationMBS for Cocoa applications.

6.0.99 How to disable the error dialogs from Internet Explorer on javascript errors?

Plugin Version: all, Platform: Windows.

Answer: You can use this code in the htmlviewer open event:

Example:

```
if targetwin32 then
htmlviewer1._ole.Content.value("Silent") = True
end if
```

Notes: This disables the error dialogs from Internet Explorer.

6.0.100 How to display a PDF file in Xojo?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: On Mac OS X you can use CoreGraphics or PDFKit to display a PDF.

Notes: An alternative can be to load the PDF into a htmlviewer so the PDF plugin can display it.

On Windows you may need to use the Acrobat ActiveX control from Adobe or launch Acrobat Reader.

6.0.101 How to do a lottery in RB?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Try this function:

Example:

```
Sub Lotto(max as Integer,count as Integer,z() as Integer)
// Lotto count numbers of max put into the array z beginning at index 0
dim n(0) as Integer ' all the numbers
dim m as Integer ' the highest field in the current array
dim i,a,b,d as Integer ' working variables

'fill the array with the numbers
m=max-1
redim n(m)

for i=0 to m
n(i)=i+1
next

' unsort them by exchanging random ones
m=max*10
for i=1 to m
a=rnd*max
b=rnd*max

d=n(a)
n(a)=n(b)
n(b)=d
next

' get the first count to the dest array
m=count-1
redim z(m)
for i=0 to m
z(i)=n(i)
next

'sort the result
z.sort
End Sub
```

```

Sub Open()
// Test it

dim za(0) as Integer ' the array of the numbers

lotto 49,6,za ' 6 of 49 in Germany

' and display them
staticText1.text=str(za(0))+chr(13)+str(za(1))+chr(13)+str(za(2))+chr(13)+str(za(3))+chr(13)+str(za(4))+chr(13)+str(za(5))+chr(13)+str(za(6))+chr(13)+str(za(7))+chr(13)+str(za(8))+chr(13)+str(za(9))+chr(13)+str(za(10))+chr(13)+str(za(11))+chr(13)+str(za(12))+chr(13)+str(za(13))+chr(13)+str(za(14))+chr(13)+str(za(15))+chr(13)+str(za(16))+chr(13)+str(za(17))+chr(13)+str(za(18))+chr(13)+str(za(19))+chr(13)+str(za(20))+chr(13)+str(za(21))+chr(13)+str(za(22))+chr(13)+str(za(23))+chr(13)+str(za(24))+chr(13)+str(za(25))+chr(13)+str(za(26))+chr(13)+str(za(27))+chr(13)+str(za(28))+chr(13)+str(za(29))+chr(13)+str(za(30))+chr(13)+str(za(31))+chr(13)+str(za(32))+chr(13)+str(za(33))+chr(13)+str(za(34))+chr(13)+str(za(35))+chr(13)+str(za(36))+chr(13)+str(za(37))+chr(13)+str(za(38))+chr(13)+str(za(39))+chr(13)+str(za(40))+chr(13)+str(za(41))+chr(13)+str(za(42))+chr(13)+str(za(43))+chr(13)+str(za(44))+chr(13)+str(za(45))+chr(13)+str(za(46))+chr(13)+str(za(47))+chr(13)+str(za(48))+chr(13)+str(za(49))+chr(13)+str(za(50))+chr(13)+str(za(51))+chr(13)+str(za(52))+chr(13)+str(za(53))+chr(13)+str(za(54))+chr(13)+str(za(55))+chr(13)+str(za(56))+chr(13)+str(za(57))+chr(13)+str(za(58))+chr(13)+str(za(59))+chr(13)+str(za(60))+chr(13)+str(za(61))+chr(13)+str(za(62))+chr(13)+str(za(63))+chr(13)+str(za(64))+chr(13)+str(za(65))+chr(13)+str(za(66))+chr(13)+str(za(67))+chr(13)+str(za(68))+chr(13)+str(za(69))+chr(13)+str(za(70))+chr(13)+str(za(71))+chr(13)+str(za(72))+chr(13)+str(za(73))+chr(13)+str(za(74))+chr(13)+str(za(75))+chr(13)+str(za(76))+chr(13)+str(za(77))+chr(13)+str(za(78))+chr(13)+str(za(79))+chr(13)+str(za(80))+chr(13)+str(za(81))+chr(13)+str(za(82))+chr(13)+str(za(83))+chr(13)+str(za(84))+chr(13)+str(za(85))+chr(13)+str(za(86))+chr(13)+str(za(87))+chr(13)+str(za(88))+chr(13)+str(za(89))+chr(13)+str(za(90))+chr(13)+str(za(91))+chr(13)+str(za(92))+chr(13)+str(za(93))+chr(13)+str(za(94))+chr(13)+str(za(95))+chr(13)+str(za(96))+chr(13)+str(za(97))+chr(13)+str(za(98))+chr(13)+str(za(99))
End Sub

```

6.0.102 How to do an asycron DNS lookup?

Plugin Version: all, Platform: Windows.

Answer: use CFHostMBS class (Mac OS X only).

Notes: Xojo internal functions and plugin DNS functions are sycronized.

You can use DNSLookupThreadMBS class for doing them asycron.

6.0.103 How to draw a dushed pattern line?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can try this code:

Example:

```
// call like this: DrawDushedPatternLine g,0,0,width,height,10
```

```

Sub DrawDushedPatternLine(g as graphics,x1 as Integer,y1 as Integer,x2 as Integer,y2 as Integer, partlen
as Integer)
dim x,y,ox,oy as Double
dim dx,dy as Double
dim w,h,d as Double
dim b as Boolean

w=x2-x1
h=y2-y1

d=sqrt(w*w+h*h)

dx=w/d*partlen
dy=h/d*partlen

```

```

b=true
x=x1
while (x<x2) and (y<y2)
  ox=x
  oy=y

  x=x+dx
  y=y+dy

  if b then
    g.DrawLine ox,oy,x,y
  end if

  b=not b
wend

```

End Sub

Notes: It would be possible to add this to the plugin, but I think it's better if you do it in plain Xojo code, so it even works on Windows.

6.0.104 How to draw a nice antialiased line?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer:

This code can help you although it's not perfect.
You need to set lc to the current color you use.

Example:

```

Sub drawLine(xs as Integer, ys as Integer, xe as Integer, ye as Integer, face as RGBSurface, lineColor as
color)
  dim intX, intY, count, n, xDiff, yDiff as Integer
  dim v, v1, floatX, floatY, xx, yy, xStep, yStep as Double
  dim c as color

  const st=1.0

  xDiff=xe-xs
  yDiff=ye-ys
  count=max(abs(xDiff), abs(yDiff))
  xStep=xDiff/count
  yStep=yDiff/count

```

```

xx=xs
yy=ys
for n=1 to count
intX=xx
intY=yy
floatX=xx-intX
floatY=yy-intY

v=(1-floatX)*(1-floatY)*st
v1=1-v
c=face.pixel(intX, intY)
face.pixel(intX, intY)=rgb(v*lineColor.red+v1*c.red, v*lineColor.green+v1*c.green, v*lineColor.blue+v1*c.blue)
v=floatX*(1-floatY)*st
v1=1-v
c=face.pixel(intX+1, intY)
face.pixel(intX+1, intY)=rgb(v*lineColor.red+v1*c.red, v*lineColor.green+v1*c.green, v*lineColor.blue+v1*c.blue)
v=(1-floatX)*floatY*st
v1=1-v
c=face.pixel(intX, intY+1)
face.pixel(intX, intY+1)=rgb(v*lineColor.red+v1*c.red, v*lineColor.green+v1*c.green, v*lineColor.blue+v1*c.blue)
v=floatX*floatY*st
v1=1-v
c=face.pixel(intX+1, intY+1)
face.pixel(intX+1, intY+1)=rgb(v*lineColor.red+v1*c.red, v*lineColor.green+v1*c.green, v*lineColor.blue+v1*c.blue)

xx=xx+xStep
yy=yy+yStep
next

End Sub

```

Notes:

PS: st should be 1 and face should be a RGBSurface or a Graphics object.

6.0.105 How to dump java class interface?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: In terminal you can use "javap -s <classname>" to display the class with the method names and parameters.

Notes: For example show ResultSet class: javap -s java.sql.ResultSet

6.0.106 How to duplicate a picture with mask or alpha channel?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use code like this function:

Example:

```
Function Duplicate(extends p as Picture) As Picture
  #if RBVersion >= 2011.04 then
  if p.HasAlphaChannel then

    // create nw picture and copy content:
    dim q as new Picture(p.Width, p.Height)
    q.Graphics.DrawPicture p,0,0

  Return q

  end if
  #endif

  // create new picture
  dim q as new Picture(p.Width, p.Height, 32)

  // get mask
  dim oldMask as Picture = p.mask(false)
  if oldMask = nil then
    // no mask, so simple copy
    q.Graphics.DrawPicture p,0,0
    Return q
  end if

  // remove mask
  p.mask = nil

  // copy picture and mask
  q.Graphics.DrawPicture p, 0, 0
  q.mask.Graphics.DrawPicture oldMask,0,0

  // restore mask
  p.mask = oldmask

  Return q
End Function
```

Notes: Simply copy it to a module and call it like this: `q = p.duplicate`.

The code above works with old Xojo versions because of the `#if` even if your RS version does not support alpha channel pictures. This way it's future proof.

6.0.107 How to enable assistive devices?

Plugin Version: all, Platform: macOS.

Answer: You can use AppleScript code like below:

Notes: tell application "System Events"
activate

```
set UI elements enabled to true
```

```
return UI elements enabled
end tell
```

You can run this with AppleScriptMBS class.

6.0.108 How to encrypt a file with Blowfish?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use code like this:

Example:

```
dim fi as FolderItem = SpecialFolder.Desktop.Child("test.xojo_binary_project")
dim fo as FolderItem = SpecialFolder.Desktop.Child("test.encrypted")
```

```
// read input
```

```
dim bi as BinaryStream = BinaryStream.Open(fi)
```

```
dim si as string = bi.Read(bi.Length)
```

```
bi.Close
```

```
// encrypt
```

```
dim so as string = BlowfishMBS.Encrypt("MyKey",si)
```

```
// write output
```

```
dim bo as BinaryStream = BinaryStream.Create(fo)
```

```
bo.Write so
```

```
bo.Close
```

Notes: Of course you can decrypt same way, just use Decrypt function and of course swap files.

6.0.109 How to extract text from HTML?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use both RemoveHTMLTagsMBS and DecodingFromHTMLMBS like this:

Example:

```
dim html as string = "<p><B>Gr&uuml;&szlig;e</B></P>"
dim htmltext as string = RemoveHTMLTagsMBS(html)
dim text as string = DecodingFromHTMLMBS(htmltext)
```

MsgBox text // shows: Gr√üë

Notes: You can use it together with RemoveHTMLTagsMBS to remove html tags. What you get will be the text without tags.

DecodingFromHTMLMBS turns HTML escapes back to unicode characters. Like ä to √§.

6.0.110 How to find empty folders in a folder?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Try this code:

Example:

```
dim folder as folderitem // your folder

dim c as Integer = folder.count
for i as Integer = 1 to c
dim item as folderitem = folder.trueitem(i)
if item = nil then
// ignore
elseif item.directory then
// folder
if item.count = 0 then
// found empty folder
end if
end if
next
```

6.0.111 How to find iTunes on a Mac OS X machine fast?

Plugin Version: all, Platform: macOS.

Answer: You can try Launch Services.

Example:

```
dim f as FolderItem

f=LaunchServicesFindApplicationForInfoMBS("hook","com.apple.iTunes","iTunes.app")

MsgBox f.NativePath
```

6.0.112 How to find network interface for a socket by it's name?

Plugin Version: all, Platform: macOS.

Answer: You can use our plugin to build a lookup table.

Example:

```
Function FindNetworkInterface(name as string) As NetworkInterface
name = name.trim

if name.len = 0 then Return nil

// search by IP/MAC
dim u as Integer = System.NetworkInterfaceCount-1
for i as Integer = 0 to u
dim n as NetworkInterface = System.GetNetworkInterface(i)
if n.IPAddress = name or n.MACAddress = name then
Return n
end if
next

// use MBS Plugin to build a mapping
dim interfaces() as NetworkInterfaceMBS = NetworkInterfaceMBS.AllInterfaces
dim map as new Dictionary

for each n as NetworkInterfaceMBS in interfaces
dim IPv4s() as string = n.IPv4s
dim IPv6s() as string = n.IPv6s

for each IPv4 as string in IPv4s
map.Value(IPv4) = n.Name
next
for each IPv6 as string in IPv6s
map.Value(IPv6) = n.Name
next
if n.MAC<>>" then
map.Value(n.MAC) = n.Name
```

```

end if
next

// now search interfaces by name, IPv4 or IPv6
for i as Integer = 0 to u
dim n as NetworkInterface = System.GetNetworkInterface(i)
if map.Lookup(n.IPAddress, "") = name then
Return n
end if

if map.Lookup(n.MACAddress, "") = name then
Return n
end if
next

End Function

```

Notes: The code above uses a lookup table build using NetworkInterfaceMBS class to find the network interface by name.

6.0.113 How to find version of Microsoft Word?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use code like this:

Example:

```

// find Word
dim f as FolderItem = LaunchServicesFindApplicationForInfoMBS("", "com.microsoft.Word", "")

// open bundle
dim c as new NSBundleMBS(f)

// read info
dim d as Dictionary = c.infoDictionary

// show version
MsgBox d.Lookup("CFBundleVersion", "")

```

Notes: Older versions of Word can be found with creator code "MSWD".

6.0.114 How to fix CURL error 60/53 on connecting to server?

Plugin Version: all, Platform: macOS.

Answer: You probably connect with SSL and you have no valid certificate.

Example:

```
dim d as new CURLSMBS

// Disable SSL verification
d.OptionSSLVerifyHost = 0 // don't verify server
d.OptionSSLVerifyPeer = 0 // don't proofs certificate is authentic

// With SSL Verification:
dim cacert as FolderItem = Getfolderitem("cacert.pem")
d.OptionCAInfo = cacert.NativePath
d.OptionSSLVerifyHost = 2 // verify server
d.OptionSSLVerifyPeer = 1 // proofs certificate is authentic
```

Notes: You can either use the code above to disable the SSL verification and have no security. Or you use the cacert file and enable the verification. Than you only get a connection if the server has a valid certificate.

see also:

<http://curl.haxx.se/ca/>

6.0.115 How to format double with n digits?

Plugin Version: all, Platform: macOS.

Answer: You can use the FormatMBS function for this.

Example:

```
dim d as Double = 123.4567890
listbox1.AddRow FormatMBS("%f", d)
listbox1.AddRow FormatMBS("%e", d)
listbox1.AddRow FormatMBS("%g", d)

listbox1.AddRow FormatMBS("%5.5f", d)
listbox1.AddRow FormatMBS("%5.5e", d)
listbox1.AddRow FormatMBS("%5.5g", d)

d = 0.000000123456
listbox1.AddRow FormatMBS("%f", d)
listbox1.AddRow FormatMBS("%e", d)
```

```
listbox1.AddRow FormatMBS("%g", d)

listbox1.AddRow FormatMBS("%5.5f", d)
listbox1.AddRow FormatMBS("%5.5e", d)
listbox1.AddRow FormatMBS("%5.5g", d)
```

Notes: see FormatMBS for details.

In general %f is normal style, %e is scientific and %g is whichever gives best result for given space.

6.0.116 How to get a time converted to user time zone in a web app?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use the WebSession.GMTOffset property.

Example:

```
Sub Open()
// current date on server
dim d as new date
dim s as string = d.LongTime

// adjust to client GMT offset
d.GMTOffset = d.GMTOffset + Session.GMTOffset

dim t as string = D.LongTime

MsgBox s+EndOfLine+t
End Sub
```

6.0.117 How to get an handle to the frontmost window on Windows?

Plugin Version: all, Platform: Windows.

Answer: This function returns a handle for the frontmost window:

Example:

```
Function GetForegroundWindowHandle() as Integer
#if targetwin32 then
declare function GetForegroundWindow Lib "user32.dll" as Integer
Return GetForegroundWindow()
#endif
End Function
```

6.0.118 How to get CFAbsoluteTime from date?

Plugin Version: all, Platforms: macOS, Windows.

Answer: Use code like this:

Example:

```
dim d as new date
dim t as CFTimeZoneMBS = SystemCFTimeZoneMBS
dim g as new CFGregorianCalendarMBS
g.Day = d.Day
g.Month = d.Month
g.Year = d.Year
g.Minute = d.Minute
g.Hour = d.Hour
g.Second = d.Second

dim at as CFAbsoluteTimeMBS = g.AbsoluteTime(t)
dim x as Double = at.Value
```

```
MsgBox str(x)
```

Notes: As you see we need a timezone and put the date values in a gregorian date record. Now we can query absolute time for the given timezone.

6.0.119 How to get client IP address on web app?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use the WebSession.RemoteAddress property.

Example:

```
Sub Open()
Title = Session.RemoteAddress
End Sub
```

6.0.120 How to get fonts to load in charts on Linux?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Please use the `SetFontSearchPath` method in the `CDBaseChartMBS` class to specify where your fonts are.

Example:

```

if TargetLinux then
CDBaseChartMBS.SetFontSearchPath "/usr/share/fonts/truetype;/usr/share/fonts/truetype/msttcorefonts"
else
// on Mac and Windows we use system fonts.
end if

// also you can later switch default fonts:

dim Chart as CDBaseChartMBS // your chart

#If TargetARM And TargetLinux Then
// use specific fonts on Linux on Raspberry Pi
Call Chart.setDefaultFonts("/usr/share/fonts/truetype/piboto/PibotoLt-Regular.ttf", "/usr/share/fonts/truetype/piboto/Pi
#EndIf

```

Notes: On macOS, iOS and Windows, the fonts are loaded from the system's font folder.

e.g. if you use ubuntu, you can install the `ttf-mscorefonts-installer` package and call this method with `"/usr/share/fonts/truetype/msttcorefonts"` as the path. No backslash on the end of a path, please.

6.0.121 How to get fonts to load in DynaPDF on Linux?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Please use the `AddFontSearchPath` method in the `DynaPDFMBS` class to specify where your fonts are.

Example:

```

dim d as new DynaPDFMBS
if TargetLinux then
call d.AddFontSearchPath "/usr/share/fonts/truetype", true
else
// on Mac and Windows we use system fonts.
end if

```

Notes: On Mac OS X and Windows, the fonts are loaded from the system's font folder.

e.g. if you use ubuntu, you can install the `ttf-mscorefonts-installer` package and call this method with `"/usr/share/fonts/truetype/msttcorefonts"` as the path. No backslash on the end of a path, please.

6.0.122 How to get GMT time and back?

Plugin Version: all, Platform: macOS.

Answer: You can use the date class and the GMTOffset property.

Example:

```
// now
dim d as new date

// now in GMT
dim e as new date
e.GMTOffset = 0

// show
MsgBox str(d.TotalSeconds,"0.0")+ " " +str(e.TotalSeconds, "0.0")

dim GMTTimeStamp as Double = e.TotalSeconds

// restore
dim f as new date

// add GMT offset here
f.TotalSeconds = GMTTimeStamp + f.GMTOffset*3600
// because here it's removed
f.GMTOffset = f.GMTOffset

MsgBox d.ShortTime+" (" +str(d.GMTOffset)+") " +str(d.TotalSeconds,"0.0")+EndOfLine+_
e.ShortTime+" (" +str(e.GMTOffset)+") " +str(e.TotalSeconds,"0.0")+EndOfLine+_
f.ShortTime+" (" +str(f.GMTOffset)+") " +str(f.TotalSeconds,"0.0")
```

Notes: It's sometimes a bit tricky with the date class as setting one property often changes the others.

6.0.123 How to get good crash reports?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Check this website from the webkit website:

Notes: <http://webkit.org/quality/crashlogs.html>

6.0.124 How to get list of all threads?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use the runtime module like in this function:

Example:

```
Function Threads() As Thread()
#pragma DisableBackgroundTasks
dim t() as Thread

Dim o as Runtime.ObjectIterator=Runtime.IterateObjects
While o.MoveNext
if o.Current isa Thread then
t.Append thread(o.current)
end if
Wend

Return t
End Function
```

Notes: This returns an array of all thread objects currently in memory.

The pragma is important here as it avoids thread switches which may cause a thread to be created or deleted.

6.0.125 How to get parameters from webpage URL in Xojo Web Edition?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use the Webpage.ParametersReceived event.

Example:

```
Sub ParametersReceived(Variables As Dictionary)
for each key as Variant in Variables.keys
MsgBox key+" ->" +Variables.Value(key)
next
End Sub
```

Notes: The text encodings of this strings is not defined in Xojo 2010r5. Please use DefineEncoding.

6.0.126 How to get the color for disabled textcolor?

Plugin Version: all, Platform: macOS.

Answer: Ask the appearance manager:

Example:

```
Function GetThemeTextColor(inColor as Integer, inDepth as Integer, inColorDev as Boolean) As Color
declare function GetThemeTextColor lib "Carbon" (inColor as Integer, inDepth as Integer, inColorDev as
Boolean, outColor as Ptr) as Integer
```

```
dim i as Integer
```

```
dim col as MemoryBlock
```

```
col = newMemoryBlock(6)
```

```
i = GetThemeTextColor(inColor, inDepth, inColorDev, col)
```

```
return RGB(col.UShort(0)\256, col.UShort(2)\256, col.UShort(4)\256)
```

```
End Function
```

Notes: The color for this is:

```
const kThemeTextColorDialogInactive = 2.
```

```
c = GetThemeTextColor(kThemeTextColorDialogInactive, Screen(0).Depth, true)
```

For Mac OS X you should use "CarbonLib" instead of "AppearanceLib" ...

6.0.127 How to get the current free stack space?

Plugin Version: all, Platform: macOS.

Answer: You can something like the code below:

Example:

```
Sub ShowStackSize()
```

```
dim threadid as Integer
```

```
dim size as Integer
```

```
declare function GetCurrentThread lib "Carbon" (byref threadid as Integer) as short
```

```
declare function ThreadCurrentStackSize lib "Carbon" (threadid as Integer, byref size as Integer) as short
```

```
if GetCurrentThread(threadid)=0 then
```

```
if 0=ThreadCurrentStackSize(threadid,size) then
```

```
MsgBox str(size)
```

```
end if
```

```
end if
```

End Sub

Notes: For Mac OS 9, use "ThreadLib" instead of "CarbonLib". You can use #if if you like for that.

6.0.128 How to get the current timezone?

Plugin Version: all, Platforms: macOS, Windows.

Answer:

You can use the TimeZoneMBS class or the CFTimeZoneMBS class.
Or code like below:

Example:

```
Function GMTOffsetInMinutes() as Integer
// Returns the offset of the current time to GMT in minutes.
// supports Mac OS and Windows, but not Linux yet (let me know if
// you have code for that, please)
//
// Note that the offset is not always an even multiple of 60, but
// there are also half hour offsets, even one 5:45h offset

// This version by Thomas Tempelmann (rb@tempel.org) on 25 Nov 2005
// with a fix that should also make it work with future Intel Mac targets.
//
// Using code from various authors found on the RB NUG mailing list

dim result, bias, dayLightbias as Integer
dim info as memoryBlock
dim offset as Integer

#if targetMacOS then

Declare Sub ReadLocation lib "Carbon" (location As ptr)

info = NewMemoryBlock(12)
ReadLocation info
if false then
// bad, because it does not work on Intel Macs:
'offset = info.short(9) * 256 + info.byte(11)
else
offset = BitwiseAnd (info.long(8), &hFFFFFF)
end

offset = info.short(9) * 256 + info.byte(11)
```

```

offset = offset \60
return offset

#endif

#if targetWin32 then

Declare Function GetTimeZoneInformation Lib "Kernel32" ( tzInfoPointer as Ptr ) as Integer
// returns one of
// TIME_ZONE_ID_UNKNOWN 0
// - Note: e.g. New Delhi (GMT+5:30) and Newfoundland (-3:30) return this value 0
// TIME_ZONE_ID_STANDARD 1
// TIME_ZONE_ID_DAYLIGHT 2

info = new MemoryBlock(172)
result = GetTimeZoneInformation(info)

bias = info.Long(0)
// note: the original code I found in the NUG archives used Long(84) and switched to Long(0)
// only for result=1 and result=2, but my tests found that Long(0) is also the right value for result=0

if result = 2 then
daylightBias = info.long(168)
end if
offset = - (bias + dayLightbias)
return offset

#endif

End Function

```

6.0.129 How to get the current window title?

Plugin Version: all, Platform: macOS.

Answer: The code below returns the current window title for the frontmost window on Mac OS X if Accessibility services are

Example:

```

Function CurrentWindowTitle() As string
// your application needs permissions for accessibility to make this work!

dim SystemWideElement,FocusedApplicationElement,FocusedWindowElement as AXUIElementMBS
dim FocusedApplication,FocusedWindow,Title as AXValueMBS
dim s as String
dim cs as CFStringMBS

```

```

SystemWideElement=AccessibilityMBS.SystemWideAXUIElement
if SystemWideElement<>nil then
FocusedApplication=SystemWideElement.AttributeValue(AccessibilityMBS.kAXFocusedApplicationAttribute)
if FocusedApplication.Type=AccessibilityMBS.kAXUIElementMBSTypeID then
FocusedApplicationElement=new AXUIElementMBS
FocusedApplicationElement.Handle=FocusedApplication.Handle
FocusedApplicationElement.RetainObject

FocusedWindow=FocusedApplicationElement.AttributeValue(AccessibilityMBS.kAXFocusedWindowAttribute)

if FocusedWindow<>nil and AccessibilityMBS.kAXUIElementMBSTypeID=FocusedWindow.Type then

FocusedWindowElement=new AXUIElementMBS
FocusedWindowElement.Handle=FocusedWindow.Handle
FocusedWindowElement.RetainObject

Title=FocusedWindowElement.AttributeValue(AccessibilityMBS.kAXTitleAttribute)
if Title<>nil and Title.Type=kCFStringMBSTypeID then
cs=new CFStringMBS
cs.handle=Title.Handle
cs.RetainObject
Return cs.str
end if
end if
end if
end if
End Function

```

6.0.130 How to get the cursor blink interval time?

Plugin Version: all, Platform: macOS.

Answer: On Mac OS you can use GetCaretTime from the toolbox.

Example:

```
declare function GetCaretTime lib "Carbon" () as Integer
```

```
MsgBox str(GetCaretTime()+ " ticks")
```

Notes: 60 ticks make one second.

6.0.131 How to get the list of the current selected files in the Finder?

Plugin Version: all, Platform: macOS.

Answer:

Use the AppleScript like this one:

```
tell application "finder"
return selection
end tell
```

Which translates into this AppleEvent:

```
Process("Finder").SendAE "core,getd,'—':obj { form:prop, want:type(prop), seld:type(sele), from:'null'() }
"
```

and as Xojo code it looks like this:

Example:

```
dim ae as appleEvent
dim o1 as appleEventObjectSpecifier
dim f as folderItem
dim alist as appleEventDescList
dim i as Integer
dim dateiname as string

// setup the AppleEvent
o1=getpropertyObjectDescriptor( nil, "sele")
ae= newappleEvent("core", "getd", "MACS")
ae.objectSpecifierParam("—")=o1

// send it
if ae.send then
// got the list
alist=ae.replyDescList

// now show the list of filename into an editfield:

for i=1 to alist.count
f=alist.folderItem(i)

dateiname=f.name
// editfield1 with property "multiline=true"!
editfield1.text=editfield1.text + dateiname + chr(13)
next
```

end if

6.0.132 How to get the Mac OS system version?

Plugin Version: all, Platform: macOS.

Answer: The following code queries the value and displays the version number:

Example:

```

dim first as Integer
dim second as Integer
dim third as Integer
dim l as Integer

if System.Gestalt("sysv",l) then

Third=Bitwiseand(l,15)
second=Bitwiseand(l\16,15)
first=Bitwiseand(l\256,15)+10*Bitwiseand(l\256\16,15)
end if

if First>=10 then
msgbox "Mac OS X "+str(First)+" "+str(Second)+" "+str(third)
else
msgbox "Mac OS "+str(First)+" "+str(Second)+" "+str(third)
end if

```

6.0.133 How to get the Mac OS Version using System.Gestalt?

Plugin Version: all, Platform: macOS.

Answer: Try this code:

Example:

```

Dim s As String
Dim b As Boolean
Dim i, resp as Integer

// Systemversion
b = System.Gestalt("sysv", resp)
If b then
s = Hex(resp)

```

```

For i =Len(s)-1 DownTo 1
s=Left(s,i)+””+Mid(s,i+1)
Next
MsgBox ”Systemversion: Mac OS ” + s
end if

```

Notes: The MBS Plugin has a SystemInformationMBS.OSVersionString function for this.

6.0.134 How to get the screensize excluding the task bar?

Plugin Version: all, Platform: Windows.

Answer: Try this code:

Notes: Use the Screen class with the available* properties.

6.0.135 How to get the size of the frontmost window on Windows?

Plugin Version: all, Platform: Windows.

Answer: Try this code:

Notes: Make yourself a class for the WindowRect with four properties:

```

Bottom as Integer
Left as Integer
Right as Integer
Top as Integer

```

Add the following method to your class:

```

Sub GetWindowRect(windowhandle as Integer)
dim err as Integer
dim mem as memoryBlock
#if targetwin32 then
Declare Function GetWindowRect Lib ”user32.dll” (hwnd as Integer, ipRect As Ptr) as Integer

mem = newmemoryBlock(16)
err = GetWindowRect(windowhandle, mem)
Left = mem.long(0)
Top = mem.Long(4)
Right = mem.Long(8)
Bottom = mem.Long(12)

```

```
#endif  
End Sub
```

Good to use for the MDI Master Window!

6.0.136 How to get the source code of a HTMLViewer?

Plugin Version: all, Platform: macOS.

Answer: Try this code:

Example:

```
// for Windows:
```

```
msgbox HTMLViewer1.IEHTMLTextMBS
```

```
// for MacOS with WebKit 2.x:
```

```
msgbox HTMLViewer1.WKWebViewMBS.HTMLText
```

6.0.137 How to get Xojo apps running Linux?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You need to install some require packages.

Notes: You need CUPS as well as GTK packages. On 64 bit systems also the ia32-libs package.

Please note that you need a x86 compatible Linux. So no PPC, Power, ARM or other CPUs.

6.0.138 How to handle really huge images with GraphicsMagick or ImageMagick?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Sometimes it may be better to use an extra application to process images.

Notes: A typical 32 bit app made with Xojo can use around 1.8 GB on Windows and 3 GB on Mac OS X. Some images may be huge, so that processing them causes several copies of the image to be in memory. With a 500 MB image in memory, doing a scale or rotation may require a temp image. So with source, temp and dest images with each 500 MB plus your normal app memory usage, you may hit the limit of Windows with 1.8 GB.

In that case it may be worth running a tool like gm in the shell class. gm is the command line version of GraphicsMagick. There you can run the 64 bit version which is not limited in memory like your own application. Also you can monitor progress and keep your app responsive.

6.0.139 How to handle tab key for editable cells in listbox?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use code like this function:

Example:

```
Function HandleTabInList(list as listbox, row as Integer, column as Integer, key as String) As Boolean
// Handle tab character in Listbox.CellKeyDown event
```

```
Select case asc(key)
case 9
if Keyboard.AsyncShiftKey then
// back

// look for column left
for i as Integer = column-1 downto 0
if list.ColumnType(i) >= list.TypeEditable then
list.EditCell(row, i)
Return true
end if
next

// not found, so look in row before
row = row - 1
if row >= 0 then
for i as Integer = list.ColumnCount-1 downto 0
if list.ColumnType(i) >= list.TypeEditable then
list.EditCell(row, i)
Return true
end if
next
end if
else
// forward

// look for column right
for i as Integer = column+1 to list.ColumnCount-1
if list.ColumnType(i) >= list.TypeEditable then
list.EditCell(row, i)
Return true
end if
next
```

```

// not found, so look in row below
row = row + 1
if row <list.ListCount then
for i as Integer = 0 to list.ColumnCount-1
if list.ColumnType(i) >= list.TypeEditable then
list.EditCell(row, i)
Return true
end if
next
end if
end if
end Select
End Function

```

Notes: You call it from CellKeyDown event like this:

```

EventHandler Function CellKeyDown(row as Integer, column as Integer, key as String) As Boolean
if HandleTabInList(me, row, column, key) then Return true
End EventHandler

```

As you see in the code, we handle tab and shift + tab for moving back and forward. Also we wrap to previous/next row if needed. Feel free to extend this to wrap from last to first row or create a new row for editing.

6.0.140 How to hard link MapKit framework?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Our MapKit classes weak link the framework. If you need hard linking it for the App Store, you can add this method to a class:

Example:

```

Sub ReferenceMapKit()
// just put this in window or app class

#if TargetMachO and Target64Bit then
Declare sub testing Lib "MapKit" Selector "test" (id as ptr)
testing(nil)
#endif

End Sub

```

Notes: No need to call the method.

Just having it in a window or app, will cause the compiler to hard link the framework.

6.0.141 How to have a PDF downloaded to the user in a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use a WebHTMLViewer control and load the PDF file with the PDF plugin from the browser.

Example:

```
dim CurrentFile as WebFile // a property of the WebPage

// define the PDF file
CurrentFile = new WebFile
CurrentFile.Filename = "test.pdf"
CurrentFile.MIMEType = "application/pdf"
CurrentFile.Data = "some pdf data" // MyDynaPDF.GetBuffer
CurrentFile.ForceDownload = true

// start the download
showurl(CurrentFile.url)
```

Notes: See our Create PDF example for the Xojo Web Edition.

6.0.142 How to hide all applications except mine?

Platform: macOS.

Answer: The code below will on Mac OS hide all applications except your one:

Example:

```
dim p as new ProcessMBS

p.GetFirstProcess
do
if not p.FrontProcess then
p.Visible=false
end if
loop until not p.GetNextProcess
```

6.0.143 How to hide script errors in HTMLViewer on Windows?

Plugin Version: all, Platform: Windows.

Answer: Set Internet Explorer to silent mode with code like this:

Example:

```
htmlviewer1._ole.Content.value("Silent") = True
```

Notes: Simply put this code in the open event of your htmlviewer control (using me instead of htmlviewer1).

6.0.144 How to hide the grid/background/border in ChartDirector?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: If you want to hide something in a chart, simply assign the kTransparent constant as color.

6.0.145 How to hide the mouse cursor on Mac?

Plugin Version: all, Platform: macOS.

Answer: Try this declare:

Example:

```
Declare Sub HideCursor Lib "Carbon" () Inline68K("A852")
```

```
HideCursor
```

Notes: The MBS Plugin has this function and supports it on Windows, too.

6.0.146 How to insert image to NSTextView or TextArea?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: With NSTextViewMBS you can use this code to insert file:

Example:

```
// insert a file to textview
```

```
Public Sub InsertFile(textview as NSTextViewMBS, f as FolderItem)
```

```
// read to file
```

```

dim b as BinaryStream = BinaryStream.Open(f)
dim s as string = b.Read(b.Length)

// build wrapper
dim fileWrapper as NSFileWrapperMBS = NSFileWrapperMBS.initRegularFileWithContents(s)
fileWrapper.preferredFilename = f.name

// make attachment
dim fileAttachment as new NSTextAttachmentMBS(fileWrapper)
dim attributedString as NSAttributedStringMBS = NSAttributedStringMBS.attributedStringWithAttachment(fileAttachment)

// add to a NSTextViewMBS
textview.insertText attributedString

End Sub

```

Notes: For TextArea you can query the underlying NSTextViewMBS object via TextArea.NSTextViewMBS method.

6.0.147 How to jump to an anchor in a htmlviewer?

Plugin Version: all, Platforms: macOS, Windows.

Answer: You can use javascript to change the current window's location.

Example:

```

// load website
htmlviewer1.LoadURL "http://www.monkeybreadsoftware.net/addressbook-abpersonmbs.shtml"

// later jump to anchor named "16":

if TargetWin32 then
call HTMLViewer1.IERunJavaScriptMBS "window.location = ""#16""
end if

```

6.0.148 How to keep a movieplayer unclickable?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: To keep the user away from clicking on a playing Movie you can just drop a Canvas in front of the Movieplayer and take the clicks there.

Example:

```
Function Canvas1.MouseDown(X as Integer, Y as Integer) as boolean
return true // take it and do nothing
End Function
```

6.0.149 How to keep my web app from using 100% CPU time?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: On Linux and MacOS you can use renice command in the terminal. On Windows use the task manager to reduce priority.

Notes: If you launch your app with nohup on Linux or Mac OS X like this from the terminal or a script:

```
nohup /webapps/MyApp/MyApp &
```

you can simply have a second line saying this:

```
renice 20 $ !
```

which tells the system to lower priority to lowest value for the latest background process.

6.0.150 How to kill a process by name?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can kill a process (or application) by name if you loop over all the processes and kill the one you need.

Example:

```
dim p as new ProcessMBS
p.GetfirstProcess ' get first
do
if p.name = "TextEdit" then
call p.KillProcess
Return
end if
loop until not p.GetNextProcess
```

Notes: You may want to check the result of killProcess function. Not every user is allowed to kill every application.

6.0.151 How to know how many CPUs are present?

Plugin Version: all, Platform: macOS.

Answer: Try this function:

Example:

```
Function GetCPUCount() as Integer
Declare Function MPPProcessors Lib "Carbon" () as Integer
```

```
Return MPPProcessors()
End Function
```

Notes: Your app will than need that library to launch on Classic. To avoid this the MBS plugin checks if this library is available and return 1 if it's not available.

6.0.152 How to know the calling function?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: On Mac you can use a helper function like this this code:

Example:

```
Public Function CallingFunction() as string
// Query name of calling function of a function
```

```
#Pragma BreakOnExceptions false
```

```
try
```

```
// raise a dummy exception
dim r as new NilObjectException
raise r
```

```
catch x as NilObjectException
```

```
// get stack
dim stack() as string = x.Stack
```

```
// pick function name and return
dim name as string = stack(2)
Return name
```

```
end try
End Function
```

Notes: You need to include function names in your application.

6.0.153 How to launch an app using it's creator code?

Plugin Version: all, Platform: macOS.

Answer: Send an AppleEvent "oapp" with the creator code to the Finder ("MACS"):

Example:

```
Dim a as AppleEvent
dim creator as string

creator = "MSIE" ' here the Internet Explorer

a = NewAppleEvent("aevt", "odoc", "MACS")
a.Timeout = -1

a.ObjectSpecifierParam("—") = GetUniqueIDObjectDescriptor("appf", nil, creator)

if not a.send then
msgBox "An error has occured"
else

end if
```

6.0.154 How to launch disc utility?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use this code:

Example:

```
dim f as FolderItem = LaunchServicesFindApplicationForInfoMBS("", "com.apple.DiskUtility", "")

if f<>Nil then
f.Launch
end if
```

Notes: This works even if people renamed the disc utility or moved it to another folder.

6.0.155 How to make a lot of changes to a REAL SQL Database faster?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You may try to embed your changes to the database between two transaction calls.

Example:

```
dim db as Database // some database

db.SQLiteExecute "BEGIN TRANSACTION"
// Do some Stuff
db.SQLiteExecute "END TRANSACTION"
```

Notes: This can increase speed by some factors.

6.0.156 How to make a NSImage object for my retina enabled app?

Plugin Version: all, Platform: macOS.

Answer: You can use code like this:

Example:

```
Function NewRetinaImage(pic as Picture, mask as Picture = nil) As NSImageMBS
// first make a NSImageMBS from it
dim n as new NSImageMBS(pic, mask)

// now set to half the size, so we have 2x pixels for the image
n.size = new NSSizeMBS(n.width/2, n.height/2)

// and return
Return n
End Function
```

Notes: The thing to do is to have 2x the pixels, but assign a size to the image which gives it the right size in points.

You can pass the NSImageMBS from here to NSMenuItemMBS. For Retina displays, the full resolution is used. For others it will be reduced.

6.0.157 How to make a window borderless on Windows?

Plugin Version: all, Platform: Windows.

Answer: Try this declares:

Example:

```
// Sets window to borderless popup type, and sets its initial dimensions.
// Call this method, then Win32SetBorderlessPos, and then RB's Show
// method. Use RB Frame type 7 (Global Floating Window).
```

```
Const SWP_NOMOVE = &H2
Const SWP_FRAMECHANGED = &H20
Const HWND_TOPMOST = -1
Const GWL_STYLE = -16
Const WS_POPUPWINDOW = &H80880000
```

```
Dim styleFlags as Integer
```

```
#If TargetWin32 Then
```

```
Declare Function SetWindowLong Lib "user32" Alias "SetWindowLongA" (hwnd as Integer, nIndex as Integer, dwNewLong as Integer) as Integer
```

```
Declare Function SetWindowPos Lib "user32" (hwnd as Integer, hWndInstertAfter as Integer, x as Integer, y as Integer, cx as Integer, cy as Integer, flags as Integer) as Integer
```

```
styleFlags = SetWindowLong( w.WinHWND, GWL_STYLE, WS_POPUPWINDOW )
styleFlags = BitwiseOr( SWP_FRAMECHANGED, SWP_NOMOVE )
styleFlags = SetWindowPos( w.WinHWND, HWND_TOPMOST, 0, 0, wd, ht, styleFlags )
```

```
#EndIf
```

6.0.158 How to make an alias using AppleEvents?

Plugin Version: all, Platform: macOS.

Answer: Try this code:

Example:

```
Sub MakeAlias(folder as folderitem, target as folderitem, aliasname as string)
```

```
dim ev as AppleEvent
```

```
dim myResult as boolean
```

```
dim properties as AppleEventRecord
```

```
ev = NewAppleEvent("core", "crel", "MACS")
```

```
ev.MacTypeParam("kocl") = "alis"
```

```
ev.FolderItemParam("to ") = target
```

```
ev.FolderItemParam("insh") = folder
```

```
properties=new AppleEventRecord
```

```

properties.StringParam("pnam")=aliasname

ev.RecordParam("prdt")=properties

myResult = ev.send
// true on success, false on error
End Sub

```

Notes: Call it like this:

```
MakeAlias SpecialFolder.Desktop, SpecialFolder.Desktop.Child("Gif Copy.rb"), "test.rb alias"
```

Seems to not work on Mac OS X 10.6

6.0.159 How to make AppleScripts much faster?

Plugin Version: all, Platform: macOS.

Answer: use "ignoring application responses" like in this example:

```

Notes: on run { fn,fpx,fpy }
ignoring application responses
tell app "Finder" to set the position of folder fn to fpx,fpy
end ignoring
end run

```

6.0.160 How to make double clicks on a canvas?

Plugin Version: all, Platform: macOS.

Answer:

Update: Newer Xojo versions support DoubleClick event, so you don't need this code.

Here's my tip from the tips list on how to add a double-click event to the Canvas control. The technique could easily be used for a window or any Rectcontrol:

Because of its built-in drawing methods, the Canvas control is often used to create custom interface controls. But while the Canvas control has event handlers for most mouse events, it doesn't have an event handler for DoubleClick events. Fortunately, you can add a double-click event handler to a Canvas control easily. Basically, you're going to create a new class based on Canvas and add a double-click event to that. You can then use the new class anytime you need a Canvas with a double-click event.

To create a new Canvas class with a DoubleClick event handler, do this:

1. Add a new class to your project.
2. Set the Super property of the new class to "Canvas".
3. Change the name of this new class to "DoubleClickCanvas".

A double-click occurs when two clicks occur within the users double-click time (set in the Mouse control panel on both Macintosh and Windows) and within five pixels of each other. So, you'll need a few properties to store when and where the last click occurred.

4. Add a new property with the following declaration and mark it as private: lastClickTicks as Integer
5. Add a new property with the following declaration and mark it as private: lastClickX as Integer
6. Add a new property with the following declaration and mark it as private: lastClickY as Integer

Since the Canvas control doesn't have a DoubleClick event, you will need to add one.

7. Add a new event to your class by choosing New Event from the Edit menu and enter "DoubleClick" as the event name.

Double-clicks occur on MouseUp. In order for the mouseUp event to fire, you must return True in the MouseDown event.

8. In the MouseDown event, add the following code:
Return True

In the MouseUp event, you will need to determine what the users double-click time is. This value is represented on both the Mac and Windows in ticks. A tick is 1/60th of a second. Since there isn't a built-in function for this, you'll need to make a toolbox call. The mouseUp event code below makes the appropriate toolbox call for both Macintosh and Windows. It then compares the time of the users last click to the time of the current click and compares the location of the users last click to the location of the current click.

9. Add the following code to the MouseUp event:

```
dim doubleClickTime, currentClickTicks as Integer

#if targetMacOS then
Declare Function GetDbtTime Lib "Carbon" () as Integer
doubleClickTime = GetDbtTime()
#endif

#if targetWin32 then
Declare Function GetDoubleClickTime Lib "User32.DLL" () as Integer
```

```

doubleClickTime = GetDoubleClickTime()/60 // convert to ticks from milliseconds
#endif

currentClickTicks = ticks
//if the two clicks happened close enough together in time
if (currentClickTicks - lastClickTicks) <= doubleClickTime then
//if the two clicks occurred close enough together in space
if abs(X - lastClickX) <= 5 and abs(Y - LastClickY) <= 5 then
DoubleClick //a double click has occurred so call the event
end if
end if
lastClickTicks = currentClickTicks
lastClickX = X
lastClickY = Y

```

10. Now to test out your new DoubleClickCanvas, drag the class from the Project window to a window in your project to create an instance of it.

11. Double-click on the canvas you just added to your window to open the Code Editor. Notice that the canvas has a DoubleClick event handler. In this event handler, add the following code:
BEEP

6.0.161 How to make my Mac not sleeping?

Plugin Version: all, Platform: macOS.

Answer: Just inform the Mac OS about some system activity with code like this:

Example:

```

Sub UpdateSystemActivity()

#if TargetCarbon
declare function myUpdateSystemActivity lib "Carbon" alias "UpdateSystemActivity" (activity as Integer)
as short

const OverallAct = 0 // Delays idle sleep by small amount */
const UsrActivity = 1 // Delays idle sleep and dimming by timeout time */
const NetActivity = 2 // Delays idle sleep and power cycling by small amount */
const HDAActivity = 3 // Delays hard drive spindown and idle sleep by small amount */
const IdleActivity = 4 // Delays idle sleep by timeout time */

dim e as Integer

e=myUpdateSystemActivity(UsrActivity)

```

```
// you may react on an error if e is not 0 after the call.
```

```
#endif
End Sub
```

Notes: You may use another constant if you prefer some different behavior. Call it maybe every second.

6.0.162 How to make my own registration code scheme?

Plugin Version: all, Platform: Windows.

Answer: There are excellent articles about how to make a registration code scheme, but you can also simply use our RegistrationEngineMBS class.

Notes: If you need a license text, why not use the one from Xojo as a starting point?

6.0.163 How to make small controls on Mac OS X?

Plugin Version: all, Platform: macOS.

Answer: You can try this code on Mac OS X:

Example:

```

'/*
' * Use the control's default drawing variant. This does not apply to
' * Scroll Bars, for which Normal is Large.
' */
const kControlSizeNormal = 0

'/*
' * Use the control's small drawing variant. Currently supported by
' * the Check Box, Combo Box, Radio Button, Scroll Bar, Slider and Tab
' * controls.
' */
const kControlSizeSmall = 1

'/*
' * Use the control's small drawing variant. Currently supported by
' * the Indeterminate Progress Bar, Progress Bar and Round Button
' * controls.
' */
const kControlSizeLarge = 2

```

```

'/*
' * Control drawing variant determined by the control's bounds. This
' * ControlSize is only available with Scroll Bars to support their
' * legacy behavior of drawing differently within different bounds.
' */
const kControlSizeAuto = &hFFFF

const kControlSizeTag = "size"

declare function SetControlData lib "Carbon" (controlhandle as Integer, part as short, tagname as OS-
Type, size as Integer, data as ptr) as short

dim m as MemoryBlock

m=NewMemoryBlock(2)
m.UShort(0)=kControlSizeSmall

Title=str(SetControlData(CheckBox1.Handle, 0, kControlSizeTag, 2, m))

```

6.0.164 How to mark my Mac app as background only?

Plugin Version: all, Platform: macOS.

Answer: You can run a build script on each build with this code:

Example:

```

Dim App As String = CurrentBuildLocation + "/" + CurrentBuildAppName + ".app"
Call DoShellCommand("/usr/bin/defaults write " + App + "/Contents/Info ""NSUIElement"" YES")

```

Notes: This will set the NSUIElement flag to YES.

6.0.165 How to move a file or folder to trash?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use code like below:

Example:

```

Function MoveToTrash(f as FolderItem) As Boolean
#if TargetMacOS then
dim r as FolderItem
dim e as Integer = MacFileOperationMBS.MoveObjectToTrashSync(f, r, MacFileOperationMBS.kFSFile-
OperationDefaultOptions)

```

```

if e = 0 then
Return true // Ok
end if

#elseif TargetWin32 then
dim w as new WindowsFileCopyMBS

dim flags as Integer = w.FileOperationAllowUndo + w.FileOperationNoErrorUI + w.FileOperationSilent
+ w.FileOperationNoConfirmation
if w.FileOperationDelete(f, flags) then
Return true // OK
end if

flags = w.FileOperationNoErrorUI + w.FileOperationSilent + w.FileOperationNoConfirmation
if w.FileOperationDelete(f, flags) then
Return true // OK
end if
#else
// Target not supported
break
Return false
#endif
End Function

```

Notes: If you want to move a file to trash, you could use `f.movefileto f.trashfolder`, but that will overwrite existing files in the trash. You can use our `MacFileOperationMBS` class to move a file on Mac to the trash. And it uses the same code as the Finder, so files are renamed when the same name is already in use in the trash:

On Windows we use `WindowsFileCopyMBS` class.
Requires Mac OS X 10.5.

6.0.166 How to move an application to the front using the creator code?

Plugin Version: all, Platform: macOS.

Answer: This makes SimpleText (Code ttxt) to the frontmost application:

Example:

```

dim a as appleevent

a=newappleEvent("misc","actv","ttxt")

```

```
if a.send then
end if
```

Notes: (Code is Mac only)

6.0.167 How to move file with ftp and curl plugin?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can set post/pre quotes to have ftp commands executed before or after the download/upload.

Example:

```
dim d as CURLMBS // your curl object

// rename/move file
dim ws() As String
ws.Append "RNFR Temp.txt"
ws.append "RNTO MyFile.txt"

d.SetOptionPostQuote(ws)
```

Notes: Use SetOptionPostQuote, SetOptionPreQuote or SetOptionQuote.

The ftp commands you pass here are native ftp commands and not the commands you use with ftp applications. So rename is two commands. First RNFR to tell where to rename from and second RNTD with the new file name. To delete use DELE and the file path.

6.0.168 How to normalize string on Mac?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use code like below:

Example:

```
Function Normalize(t as string) As string
const kCFStringNormalizationFormD = 0 // Canonical Decomposition
const kCFStringNormalizationFormKD = 1 // Compatibility Decomposition
const kCFStringNormalizationFormC = 2 // Canonical Decomposition followed by Canonical Composition
const kCFStringNormalizationFormKC = 3 // Compatibility Decomposition followed by Canonical Composition

dim s as CFStringMBS = NewCFStringMBS(t)
dim m as CFMutableStringMBS = s.Normalize(kCFStringNormalizationFormD)
```

```
Return m.str  
End Function
```

Notes: This uses Apple's CFString functions to normalize unicode variants.

6.0.169 How to obscure the mouse cursor on Mac?

Plugin Version: all, Platform: macOS.

Answer: Try this declare:

Example:

```
Declare Sub ObscureCursor Lib "Carbon" ()
```

```
ObscureCursor
```

Notes: The MBS Plugin has this function, but it's not supported for Windows.

6.0.170 How to open icon file on Mac?

Plugin Version: all, Platform: macOS.

Answer: Use the NSImageMBS class like this:

Example:

```
dim f as FolderItem = SpecialFolder.Desktop.Child("test.ico")  
dim n as new NSImageMBS(f)
```

```
window1.Backdrop = n.CopyPictureWithMask
```

6.0.171 How to open PDF in acrobat reader?

Plugin Version: all, Platform: macOS.

Answer: Try this code:

Example:

```
dim pdf as FolderItem = SpecialFolder.Desktop.Child("test.pdf")
```

```

// open PDF in Acrobat Reader on Mac:

// find app
dim bundleID as string = "com.adobe.Reader"
dim app as FolderItem = LaunchServicesFindApplicationForInfoMBS("", bundleID, "")

if app<>nil then

// launch app with parameters

dim docs() as FolderItem
docs.Append pdf

dim param as new LaunchServicesLaunchParameterMBS
param.Defaults = true
param.Application = app

dim x as FolderItem = LaunchServicesOpenXMBS(docs, param)

// on failure, simply launch it
if x = nil then
pdf.Launch(true)
end if

else
pdf.Launch(true)
end if

```

Notes: On Windows, simply use pdf.launch or WindowsShellExecuteMBS.

6.0.172 How to open printer preferences on Mac?

Plugin Version: all, Platform: macOS.

Answer: You can use our OpenMacOSXPreferencesPaneMBS function like this:

Example:

```

dim e as Integer = OpenMacOSXPreferencesPaneMBS("PrintAndFax")
if 0 = e then
MsgBox "OK"
elseif e = -43 then
MsgBox "File not found."
else
MsgBox "Error: "+str(e)
end if

```

6.0.173 How to open special characters panel on Mac?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: We have functions for that in Cocoa and Carbon.

Example:

```
dim a as new NSApplicationMBS
a.orderFrontCharacterPalette
```

Notes: For Cocoa, you can use `orderFrontCharacterPalette` method in `NSApplicationMBS` class.

Or simply for Carbon and Cocoa the `ShowCharacterPaletteMBS` method.

6.0.174 How to optimize picture loading in Web Edition?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use the `WebPicture` class.

Notes: Take your picture and create a `WebPicture` object. Store this `WebPicture` in a property of the `WebPage`, `Session` or `app` (as global as possible). On the first time you use this picture on an user session, the browser will load it. Second time you use it, the browser will most likely pick it from the cache.

Having pictures in `App` or some module reuses the same picture for all sessions which reduces memory footprint.

This does not work well with pictures you change very often or use only for one webpage on one user.

If you like to see an example, check our `Map` example.

6.0.175 How to parse XML?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use code like this:

Example:

```
dim s as string = "<test><test /></test>"
```

```
try
```

```

dim x as new XmlDocument(s)
MsgBox "OK"
catch xe as XmlException
MsgBox "invalid XML"
end try

```

Notes: If you got an exception, you have a parse error.

6.0.176 How to play audio in a web app?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use the HTML5 audio tag and control it with javascript.

Notes: This is just another example app I made today. It plays a christmas song. The audio file is provided by the application to the server, so no external web server is needed and this application can run stand alone. To compile and run you need Xojo 2010r5.

In the open event we search the audio files and open them as binarystreams. We create the two webfile objects. Those webfiles are part of the app class, so we have them globally. There we set the data with the content of our streams. We also define file names and mime types. They are needed so browser know what we have here:

```

audioFileM4V = new WebFile
audioFileM4V.Data = bM.Read(BM.Length)
audioFileM4V.Filename = "music.m4a"
audioFileM4V.MIMEType = "audio/m4a"

```

```

audioFileOGG = new WebFile
audioFileOGG.Data = bO.Read(BO.Length)
audioFileOGG.Filename = "music.ogg"
audioFileOGG.MIMEType = "audio/ogg"

```

Next in the open event of the webpage we have a PageSource control. The location is set to be before content. In the open event we define the html code for this. First we pick the URLs for the audio files. Than we build the html to use the audio tag. As you see, we give it an ID for later use and have it preload automatically. If you add an autoplay tag, you can have the audio play right away. Inside the audio tag we have two sources so we provide audio for both Firefox (OGG) and Safari (MPEG4). Finally we have a text to display if HTML5 audio tag is not supported.

You can set the source in the EditSource event:

```
dim urlO as string = app.audioFileOGG.URL
dim urlM as string = app.audioFileM4V.URL
me.Source = "<audio id=""mymusic"" preload=""auto""><source src="""+urlO+""" type=""audio/ogg""
/><source src="""+urlM+""" type=""audio/mpeg"" />Your browser does not support the audio ele-
ment.</audio>"
```

Next in the Play button we execute code to play the audio. This is a short javascript code which searches in the html document for the element with the ID "mymusic" which is the ID of our audio tag above. Once we got the object, we call it's play method to start playback.

```
me.ExecuteJavaScript("document.getElementById('mymusic').play();")
```

same for pause:

```
me.ExecuteJavaScript("document.getElementById('mymusic').pause();")
```

and finally for changing volume:

```
me.ExecuteJavaScript("document.getElementById('mymusic').volume="+str(me.Value/100.0)+"");")
```

6.0.177 How to pretty print xml?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use the XML Transform method with the right XLS.

Notes: Learn more here:

<http://docs.xojo.com/index.php/XMLDocument.Transform>

6.0.178 How to print to PDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: This code below shows how to redirect printing to a PDF file on Mac OS X.

Example:

```
// get Xojo printer setup
dim p as new PrinterSetup

// now put it into NSPrintInfo to manipulate
dim n as new NSPrintInfoMBS
n.SetupString = p.SetupString
```

```

// change destination to file
dim f as FolderItem = SpecialFolder.Desktop.Child("test.pdf")
n.SetSaveDestination(f)

// move back
p.SetupString = n.SetupString

// and print as usual
dim g as Graphics = OpenPrinter(p)
g.DrawString "Hello World", 20, 20

```

Notes: And you can use normal graphics class for that.

6.0.179 How to query Spotlight's Last Open Date for a file?

Plugin Version: all, Platform: macOS.

Answer: You can use a MDItemMBS object to query this value:

Example:

```

Function LastOpenedDate(Extends F As FolderItem, DefaultOtherDates As Boolean = True) As Date
#If TargetMacOS Then
Dim xMDItem as New MDItemMBS(F)
Dim xDate as Variant

If xMDItem <>Nil Then
xDate = xMDItem.GetAttribute(xMDItem.kMDItemLastUsedDate).DateValue
If xDate IsA Date Then Return xDate
Else
If xDate <>Nil Then Break
End If
#EndIf

If DefaultOtherDates Then
If F.ModificationDate <>Nil Then Return F.ModificationDate
If F.CreationDate <>Nil Then Return F.CreationDate
End If
End Function

```

Notes: Thanks for Josh Hoggan for this example code.

6.0.180 How to quit windows?

Plugin Version: all, Platform: Windows.

Answer: Try this code:

Example:

```
#if targetwin32 then
dim i1,i2,r as Integer
declare function ExitWindowsEx lib "user32" (uFlags as Integer, dwReserved as Integer) as Integer
i1 = 2
i2 = 0
r = ExitWindowsEx(i1,i2)
if r<>0 then
' Error()
end if

#endif
```

Notes: uFlags parameters:

```
'4 = EWX_Force
'0 = EWX_Logoff
'2 = EWX_Reboot
'1 = EWX_shutdown, should shut down computer
```

Also check the ExitWindowsMBS method.

6.0.181 How to read a CSV file correctly?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: With all the rules for quotes and delimiters, you can simply use the SplitCommaSeparatedValuesMBS method in our plugins like this:

Example:

```
dim f as FolderItem = SpecialFolder.Desktop.Child("test.csv")
dim t as TextInputStream = f.OpenAsTextFile

while not t.EOF
dim s as string = t.ReadLine(encodings.ASCII)

dim items() as string = SplitCommaSeparatedValuesMBS(s, ";", """")
```

```
List.AddRow """
dim u as Integer = UBound(items)
for i as Integer = 0 to u
List.Cell(List.LastIndex,i) = items(i)
next

wend
```

Notes: Please make sure you choose the right text encoding.

6.0.182 How to read the command line on windows?

Plugin Version: all, Platform: Windows.

Answer: Try this code:

Example:

```
#if targetwin32 then
dim line as string
Dim mem as MemoryBlock

Declare Function GetCommandLineA Lib "kernel32" () As Ptr

mem=GetCommandLineA()
s=mem.cstring(0)

#endif
```

Notes: Newer Xojo versions have a system.commandline property.

6.0.183 How to render PDF pages with PDF Kit?

Plugin Version: all, Platform: Windows.

Answer: Try this code:

Example:

```
// choose a file
dim f as FolderItem = SpecialFolder.Desktop.Child("test.pdf")

// open it as PDF Document
dim sourceFile as New PDFDocumentMBS(f)
```

```

if sourceFile.handle <>0 then // it is a PDF file

// get upper bound of pages
dim c as Integer = sourceFile.pageCount-1

// from first to last page
for n as Integer = 0 to c

// pick that page
dim page as PDFPageMBS = sourceFile.pageAtIndex(n)

// render to image
dim p as NSImageMBS = page.Render

// and convert to RB picture and display
Backdrop = p.CopyPictureWithMask

next

end if

```

Notes: PDFKit works only on Mac OS X.

6.0.184 How to restart a Mac?

Plugin Version: all, Platform: macOS.

Answer: Ask the Finder via Apple Events:

Example:

```

dim ae as appleevent
ae=newappleEvent("FNDR","rest","MACS")
if not ae.send then
msgBox "The computer couldn't be restarted."
end if

```

6.0.185 How to resume ftp upload with curl plugin?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: CURL supports that and you simply need to set the right options.

Notes: First of course OptionUpload must be true. Second OptionFTPAppend must be true so the OptionResumeFrom is used. Store there (or in OptionResumeFromLarge) your start value. Don't forget to implement the read event and return data there as requested.

6.0.186 How to rotate a PDF page with CoreGraphics?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: This code opens a PDF and draws the first page into a new PDF with 90° rotation.

Example:

```
// Rotate a PDF page

// our files
dim sourcefile as FolderItem = SpecialFolder.Desktop.Child("test.pdf")
dim destfile as FolderItem = SpecialFolder.Desktop.Child("rotated.pdf")

// open PDF
dim pdf as CGPDFDocumentMBS = sourcefile.OpenAsCGPDFDocumentMBS

// query media size of first page
dim r as CGRectMBS = pdf.MediaBox(1)

// create new PDF
dim c as CGContextMBS = destfile.NewCGPDFDocumentMBS(r,"title","Author","Creator")

// create rotated rectangle
dim nr as new CGRectMBS(0,0,r.Height,r.Width)

// create new page
c.BeginPage nr
c.SaveGState

const pi = 3.14159265

// rotate by 90°
c.RotateCTM pi*1.5

// fix origin
c.TranslateCTM -r.width,0

// draw PDF
c.DrawCGPDFDocument pdf,r,1

// cleanup
c.RestoreGState
c.EndPage
```

```
c = nil

// show in PDF viewer
destfile.Launch
```

Notes: This code is Mac only as it needs CoreGraphics.

6.0.187 How to rotate image with CoreImage?

Plugin Version: all, Platform: macOS.

Answer: Use the code like the one below:

Example:

```
// Rotate image with CoreImage

// load image
dim f as FolderItem = SpecialFolder.Desktop.Child("test.png")
dim image as new CIImageMBS(f)

// rotate 45 degree
dim n as new NSAffineTransformMBS
n.rotateByDegrees(45)

dim TransformFilter as new CIFilterAffineTransformMBS
TransformFilter.inputImage = image
TransformFilter.inputTransform = n

// get result
dim resultImage as CIImageMBS = TransformFilter.outputImage

// for saving to file
dim outputImage as NSImageMBS = resultImage.RenderNSImage(false)

f = SpecialFolder.Desktop.Child("output.png")
dim b as BinaryStream = BinaryStream.Create(f, true)
b.Write outputImage.PNGRepresentation

// as Xojo picture object for display
dim pic as Picture = outputImage.CopyPictureWithMask

Backdrop = pic
```

6.0.188 How to run a 32 bit application on a 64 bit Linux?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Install 32 bit compatibility libraries.

Notes: The package is called ia32-libs for ubuntu (and others).

Some applications need to be run on a 32 bit system as they need some hardware related libraries. Like libUSB or libHID for USB devices.

6.0.189 How to save HTMLViewer to PDF with landscape orientation?

Plugin Version: all, Platform: macOS.

Answer: You can use NSPrintInfoMBS to change the options for PrintToPDFFile function.

Example:

```
// make it landscape
dim n as NSPrintInfoMBS = NSPrintInfoMBS.sharedPrintInfo
n.orientation = n.NSLandscapeOrientation

// save html to file
dim f as FolderItem = SpecialFolder.Desktop.Child("test.pdf")
call HTMLViewer1.PrintToPDFFileMBS(f,10,30,10,30)
```

Notes: You may want to reset options later.
This code is only for Mac OS X.

6.0.190 How to save RTFD?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: With NSTextViewMBS you can use this code to save to RTFD:

Example:

```
// save text as RTFD including image attachments
dim f as FolderItem = GetSaveFolderItem(FileTypes1.ApplicationRtfd, "test.rtf")

if f = nil then Return

dim a as NSAttributedStringMBS = textView.textStorage
dim w as NSFFileWrapperMBS = a.RTFDFileWrapperFromRange(0, a.length, DocumentAttributes)

dim e as NSErrorMBS
if w.writeToFile(f, e) then
```

```

else
MsgBox e.LocalizedDescription
end if

```

Notes: For TextArea you can query the underlying NSTextViewMBS object via TextArea.NSTextViewMBS method.

6.0.191 How to save RTFD?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: How to load PDF to htmlviewer on desktop?

Example:

```

Public Sub LoadPDFData(viewer as HTMLViewer, PDFData as string)
Dim base64string As String = EncodeBase64(PDFData)

// remove line endings to make it a big line
base64string = ReplaceLineEndings(base64string, "")

// build data URL
// https://en.wikipedia.org/wiki/Data_URI_scheme
Dim dataURL As String = "data:application/pdf;base64," + base64string

// show in webviewer
HTMLViewer1.LoadURL(dataURL)

// may not work everywhere due to URL length limit
// for Web projects, use WebFile instead!
End Sub

```

Notes: This avoids a temporary file, which may also work.
For Web Apps, please use WebFile.

6.0.192 How to scale a picture proportionally with mask?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: For a proportional scaling, we calculate the new picture size relative to the target maximum size.

Example:

```

Function ProportionalScaledWithMask(extends pic as Picture, Width as Integer, Height as Integer) As Picture
// Calculate scale factor

dim faktor as Double = min( Height / Pic.Height, Width / Pic.Width)

// Calculate new size
dim w as Integer = Pic.Width * faktor
dim h as Integer = Pic.Height * faktor

// create new picture
dim NewPic as new Picture(w,h,32)

// check if we have a mask and clear it
dim m as picture = pic.mask(False)
pic.mask = nil

// draw picture in the new size
NewPic.Graphics.DrawPicture Pic, 0, 0, w, h, 0, 0, Pic.Width, Pic.Height

if m <>nil then
// restore mask and scale it
pic.mask = m
NewPic.mask.Graphics.DrawPicture m, 0, 0, w, h, 0, 0, Pic.Width, Pic.Height
end if

// return result
Return NewPic
End Function

```

Notes: This version handles mask. As you see we actually have to remove mask in order to copy the picture part correctly.

6.0.193 How to scale a picture proportionally?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: For a proportional scaling, we calculate the new picture size relative to the target maximum size.

Example:

```

Function ProportionalScaled(extends pic as Picture, Width as Integer, Height as Integer) As Picture
// Calculate scale factor

dim faktor as Double = min( Height / Pic.Height, Width / Pic.Width)

```

```

// Calculate new size
dim w as Integer = Pic.Width * faktor
dim h as Integer = Pic.Height * faktor

// create new picture
dim NewPic as new Picture(w,h,32)

// draw picture in the new size
NewPic.Graphics.DrawPicture Pic, 0, 0, w, h, 0, 0, Pic.Width, Pic.Height

// return result
Return NewPic
End Function

```

Notes: This does not handle mask, but you can scale the mask the same way and assign it to the new picture.
(see other FAQ entry with mask)

6.0.194 How to scale/resize a CIIImageMBS?

Plugin Version: all, Platform: Windows.

Answer: Use the CIFilterLanczosScaleTransform filter to scale down a picture to a specific size.

Example:

```

Dim pic As Picture = LogoMBS(500)
Dim image As CIIImageMBS = CIIImageMBS.imageWithPicture(pic)

Dim filter As New CIFilterLanczosScaleTransformMBS

Const targetWidth = 600.0
Const targetHeight = 400.0

Dim scale As Double = targetHeight / image.Extent.Height
Dim aspect As Double = targetWidth / (image.Extent.Width * scale)

filter.inputImage = image
filter.inputScale = scale
filter.inputAspectRatio = aspect

Dim result As Picture = filter.outputImage.RenderPicture

Backdrop = result

```

Notes: This is same code as our scaleTo convenience method.

6.0.195 How to scale/resize a picture?

Plugin Version: all, Platform: Windows.

Answer: There are several ways to scale or resize a picture. The easiest way may be the ScaleMBS function in the Picture class.

Example:

```
dim Original,Scaled as Picture
```

```
Original=LogoMBS(500)
Scaled=Original.ScaleMBS(100,100,true)
```

Notes: The plugin ways:

- GraphicsMagick can scale/resize.
- CoreImage scale filter may result in the fastest and best images on Mac OS X 10.4.
- NSImageMBS can scale, but is Mac OS X only.
- CGImageMBS can scale, but is Mac OS X only.
- CIImageMBS can scale, but is Mac OS X only.
- QuickTime Graphics exporter and importer can be connected to scale. (this was used more often a few years ago)
- ImageMagick can scale very nice and crossplatform. But the ImageMagick libraries are big.
- The picture.ScaleMBS function is self written and results in equal output on Mac, Windows and Linux without any additional libraries installed.
- Picture.ScalingMBS does crossplatform scaling with several modes.

with pure Xojo:

- make a new picture and draw the old one with new size inside.

6.0.196 How to search with regex and use unicode codepoints?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can specify unicode characters in search string with backslash x and digits.

Example:

```
dim r as RegExMbs
dim s as string
dim c as Integer
```

```

s="123 √$√√° ABC 456"

r=new RegExMBS
if r.Compile("√") then
c=r.Execute(s,0)
MsgBox str(c)+" "+str(r.Offset(0))+" "+str(r.Offset(1))
// shows: 1 4 10
// 1 for ubound of the offset array
// 4 for 4 bytes before the matched pattern
// 10 for the 10 bytes before the end of the matched pattern
end if

r=new RegExMBS
if r.Compile("\xF6") then // finds √ using Unicode codepoint
c=r.Execute(s,0)
MsgBox str(c)+" "+str(r.Offset(0))+" "+str(r.Offset(1))
// shows: 1 4 10
// 1 for ubound of the offset array
// 4 for 4 bytes before the matched pattern
// 10 for the 10 bytes before the end of the matched pattern
end if

```

6.0.197 How to see if a file is invisible for Mac OS X?

Plugin Version: all, Platform: macOS.

Answer: Try this function:

Example:

```

Function Invisible(F As FolderItem) As Boolean
Dim TIS As TextInputStream
Dim S,All As String
Dim I as Integer
dim g as folderitem

If Left(F.Name,1)="." or not f.visible Then
Return True
End If

g=F.Parent.Child(".hidden")
If g.Exists Then
TIS=g.OpenAsTextFile
if tis<>Nil then
All=TIS.ReadAll
For I=1 to CountFields(All,Chr(11))
S=NthField(All, Chr(11), I)

```

```

If S=F.name Then
Return True
End If
Next
end if
End if
End Function

```

6.0.198 How to set cache size for SQLite or REALSQLDatabase?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You use the pragma cache_size command on the database.

Example:

```

// set cache size to 20000 pages which is about 20 MB for default page size
dim db as REALSQLDatabase
db.SQLExecute "PRAGMA cache_size = 20000"

```

Notes: Default cache size is 2000 pages which is not much.

You get best performance if whole database fits in memory.

At least you should try to have a cache big enough so you can do queries in memory.

You only need to call this pragma command once after you opened the database.

6.0.199 How to set the modified dot in the window?

Plugin Version: all, Platform: macOS.

Answer: Try this declares:

Example:

```

window1.ModifiedMBS=true

```

6.0.200 How to show a PDF file to the user in a Web Application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use a WebHTMLViewer control and load the

Example:

```

dim CurrentFile as WebFile // a property of the WebPage

// define the PDF file
CurrentFile = new WebFile
CurrentFile.Filename = "test.pdf"
CurrentFile.MIMEType = "application/pdf"
CurrentFile.Data = "some pdf data" // MyDynaPDF.GetBuffer

// load into html viewer
HTMLViewer1.URL = CurrentFile.URL

```

Notes: See our Create PDF example for the Xojo Web Edition.

6.0.201 How to show Keyboard Viewer programmatically?

Platform: macOS.

Answer: Use Xojo or AppleScript to launch the KeyboardViewerServer.app.

Example:

```

dim a as new AppleScriptMBS
dim text as string
dim lines(-1) as string

lines.append "set theApplication to ""KeyboardViewerServer""
lines.append "set thePath to ""/System/Library/Components/KeyboardViewer.component/Contents/Shared-
Support/KeyboardViewerServer.app""
lines.append ""
lines.append "set POSIXPath to ((POSIX file thePath) as string)"
lines.append "tell application ""System Events"" to set isRunning to 0 <(count (application processes whose
name is theApplication))"
lines.append "if isRunning then tell application POSIXPath to quit"
lines.append "delay 0.15"
lines.append ""
lines.append "ignoring application responses"
lines.append " tell application POSIXPath to run"
lines.append "end ignoring"

text=join(lines,EndOfLine.macintosh)

a.Compile text
a.Execute

```

Notes: AppleScript code:

```
set theApplication to "KeyboardViewerServer"
set thePath to "/System/Library/Components/KeyboardViewer.component/Contents/SharedSupport/KeyboardViewerServer.app"
```

```
set POSIXPath to ((POSIX file thePath) as string)
tell application "System Events" to set isRunning to 0 <(count (application processes whose name is theApplication))
if isRunning then tell application POSIXPath to quit
delay 0.15
```

```
ignoring application responses
tell application POSIXPath to run
end ignoring
```

6.0.202 How to show the mouse cursor on Mac?

Plugin Version: all, Platform: macOS.

Answer: Try this declare:

Example:

```
Declare Sub ShowCursor Lib "Carbon" ()
```

```
ShowCursor
```

Notes: The MBS Plugin has this function and supports it on Windows, too.

6.0.203 How to shutdown a Mac?

Plugin Version: all, Platform: macOS.

Answer: Ask the Finder via Apple Events:

Example:

```
dim ae as appleevent
ae=newappleEvent("FNDR", "shut", "MACS")
if not ae.send then
msgBox "The computer couldn't be shutdown."
end if
```

Notes: Or toolbox call (Attention: This method will stop the computer immediatly: No document asked to be saved, all applications quitting without knowing).

```
Declare Sub ShutDwnPower Lib "Carbon" ()
ShutDwnPower
```

6.0.204 How to sleep a Mac?

Plugin Version: all, Platform: macOS.

Answer: Ask the Finder via Apple Events:

Example:

```
dim ae as appleevent
ae=newappleEvent("FNDR","slep","MACS")
if not ae.send then
msgBox "The computer doesn't want to sleep."
end if
```

6.0.205 How to speed up rasterizer for displaying PDFs with DynaPDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Here a few speed tips:

Notes:

- Use the DynaPDFRasterizerMBS function instead of our render functions.
- Reuse DynaPDFRasterizerMBS as long as the target picture size doesn't change.
- Import only the PDF pages you want to display.
- Let DynaPDF do zooming, rotating or other effects instead of you change it.

6.0.206 How to use PDFLib in my RB application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: The PDFlib plugin was discontinued in favor of our DynaPDF plugin.

Notes: If you need help to move, please contact us.

6.0.207 How to use quotes in a string?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Just double them.

Example:

```
msgbox "This String contains ""quotes"""
```

6.0.208 How to use Sybase in Web App?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Please use our MBS Xojo SQL Plugin to connect to a Sybase Database in your web application.

Notes: If you see db.Connect giving the error message "cs_ctx_alloc ->CS_MEM_ERROR", than some things are not setup right for Sybase.

The Apache process may not have all the SYBASE environment variables being set when the CGI was launched.

Adding these lines to /etc/httpd/conf/httpd.conf stopped the faux memory errors for us:

```
SetEnv LD_LIBRARY_PATH /opt/sybase/OCS-15_0/lib:/opt/sybase/OCS-15_0/lib3p64:/opt/sybase/OCS-15_0/lib3p:
SetEnv SYBROOT /opt/sybase
SetEnv SYBASE_OCS /opt/sybase
SetEnv SYBASE /opt/sybase
```

6.0.209 How to use the Application Support folder?

Plugin Version: all, Platform: macOS.

Answer:

I was saving a registration code for an app to the Preference folder. People on the list have suggested that it would be better in the ApplicationSupportFolder. How do I save the file called CWWPrefs into that folder using MBS?

I have checked for examples and the docs but can't see how to apply it

```
//f = SpecialFolder.Preferences.child("CWWPrefs")
f = ApplicationSupportFolderMBS(-32768)
```

Example:

```

dim folder,file as FolderItem

folder = createApplicationSupportFolderMBS(-32763)

if folder=nil then
// Some very old Mac OS Versions may not support it
// or the plugin may fail for any reason
folder=SpecialFolder.Preferences
end if

file=folder.Child("CWWPrefs")

MsgBox file.NativePath

```

Notes:

You may not be able to write there with a normal user account!

6.0.210 How to use the IOPMCopyScheduledPowerEvents function in Xojo?

Plugin Version: all, Platform: macOS.

Answer: You can use the following code which does this using the SoftDeclareMBS class.

Example:

```

Sub Open()
dim c as CFDateMBS
dim t as CFAbsoluteTimeMBS

// get current date
c=NewCFDateMBS

// in absolute time (seconds since x)
t=c.AbsoluteTime

// add 600 seconds (= 10 Minutes)
t.Value=t.Value+600

// Make a Date from it
c=t.Date

// Schedule the event
// 0 on success
// E00002C1 for missing root rights

```

```

Title=hex(schedulePowerEvent(c, "wake"))

// Just for information, display the scheduled stuff
CFShowMBS CopyScheduledPowerEvents
End Sub

Function CopyScheduledPowerEvents() As carrayMBS
dim s as SoftDeclareMBS
dim m as MemoryBlock

s=new SoftDeclareMBS

if s.LoadLibrary("IOKit.framework") then
if s.LoadFunction("IOPMCopyScheduledPowerEvents") then
if s.CallFunction(0,nil) then
Return NewCFArrayMBSHandle(s.Result,true)
else
MsgBox "Failed to Call IOPMCopyScheduledPowerEvents."
end if
else
MsgBox "Failed to load IOPMCopyScheduledPowerEvents."
end if
else
MsgBox "Failed to load IOKit."
end if

Return nil
End Function

Function SchedulePowerEvent(time_to_wake as CFDateMBS, Type as CFStringMBS) as Integer
dim s as SoftDeclareMBS
dim m as MemoryBlock

'/*
'* Types of power event
'* These are potential arguments to IOPMSchedulePowerEvent().
'* These are all potential values of the kIOPMPowerEventTypeKey in the CFDictionaryes
'* returned by IOPMCopyScheduledPowerEvents().
'*/
'/*!
'@define kIOPMAutoWake
'@abstract Value for scheduled wake from sleep.
'*/
'#define kIOPMAutoWake "wake"
,
'/*!
'@define kIOPMAutoPowerOn
'@abstract Value for scheduled power on from off state.

```

```

*/
`#define kIOPMAutoPowerOn "poweron"
,
`/*!
`@define kIOPMAutoWakeOrPowerOn
`@abstract Value for scheduled wake from sleep, or power on. The system will either wake OR
`power on, whichever is necessary.
*/
,
`#define kIOPMAutoWakeOrPowerOn "wakepoweron"
`/*!
`@define kIOPMAutoSleep
`@abstract Value for scheduled sleep.
*/
,
`#define kIOPMAutoSleep "sleep"
`/*!
`@define kIOPMAutoShutdown
`@abstract Value for scheduled shutdown.
*/
,
`#define kIOPMAutoShutdown "shutdown"

s=new SoftDeclareMBS

if s.LoadLibrary("IOKit.framework") then
if s.LoadFunction("IOPMSchedulePowerEvent") then

m=NewMemoryBlock(12)
m.Long(0)=time_to_wake.handle
m.Long(4)=0 // nil
m.Long(8)=type.Handle

if s.CallFunction(3,m) then
Return s.Result
end if
end if
end if

End Function

```

Notes: Requires Mac OS X and to execute root rights.

6.0.211 How to validate a GUID?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use this function below which uses a regular expression to verify that the string is a valid UUID/GUID:

Example:

Function IsGUID(guid as string) As Boolean

dim r as new RegEx

```
r.SearchPattern = "^(\{ { 0,1 } ( [ 0-9a-fA-F ] ) { 8 } -( [ 0-9a-fA-F ] ) { 4 } -( [ 0-9a-fA-F ] ) { 4 } -( [ 0-9a-fA-F ] ) { 4 } -( [ 0-9a-fA-F ] ) { 12 } \} { 0,1 } )$ "
```

Return r.Search(guid)<>nil

End Function

Notes: Simply parsing the GUID with CFUUIDMBS does not give the same result as CFUUIDMBS will also take a string like "DDDD".

6.0.212 How to walk a folder hierarchie non recursively?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Use code like this one:

Example:

Sub Walk(folder as FolderItem)

dim folders() as FolderItem

folders.Append folder

while UBound(folders)>=0

dim currentFolder as FolderItem = folders.pop

dim c as Integer = currentFolder.Count

for i as Integer = 1 to c

dim item as FolderItem = currentFolder.TrueItem(i)

if item = Nil then

// no permission

elseif item.Visible then // only visible

if item.Directory then

folders.Append item

```
else
// work with file here
end if

end if

next

wend
End Sub
```

Notes: As you see we go with a long loop which runs until we don't have more folders to process. We ignore items we can't access due to permission limits. And we only work visible items. If you like, check `folderitem.isBundleMBS` on item to handle packages and applications better on Mac OS X.

6.0.213 I got this error: PropVal, QDPictMBS.Name (property value), Type mismatch error. Expected CGDataProviderMBS, but got Variant, Name:QDPictMBS

Plugin Version: all, Platform: macOS.

Answer: The plugins MacOSX and MacOSXCF belong together. If you use one part, please also install the other part.

Notes: We splitted the plugin because the Xojo IDE on Windows crashed on compilation.

6.0.214 I registered the MBS Plugins in my application, but later the registration dialog is shown.

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: There are two main reasons.

Notes: 1. you may use the plugin before registering them. This is often the case if you register in a window open event and use the plugin in a control open event.

On the console on Mac OS X or Windows, you may see a message like this "MBS Plugins were used by the application before the RegisterMBSPlugin function was called. Please fix this in your code!".

2. you may have mixed different plugin versions which are not compatible.

In this case you can see a message "Internal plugin registration error." on the console on Mac OS X. Newer plugins may show a message dialog reporting this. Older version simply think they are not registered.

If the installer just merges old and new applications, users may have libraries of older and newer plugin versions in the libs folder. If your application loads the wrong version, the registration fails.

If you use remote debugging, make sure you clear the temporary files there, too. Otherwise you may have old DLLs on your hard disc which may disturb your application.

You can run into issues if you use your registration code on different places of your app. Please register only once in app.open (or app Constructor). If you have several codes, simply call them one after the other.

Also check that you only call RegisterMBSPlugin with valid serial number. If you later call RegisterMBSPlugin with Demo like in example code above, you remove the license.

Next check if you can clear the Xojo caches and that helps. This includes the Xojo Scratch folder and the Plugins & Project caches. Simply locate those folders and delete them. For Windows look in hidden AppData folder in your user folder. For Mac, please check textasciitilde /Library/Caches and your temp folders.

Finally make sure you use the right serial number. Not an older one or a misspelled one.

6.0.215 I want to accept Drag & Drop from iTunes

Plugin Version: all, Platform: macOS.

Answer: You need to accept AcceptMacDataDrop "itun" and Handle the DropObject.

Example:

```
Sub Open()
window1.AcceptMacDataDrop "itun"
End Sub
```

```
Sub DropObject(obj As DragItem)
dim s as string
dim f as folderItem
dim d as CFDictionaryMBS
dim o as CFObjectMBS
dim key as CFStringMBS
dim dl as CFDictionaryListMBS
dim i,c as Integer
dim u as CFURLMBS
dim file as FolderItem
```

```
if obj.MacDataAvailable("itun") then
s = obj.MacData("itun")
```

```
// Parse XML
o=NewCFOBJECTMBSFromXML(NewCFBinaryDataMBS(s))

// Make dictionary
if o isa CFDictionaryMBS then
d=CFDictionaryMBS(o)

// get Tracks Dictionary
key=NewCFStringMBS("Tracks")
o=d.Value(key)

if o isa CFDictionaryMBS then
d=CFDictionaryMBS(o)
dl=d.List

// Walk over all entries in the Tracks dictionary
c=dl.Count-1
for i=0 to c
o=dl.Value(i)

if o isa CFDictionaryMBS then
d=CFDictionaryMBS(o)

key=NewCFStringMBS("Location")
o=d.Value(key)
if o isa CFStringMBS then
u=NewCFURLMBS(CFStringMBS(o),nil)

file=u.file
if file<>nil then
MsgBox file.NativePath
end if
end if
end if
next
end if
end if
end if
End Sub
```

Notes: The code above inside a window on Xojo 5.5 with MBS Plugin 5.3 will do it nice and show the paths.

6.0.216 I'm drawing into a listbox but don't see something.

Plugin Version: all.

Answer: If you draw this in a listbox cellbackground, you need to draw on the correct position

Example:

```
Function CellBackgroundPaint(g As Graphics, row as Integer, column as Integer) As Boolean
dim f as FolderItem
f=SpecialFolder.Desktop
f.DrawWideIconMBS(g,listbox1.left,listbox1.top+row*20,16)
Return true
End Function
```

Notes: Try this in a listbox. The Graphics object there has a clipping and an offset which the plugin doesn't know about.

6.0.217 I'm searching for a method or so to move a window from position x.y to somewhere else on the screen.

Platform: macOS.

Answer:

The code I produced in RB isn't smooth enough. Is there a call in MBS, if not, can it be done? The speed of it has to be like the show of a DrawerWindow.

Try the declare below for Carbon. With WindowLib it will work on Mac OS 8.5 and newer.

Notes:

See Window.Transition functions.

6.0.218 If I use one of your plug-ins under windows, would this then impose the use of dll after compilation or my would my compiled soft still be a stand-alone single file software?

Platforms: macOS, Linux, Windows.

Answer: Stand alone.

Notes: Xojo compiles all used plugins into the application binary.

Some plugin parts need external dlls but you will find that in the documentation. (e.g. pdfib for some classes)

6.0.219 Is the fn key on a powerbook keyboard down?

Plugin Version: all, Platform: macOS.

Answer: I am unable to figure out how or if it is possible to detect if the fn key is down on a powerbook keyboard. Is it possible?

Example:

' Window.Open Event of a blank project:

```
dim i as Integer

for i=0 to 127
if keyboard.asynckeydown(i) then
title=str(i) // found
return
end if
next
title="" // not found
```

Notes: This test application shows the keycode (decimal) 63 for the fn key.

6.0.220 Is there a case sensitive Dictionary?

Plugin Version: all.

Answer: The MBS Plugin has several classes which can work as a replacement.

Notes: First you could use VariantToVariantHashMapMBS or VariantToVariantOrderedMapMBS.

If you know that all keys are Strings or Integers only, you can use the specialized classes which are a little bit faster due to avoiding variants:

```
IntegerToIntegerHashMapMBS class
IntegerToIntegerOrderedMapMBS class
IntegerToStringHashMapMBS class
IntegerToStringOrderedMapMBS class
IntegerToVariantHashMapMBS class
IntegerToVariantOrderedMapMBS class
StringToStringHashMapMBS class
StringToStringOrderedMapMBS class
StringToVariantHashMapMBS class
StringToVariantOrderedMapMBS class
```

6.0.221 Is there a way to use the MBS plugin to get only the visible item and folder count on a volume?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can use the DirectorySizeMBS class for this as in the example below:

Example:

```
dim d as DirectorySizeMBS

d=new DirectorySizeMBS

// volume(1) as my boot volume is very full
if d.update(volume(1),true,0) then
MsgBox str(d.VisibleItemCount)+" visible items, "+str(d.HiddenItemCount)+" invisible items."
end if
```

Notes: Complete Question: Is there a way to use the MBS plugin to get only the visible item and folder count on a volume? The FileCount and FolderCount properties of VolumeInformationMBS seem to provide the total # of items including invisible items such as .DS_Store and more importantly .Trashes which is causing me a great amount of difficulty during a recursive scan of a volume. I've got a progress bar which uses the total of the filecount and foldercount properties as the maximum value, but my routine needs to filter out all invisible items, as it is creating a catalog of a volume for archiving purposes. Any thoughts how I could get accurate number.

6.0.222 Is there an easy way I can launch the Displays preferences panel?

Plugin Version: all, Platform: macOS.

Answer: Use the code below:

Example:

```
dim error as Integer

error=OpenMacOSXPreferencesPaneMBS("Displays")
if error<>0 then
MsgBox "Failed to launch QuickTime System Preferences panel."
end if
```

6.0.223 List of Windows Error codes?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: We have a list of windows error codes on our website.

Notes: <http://www.monkeybreadsoftware.de/xojo/winerror.shtml>

6.0.224 Midi latency on Windows problem?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: The issue is system related, not a problem with RB or the plugin.

Notes: Two things will adversely affect the timing:

(1) latency of the software synthesizer output driver. The default Windows wavetable synthesizer has considerable latency. I don't know how many milliseconds, but it is noticeable.

(2) latency of the digital audio output driver. Different systems have different drivers for different audio hardware. My Dell laptop has a minimum 15ms latency in the audio driver.

These two things put together were causing a very sluggish MIDI response. I was able to verify these as the culprits by routing MIDI directly out of RB into a sample player, which only introduces the latency of (2) and does not include latency of (1).

I don't know how widely known are these facts, if not then you may want to add this information to the documentation, since Windows programmers using the MIDI plugin may not know those problems, and might mistakenly blame your plugin, as I did :) Sorry about that!

(From Aaron Andrew Hunt)

6.0.225 My Xojo Web App does not launch. Why?

Plugin Version: all, Platform: macOS.

Answer: Here is a list of checks to do for linux apache installations with Xojo or Xojo Web applications:

Notes: Just a list of checks to do for linux apache installations:

- You have 64bit linux? Than you need 32 bit compatibility libraries.
- The folder of your app is writable? Set permissions to 777.
- The cgi script is executable? Set permissions to 755.

- The app file itself is executable? Set permissions to 755.
- You uploaded cgi file as text, so it has unix line endings? (this often gives error "Premature end of script headers" in apache log)
- You uploaded config.cfg file and made it writable? Set permissions to 666.
- Your apache allows execution of cgi scripts? You enabled cgi for apache and uncommented addhandler command for CGI on a new apache installation?
- You uploaded the app file and libraries as binary files? Upload as text breaks them.
- You did upload the libs folder?
- You don't have code in app.open, session.open and other events which crashes app right at launch?
- You don't have a print command in your app.open event? (see feedback case 23817)
- You allowed htaccess file to overwrite permissions?

6.0.226 SQLiteDatabase not initialized error?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Before you can use SQLiteDatabaseMBS, it must be initialized.

Example:

```
dim d as new SQLiteDatabaseMBS
```

Notes: This happens normally when you use "new SQLiteDatabaseMBS".

But if you just have a SQLConnectionMBS and get a recordset there, the initialization may not have happened, yet.

So please simply add a line "dim d as new SQLiteDatabaseMBS" to your app.open code after registration, so the plugin part can initialize and late provide recordsets.

6.0.227 Textconverter returns only the first x characters. Why?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer:

Some older Xojo versions limit the Textconverter to around 1024 characters in input and output. This should be fixed with RB5.

Notes:

Xojo seems not to support Textconverters at all on Windows.

6.0.228 The type translation between CoreFoundation/Foundation and Xojo data types.

Plugin Version: all, Platform: macOS.

Answer: The plugin does conversion between Cocoa/Carbon data types and native Xojo data types. The following list help you knowing what the current plugins support:

Notes: Cocoa NSObject to Variant:

```

nil ->nil
NSDictionary ->Dictionary
NSData ->MemoryBlock
NSString ->String
NSAttributedString ->NSAttributedStringMBS
NSDate ->Date
NSNumber ->double/integer/Int64/UInt64/UInt32/Boolean
NSURL ->String
NSValue with NSRect ->NSRectMBS
NSValue with NSPoint ->NSPointMBS
NSValue with NSSize ->NSSizeMBS
NSValue with NSRange ->NSRangeMBS
NSValue with QTime ->QTimeMBS
NSValue with QTimeRange ->QTimeRangeMBS
NSArray ->Array of Variant
QuartzFilter ->QuartzFilterMBS

```

- ->*MBS

Variant to Cocoa NSObject:

```

nil ->nil
Dictionary ->NSDictionary
Boolean ->NSNumber
Integer ->NSNumber
Color ->NSColor
Int64 ->NSNumber
Single ->NSNumber
Double ->NSNumber
Date ->NSDate
MemoryBlock ->NSData
String ->NSString
NSImageMBS ->NSImage
NSAttributedStringMBS ->NSAttributedString
NSColorMBS ->NSColor
NSRectMBS ->NSValue with NSRect
NSSizeMBS ->NSValue with NSSize

```

NSPointMBS ->NSValue with NSPoint
 NSRangeMBS ->NSValue with NSRange
 NSBurnMBS ->NSBurn
 NSViewMBS ->NSView
 NSFontMBS ->NSFont
 NSParagraphStyleMBS ->NSParagraphStyle
 NSAttributedStringMBS ->NSAttributedString
 WebPolicyDelegateMBS ->WebPolicyDelegate
 WebUIDelegateMBS ->WebUIDelegate
 WebFrameLoadDelegateMBS ->WebFrameLoadDelegate
 WebResourceLoadDelegateMBS ->WebResourceLoadDelegate
 NSIndexSetMBS ->NSIndexSet
 QTTimeMBS ->QTTime
 QTTimeRangeMBS ->QTTimeRange
 Array of Variant ->NSArray
 Array of String ->NSArray
 CFStringMBS ->NSString
 CFNumberMBS ->NSNumber
 CFDataMBS ->NSData
 CFURLMBS ->NSURL
 CFArrayMBS ->NSArray
 CFDictionaryMBS ->NSDictionary
 CFBinaryDataMBS ->NSData

Carbon CTypeRef to Variant:

CFDictionaryRef ->Dictionary
 CFStringRef ->String
 CFDataRef ->String
 CFURL ->String
 CFNumber ->Integer/Double/Int64
 CFArray ->Array
 CFDate ->date
 nil ->nil
 CGColorSpace ->CGColorSpaceMBS
 CGColor ->CGColorMBS
 CGImage ->CGImageMBS
 CF* ->CF*MBS

Variant to Carbon CTypeRef:

Dictionary ->CFDictionaryRef
 Boolean ->CFBooleanRef
 Color ->CFNumberRef
 Integer ->CFNumberRef

Int64 ->CFNumberRef
 Single ->CFNumberRef
 Double ->CFNumberRef
 String ->CFStringRef
 Color ->CGColorRef
 Date ->CFDateRef
 nil ->nil
 Memoryblock ->CFDataRef
 FolderItem ->CFURLRef
 Dictionary ->CFDictionaryRef
 Array of Variant/String/Date/Double/Single/Int64/Integer ->CFArray
 CGRectMBS ->CGRect as CFDataRef
 CGSizeMBS ->CGSize as CFDataRef
 CGPointMBS ->CGPoint as CFDataRef
 CGColorMBS ->CGColor
 CGColorSpaceMBS ->CGColorSpace
 CGImageMBS ->CGImage
 CGDataConsumerMBS ->CGDataConsumer
 CGDataProviderMBS ->CGDataProvider
 CF*MBS ->CF*

Strings without encodings should be put into dictionaries as memoryblocks.

6.0.229 Uploaded my web app with FTP, but it does not run on the server!

Plugin Version: all, Platform: Windows.

Answer: If you see errors like a simple "Segmentation Fault" on Linux or some other wired errors, you may want to check your FTP upload mode. It must be binary for web apps. ASCII mode corrupts the application.

6.0.230 What classes to use for hotkeys?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Please use CarbonHotKeyMBS class on Mac and WindowsKeyFilterMBS on Windows.

Notes: CarbonHotKeyMBS will also work fine in Cocoa apps.

6.0.231 What do I need for Linux to get picture functions working?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: In order to get our plugins working on Linux systems without GUI, the plugin loads graphics

libraries dynamically.

Notes: To get it working, the plugin tries to load gtk with this paths:

- libgtk-x11-2.0.so”
- libgtk-x11-2.0.so.0”
- /usr/lib/libgtk-x11-2.0.so”
- /usr/lib32/libgtk-x11-2.0.so”
- /usr/lib/libgtk-x11-2.0.so.0”
- /usr/lib32/libgtk-x11-2.0.so.0”

gdk is loaded with this paths:

- libgdk-x11-2.0.so”
- libgdk-x11-2.0.so.0”
- /usr/lib/libgdk-x11-2.0.so”
- /usr/lib32/libgdk-x11-2.0.so”
- /usr/lib/libgdk-x11-2.0.so.0”
- /usr/lib32/libgdk-x11-2.0.so.0”

For the paths without explicit path, the system will search in /lib, /usr/lib and all directories in the LD_LIBRARY_PATH environment variable.

6.0.232 What does the NAN code mean?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer:

6.0.233 What font is used as a 'small font' in typical Mac OS X apps?

Plugin Version: all, Platform: macOS.

Answer:

Xojo 4.5 has a constant "SmallSystem" to use for a font name.

For older versions try this code:

Example:

```

Sub GetThemeFont(fontType as Integer, ByRef fontName as String, ByRef fontSize as Integer, ByRef
fontName as Integer)
dim err as Integer
dim theFont, theFontSize, theFontStyle as MemoryBlock

const smSystemScript = -1

Declare Function GetThemeFont Lib "Carbon" (inFontID as Integer, inScript as Integer, outFontName
as Ptr, outFontSize as Ptr, outStyle as Ptr) as Integer

theFont = NewMemoryBlock(256) //Str255
theFontSize = NewMemoryBlock(2) //SInt16
theFontStyle = NewMemoryBlock(1) //Style

err = GetThemeFont(fontType, smSystemScript, theFont, theFontSize, theFontStyle)

if err = 0 then
fontName = theFont.PString(0)
fontSize = theFontSize.UShort(0)
fontStyle = theFontStyle.Byte(0)
else
fontName = ""
fontSize = 0
fontStyle = 0
end if
End Sub

```

6.0.234 What is last plugin version to run on Mac OS X 10.4?

Plugin Version: all, Platform: Windows.

Answer: Last Version with 10.4 support is version 15.4.

Notes: With version 15.4 you can build applications for OS X 10.4 and newer.

For Version 16.0 we disabled 10.4 and moved minimum to 10.5. We may be able to enable it again to build a version of 16.x, but may need to charge for this by hour.

6.0.235 What is last plugin version to run on PPC?

Plugin Version: all, Platform: Windows.

Answer: Last Version with PPC is 15.4.

Notes: With version 15.4 you can build PPC applications for OS X 10.4 and newer.

For Version 16.0 we disabled PPC. We may be able to enable it again to build a PPC version of 16.x, but may need to charge for this by hour.

6.0.236 What is last version of the plugins for macOS 32-bit?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Please use version 23.0 or older.

Notes: We stopped including 32-bit code for macOS in version 23.1.

Please use older versions if you use an old Xojo.

Xojo 2017r3 and newer load our 64-bit plugins.

6.0.237 What is the difference between Timer and WebTimer?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Timer is server side and WebTimer client side.

Notes: Timer is the normal timer class in Xojo. It runs on the server. On the side the WebTimer runs on the client. It triggers a request to the server to perform the action. So a WebTimer is good to keep the connection running and the website updated regularly. A timer on the server is good to make regular jobs like starting a database backup every 24 hours.

6.0.238 What is the list of Excel functions?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Below a list of function names known by LibXL.

Notes: LibXL parses the functions and writes tokens to the excel file. So even if Excel can do more functions, we can only accept the ones known by LibXL.

ABS, ABSREF, ACOS, ACOSH, ACTIVE.CELL, ADD.BAR, ADD.COMMAND, ADD.MENU, ADD.TOOLBAR, ADDRESS, AND, APP.TITLE, AREAS, ARGUMENT, ASC, ASIN, ASINH, ATAN, ATAN2, ATANH, AVEDEV, AVERAGE, AVERAGEA, BAHTTEXT, BETADIST, BETAINV, BINOMDIST, BREAK, CALL, CALLER, CANCEL.KEY, CEILING, CELL, CHAR, CHECK.COMMAND, CHIDIST, CHIINV, CHITEST, CHOOSE, CLEAN, CODE, COLUMN, COLUMNS, COMBIN, CONCATENATE, CONFIDENCE, CORREL, COS, COSH, COUNT, COUNTA, COUNTBLANK, COUNTIF, COVAR, CREATE.OBJECT, CRITBINOM, CUSTOM.REPEAT, CUSTOM.UNDO, DATE, DATEDIF, DATESTRING, DATEVALUE, DAVERAGE, DAY, DAYS360, DB, DBCS, DCOUNT, DCOUNTA, DDB, DEGREES, DELETE.BAR, DELETE.COMMAND, DELETE.MENU, DELETE.TOOLBAR, DEREf, DEVSQ, DGET, DIALOG.BOX, DIRECTORY, DMAX, DMIN, DOCUMENTS, DOLLAR, DPRODUCT, DSTDEV, DSTDEVP, DSUM, DVAR, DVARP, ECHO, ELSE, ELSE.IF, ENABLE.COMMAND, ENABLE.TOOL, END.IF, ERROR, ERROR.TYPE, EVALUATE, EVEN, EXACT, EXEC, EXECUTE, EXP, EXPONDIST, FACT, FALSE, FCLOSE, FDIST, FILES, FIND, FINDB, FINV, FISHER, FISHERINV, FIXED, FLOOR, FOPEN, FOR, FOR.CELL, FORECAST,

FORMULA.CONVERT, FPOS, FREAD, FREADLN, FREQUENCY, FSIZE, FTEST, FV, FWRITE, FWRITELN, GAMMADIST, GAMMAINV, GAMMALN, GEOMEAN, GET.BAR, GET.CELL, GET.CHART.ITEM, GET.DEF, GET.DOCUMENT, GET.FORMULA, GET.LINK.INFO, GET.MOVIE, GET.NAME, GET.NOTE, GET.OBJECT, GET.PIVOT.FIELD, GET.PIVOT.ITEM, GET.PIVOT.TABLE, GET.TOOL, GET.TOOLBAR, GET.WINDOW, GET.WORKBOOK, GET.WORKSPACE, GETPIVOTDATA, GOTO, GROUP, GROWTH, HALT, HARMEAN, HELP, HLOOKUP, HOUR, HYPERLINK, HYPGEOMDIST, IF, INDEX, INDIRECT, INFO, INITIATE, INPUT, INT, INTERCEPT, IPMT, IRR, ISBLANK, ISERR, ISERROR, ISLOGICAL, ISNA, ISNONTEXT, ISNUMBER, ISPMT, ISREF, ISTEXT, ISTHAIDIGIT, KURT, LARGE, LAST.ERROR, LEFT, LEFTB, LEN, LENB, LINEST, LINKS, LN, LOG, LOG10, LOGEST, LOGINV, LOGNORMDIST, LOOKUP, LOWER, MATCH, MAX, MAXA, MDETERM, MEDIAN, MID, MIDB, MIN, MINA, MINUTE, MINVERSE, MIRR, MMULT, MOD, MODE, MONTH, MOVIE.COMMAND, N, NA, NAMES, NEGBINOMDIST, NEXT, NORMDIST, NORMINV, NORMSDIST, NORMSINV, NOT, NOTE, NOW, NPER, NPV, NUMBERSTRING, ODD, OFFSET, OPEN.DIALOG, OPTIONS.LISTS.GET, OR, PAUSE, PEARSON, PERCENTILE, PERCENTRANK, PERMUT, PHONETIC, PI, PIVOT.ADD.DATA, PMT, POISSON, POKE, POWER, PPMT, PRESS.TOOL, PROB, PRODUCT, PROPER, PV, QUARTILE, RADIANS, RAND, RANK, RATE, REFTTEXT, REGISTER, REGISTER.ID, RELREF, RENAME.COMMAND, REPLACE, REPLACEB, REPT, REQUEST, RESET.TOOLBAR, RESTART, RESULT, RESUME, RETURN, RIGHT, RIGHTB, ROMAN, ROUND, ROUNDBAHTDOWN, ROUNDBAHTUP, ROUNDDOWN, ROUNDUP, ROW, ROWS, RSQ, RTD, SAVE.DIALOG, SAVE.TOOLBAR, SCENARIO.GET, SEARCH, SEARCHB, SECOND, SELECTION, SERIES, SET.NAME, SET.VALUE, SHOW.BAR, SIGN, SIN, SINH, SKEW, SLN, SLOPE, SMALL, SPELLING.CHECK, SQRT, STANDARDIZE, STDEV, STDEVA, STDEVP, STDEVPA, STEP, STEYX, SUBSTITUTE, SUBTOTAL, SUM, SUMIF, SUMPRODUCT, SUMSQ, SUMX2MY2, SUMX2PY2, SUMXMY2, SYD, T, TAN, TANH, TDIST, TERMINATE, TEXT, TEXT.BOX, TEXTREF, THAIDAYOFWEEK, THAIDIGIT, THAIMONTHOFYEAR, THAINUMSOUND, THAINUMSTRING, THAISTRINGLENGTH, THAIYEAR, TIME, TIMEVALUE, TINV, TODAY, TRANSPOSE, TREND, TRIM, TRIMMEAN, TRUE, TRUNC, TTEST, TYPE, UNREGISTER, UPPER, USDOLLAR, USERDEFINED, VALUE, VAR, VARA, VARP, VARPA, VDB, VIEW.GET, VLOOKUP, VOLATILE, WEEKDAY, WEIBULL, WHILE, WINDOW.TITLE, WINDOWS, YEAR and ZTEST.

6.0.239 What is the replacement for PluginMBS?

Plugin Version: all, Platform: macOS.

Answer: Use the SoftDeclareMBS class to load libraries dynamically.

6.0.240 What to do on Xojo reporting a conflict?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer:

I get an error like "This item conflicts with another item of the same name" when using one of the plugin functions.

Xojo just wants to tell you that you dropped something in the plugins folder what is not a plugin.

Notes:

Some users dropped the examples, the documentation or other files into the plugins folder. Don't do it.

6.0.241 What to do with a NSImageCacheException?

Plugin Version: all, Platforms: macOS, Windows.

Answer: You need to add exception handlers for NSExcptionMBS in order to catch this exception.

Notes: You may also add code to write the stack of the exception into a log file for later locating the error source.

A NSImage has several image representations in memory. So basicly you pass in the base image and for whatever size an image is needed, the NSImage class will create a cache image representation of the requested size so on the next query it can use that cache for the same requested size.

6.0.242 What to do with MySQL Error 2014?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: You can get this error on MySQL if you have a recordset open while you create another one.

6.0.243 What to do with SQL Plugin reporting Malformed string as error?

Plugin Version: all, Platform: macOS.

Answer: Please make sure the table and/or database fields have a text encoding set.

Notes: For Firebird our plugin tries to use UTF-8 encoding if possible and to correctly convert between various tables, the tables and their fields need to have a text encoding defined.

e.g. if the text field in the table is windows-1252 and the other ISO 8859-5, then the Firebird database can convert them to UTF-8 and deliver texts to the plugin.

If encoding is set to none, it may get confused for non-ascii text.

6.0.244 Where is CGGetActiveDisplayListMBS?

Plugin Version: all, Platform: Windows.

Answer: This is now CGDisplayMBS.GetActiveDisplayList.

6.0.245 Where is CGGetDisplaysWithPointMBS?

Plugin Version: all, Platform: Windows.

Answer: This is now CGDisplayMBS.GetDisplaysWithPoint.

6.0.246 Where is CGGetDisplaysWithRectMBS?

Plugin Version: all, Platform: Windows.

Answer: This is now CGDisplayMBS.GetDisplaysWithRect.

6.0.247 Where is CGGetOnlineDisplayListMBS?

Plugin Version: all, Platform: Windows.

Answer: This is now CGDisplayMBS.GetOnlineDisplayList.

6.0.248 Where is GetObjectClassNameMBS?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Please use this replacement method:

Example:

```
Function GetObjectClassNameMBS(o as Object) As string
dim t as Introspection.TypeInfo = Introspection.GetType(o)
Return t.FullName
End Function
```

Notes: GetObjectClassNameMBS was removed from the plugins.

6.0.249 Where is NetworkAvailableMBS?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: We removed NetworkAvailableMBS some versions ago. It was not working right and basically it's not useful. If you want to check whether you have a network, than do a DNS resolve:

Example:

```

// two independent domain names
const domain1 = "www.google.com"
const domain2 = "www.macsw.de"

// resolve IPs
dim ip1 as string = DNSNameToAddressMBS(Domain1)
dim ip2 as string = DNSNameToAddressMBS(Domain2)

// if we got IPs and not the same IPs (error/login pages)
if len(ip1)=0 or len(ip2)=0 or ip1=ip2 then
MsgBox "no connection"
else
MsgBox "have connection"
end if

```

Notes: This way you can detect whether you got something from DNS. And you can make sure that a DNS redirection to a login page won't catch you.

6.0.250 Where is StringHeight function in DynaPDF?

Plugin Version: all, Platform: Windows.

Answer: Use the function GetFTextHeight or GetFTextHeightEx.

Notes: Be aware that GetFTextHeight works with format commands and you may want to escape your text if you don't use them.

6.0.251 Where is XLSDocumentMBS class?

Plugin Version: all, Platform: macOS.

Answer: This class has been removed in favor of XLBookMBS class.

Notes: This classes have been removed XLSCellMBS, XLSDocumentMBS, XLSFormatRecordMBS, XLSMergedCellsMBS, XLSRowMBS and XLSSheetMBS.

6.0.252 Where to get information about file formats?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer:

Please visit this web page:

<http://www.wotsit.org>

6.0.253 Where to register creator code for my application?

Plugin Version: all, Platform: macOS.

Answer:

Register at Apple:

<http://developer.apple.com/dev/cftype/information.html>

6.0.254 Which Mac OS X frameworks are 64bit only?

Plugin Version: all, Platform: macOS.

Answer: Some frameworks from Mac OS X do not support 32 bit applications, so we can't provide plugins for Xojo until 64bit target is available.

Notes: For Mac OS X 10.8:

- Accounts
- EventKit
- GLKit
- Social

and in 10.9:

- Accounts
- AVKit
- EventKit
- GameController
- GLKit
- MapKit
- MediaLibrary
- Social
- SpriteKit

In general Apple makes all new frameworks being 64 bit only.

6.0.255 Which plugins are 64bit only?

Plugin Version: all, Platform: macOS.

Answer: Some of our plugins work only in 64 bit modes as operation systems do not provide 32 bit code.

Notes: This effects currently: EventKit, Accounts, Social frameworks from Apple and our matching plugins.

6.0.256 Why application doesn't launch because of a missing ddraw.dll!?

Plugin Version: all, Platform: Windows.

Answer: Some RB versions require that you install DirectX from Microsoft on your Windows.

6.0.257 Why application doesn't launch because of a missing shlwapi.dll!?

Plugin Version: all, Platform: Windows.

Answer: Some RB versions require that you install the Internet Explorer from Microsoft on your Windows.

Notes: This bug is for several older Windows 95 editions.

6.0.258 Why do I hear a beep on keydown?

Plugin Version: all, Platform: Windows.

Answer: When the user presses a key, RB goes through all keydown event handlers till on returns true.

Notes: If no keydown event handler returns true for the key, a beep is performed.

6.0.259 Why does folderitem.item return nil?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer: Because Xojo fails to make a folderitem for you. Reason may be an alias file which can't be resolved or simply that you don't have enough access rights to read the folder content.

Notes: A more rarely reason is that the directory changed and the file with the given index or name does no longer exist.

6.0.260 Why doesn't showurl work?

Plugin Version: all, Platforms: macOS, Linux, Windows.

Answer:

There are three main reasons:

1. showurl is not supported by Xojo in 68k applications.
2. there is now application defined for the protocol (e.g. http) in the Internet Control panel.
3. You don't have Internet Config installed.

You can use the InternetConfigMBS class to check for this stuff.

6.0.261 Why don't the picture functions not work on Linux?

Plugin Version: all, Platform: macOS.

Answer: Please make sure libcairo is installed.

Notes: For accessing pictures on Linux, the MBS Plugin relays on the cairo library.

Please install the package if you don't have it already.

Our plugin looks for library called libcairo.so or libcairo.so.2.

6.0.262 Why have I no values in my chart?

Plugin Version: all, Platforms: macOS, Windows.

Answer: You have no data points visible, there may be several reasons:

Notes: For example one of the data values may be infinite or invalid.

Or the scaling may be out of range, so you simply see nothing.

6.0.263 Will application size increase with using plugins?

Plugin Version: all, Platform: Windows.

Answer: All plugins used by your application will be included in the application.

Notes: If you use no plugins, your application will not change size.

And if you use one class from the plugins, your application size will increase by a few kilobytes.

The documentation of the plugins include a list of all plugin parts and their sizes for the different platforms.

6.0.264 XLS: Custom format string guidelines

Plugin Version: all, Platform: macOS.

Answer: You have to download the source code and compile a static version of the library.

Notes: Up to four sections of format codes can be specified. The format codes, separated by semicolons, define the formats for positive numbers, negative numbers, zero values, and text, in that order. If only two sections are specified, the first is used for positive numbers and zeros, and the second is used for negative numbers. If only one section is specified, it is used for all numbers. Four sections example:

```
#,###.00_); [ Red ] (#,###.00);0.00;"sales "@
```

The following table describes the different symbols that are available for use in custom number formats.

Specify colors

To set the text color for a section of the format, type the name of one of the following eight colors in square brackets in the section. The color code must be the first item in the section.

Instead of using the name of the color, the color index can be used, like this [Color3] for Red. Valid numeric indexes for color range from 1 to 56, which reference by index to the legacy color palette.

Specify conditions

To set number formats that will be applied only if a number meets a specified condition, enclose the condition in square brackets. The condition consists of a comparison operator and a value. Comparison operators include: = Equal to; >Greater than; <Less than; >= Greater than or equal to, <= Less than or equal to, and <>Not equal to. For example, the following format displays numbers that are less than or equal to 100 in a red font and numbers that are greater than 100 in a blue font.

```
[ Red ] [ <=100 ] ; [ Blue ] [ >100 ]
```

If the cell value does not meet any of the criteria, then pound signs ("##") are displayed across the width of the cell.

Dates and times

Examples

6.0.265 Xojo doesn't work with your plugins on Windows 98.

Plugin Version: all, Platform: Windows.

Answer: Please upgrade your Windows version.

**6.0.266 Xojo or my RB application itself crashes on launch on Mac OS Classic.
Why?**

Plugin Version: all.

Answer:

You may check if the application has enough memory to be loaded.

RB should have on Mac OS Classic more than 20 MB of RAM.

I preferred to use 50 MB and for an application a 10 MB partition is a good way to start.

Parameter	Description
x	The x value of the data point. For an enumerated x-axis (see <code>Axis.setLabels</code> on what is an enumerated axis), the first data point is 0, and the nth data point is (n-1).
xLabel	The bottom x-axis label of the data point.
x2Label	The top x-axis label of the data point.
value	The value of the data point.
accValue	The sum of values of all data points that are in the same x position and same data group as the current data point, and with data set number less than or equal to the current data point. This is useful for stacked charts, such as stacked bar chart and stacked area chart.
totalValue	The sum of values of all data points that are in the same x position and same data group as the current data point. This is useful for stacked charts, such as stacked bar chart and stacked area chart.
percent	The percentage of the data point based on the total value of all data points that are in the same x position and same data group as the current data point. This is useful for stacked charts, such as stacked bar chart and stacked area chart.
accPercent	The accumulated percentage of the data point based on the total value of all data points that are in the same x position and same data group as the current data point. This is useful for stacked charts, such as stacked bar chart and stacked area chart.
gpercent	The percentage of the data point based on the total value of all data points in a layer.
dataSet	The data set number to which the data point belongs. The first data set is 0. The nth data set is (n-1).
dataSetName	The name of the data set to which the data point belongs.
dataItem	The data point number within the data set. The first data point is 0. The nth data point is (n-1).
dataGroup	The data group number to which the data point belongs. The first data group is 0. The nth data group is (n-1).
dataGroupName	The name of the data group to which the data point belongs.
layerId	The layer number to which the data point belongs. The first layer is 0. The nth layer is (n-1).
fieldN	The (N + 1)th extra field. For example, { field0 } means the first extra field. An extra field is an array of custom elements added using <code>Layer.addExtraField</code> , <code>Layer.addExtraField2</code> , <code>BaseChart.addExtraField</code> or <code>BaseChart.addExtraField2</code> .

diFieldN	Same as fieldN. See above.
dsFieldN	Similar to fieldN, except that dsFieldN means the extra field is indexed by data set number. The Pth data set corresponds to the Pth element of the extra field.
dsdiFieldN	Similar to fieldN, except that dsdiFieldN means the extra fields are indexed by both the data set number and data point number. The Pth data item of the Qth data set corresponds to the Pth element of the (N + Q)th extra field.

Parameter	Description
zx	The symbol scale in the x dimension. Applicable for layers with symbol scales set by <code>LineLayer.setSymbolScale</code> .
zy	The symbol scale in the y dimension. Applicable for layers with symbol scales set by <code>LineLayer.setSymbolScale</code> .
z	The symbol scale without distinguishing the dimension to use. Applicable for layers with symbol scales set by <code>LineLayer.setSymbolScale</code> .

Parameter	Description
slope	The slope of the trend line.
intercept	The y-intercept of the trend line.
corr	The correlation coefficient in linear regression analysis.
stderr	The standard error in linear regression analysis.

Parameter	Description
top	The value of the top edge of the box-whisker symbol.
bottom	The value of the bottom edge of the box-whisker symbol.
max	The value of the maximum mark of the box-whisker symbol.
min	The value of the minimum mark of the box-whisker symbol.
med	The value of the median mark of the box-whisker symbol.

Parameter	Description
high	The high value.
low	The low value.
open	The open value.
close	The close value.

Parameter	Description
dir	The direction of the vector.
len	The length of the vector.

Parameter	Description
radius	The radial value of the data point.
value	Same as { radius } . See above.
angle	The angular value of the data point.
x	Same as { angle } . See above.
label	The angular label of the data point.
xLabel	Same as { label } . See above.
name	The name of the layer to which the data point belongs.
dataSetName	Same as { name } . See above.
i	The data point number. The first data point is 0. The nth data point is (n-1).
dataItem	Same as { i } . See above.
z	The symbol scale. Applicable for layers with symbol scales set by Polar-Layer.setSymbolScale.
fieldN	The (N + 1)th extra field. For example, { field0 } means the first extra field. An extra field is an array of custom elements added using Layer.addExtraField, Layer.addExtraField2, BaseChart.addExtraField or BaseChart.addExtraField2.
diFieldN	Same as fieldN. See above.
dsFieldN	Similar to fieldN, except that dsFieldN means the extra field is indexed by layer index. The Pth layer corresponds to the Pth element of the extra field.
dsdiFieldN	Similar to fieldN, except that dsdiFieldN means the extra fields are indexed by both the data set number and data point number. The Pth data item of the Qth layer corresponds to the Pth element of the (N + Q)th extra field.
Parameter	Description
dir	The direction of the vector.
len	The length of the vector.
Parameter	Description
value	The axis value at the tick position.
label	The axis label at the tick position.
Parameter	Description
[param]	The name of the parameter
[a]	If this field a number, it specifies the number of decimal places (digits to the right of the decimal point).

[b]	The thousand separator. Should be a non-alphanumeric character (not 0-9, A-Z, a-z). Use ' '.
textasciitilde ' for no thousand separator. The default is ' '.	
textasciitilde ', which can be modified using BaseChart.setNumberFormat.	
[c]	The decimal point character. The default is '.', which can be modified using BaseChart.setNumberFormat.
[d]	The negative sign character. Use ' '.
textasciitilde ' for no negative sign character. The default is '-', which can be modified using BaseChart.setNumberFormat.	

Parameter	Description
yyyy	The year in 4 digits (e.g. 2002)
yyy	The year showing only the least significant 3 digits (e.g. 002 for the year 2002)
yy	The year showing only the least significant 2 digits (e.g. 02 for the year 2002)
y	The year showing only the least significant 1 digits (e.g. 2 for the year 2002)
mmm	The month formatted as its name. The default is to use the first 3 characters of the english month name (Jan, Feb, Mar ...). The names can be configured using BaseChart.setMonthNames.
mm	The month formatted as 2 digits from 01 - 12, adding leading zero if necessary.
m	The month formatted using the minimum number of digits from 1 - 12.
MMM	The first 3 characters of the month name converted to upper case. The names can be configured using BaseChart.setMonthNames.
MM	The first 2 characters of the month name converted to upper case. The names can be configured using BaseChart.setMonthNames.
M	The first character of the month name converted to upper case. The names can be configured using BaseChart.setMonthNames.
dd	The day of month formatted as 2 digits from 01 - 31, adding leading zero if necessary.
d	The day of month formatted using the minimum number of digits from 1 - 31.
w	The name of the day of week. The default is to use the first 3 characters of the english day of week name (Sun, Mon, Tue ...). The names can be configured using BaseChart.setWeekDayNames.
hh	The hour of day formatted as 2 digits, adding leading zero if necessary. The 2 digits will be 00 - 23 if the 'a' option (see below) is not specified, otherwise it will be 01 - 12.
h	The hour of day formatted using the minimum number of digits. The digits will be 0 - 23 if the 'a' option (see below) is not specified, otherwise it will be 01 - 12.
nn	The minute formatted as 2 digits from 00 - 59, adding leading zero if necessary.
n	The minute formatted using the minimum number of digits from 00 - 59.
ss	The second formatted as 2 digits from 00 - 59, adding leading zero if necessary.
s	The second formatted using the minimum number of digits from 00 - 59.
a	Display either 'am' or 'pm', depending on whether the time is in the morning or afternoon. The text 'am' and 'pm' can be modified using BaseChart.setAMPM.

Shape Id	Value	Description
SquareShape	1	Square shape. See (1, 1) above.
DiamondShape	2	Diamond shape. See (2, 1) above.
TriangleShape	3	Triangle shape pointing upwards. See (3, 1) above.
RightTriangleShape	4	Triangle shape pointing rightwards. See (4, 1) above.
LeftTriangleShape	5	Triangle shape pointing leftwards. See (5, 1) above.
InvertedTriangleShape	6	Triangle shape pointing downwards. See (1, 2) above.
CircleShape	7	Circle shape. See (2, 2) above.
StarShape	[Method]	Star shapes of various points. See (2, 3), (2, 4), (2, 5), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5) above for stars with 3 to 10 points.
PolygonShape	[Method]	Polygon shapes symmetrical about a vertical axis with a vertex at the top center position. See (4, 1), (4, 3), (4, 5), (5, 1) for polygons of 5 to 8 sides.
Polygon2Shape	[Method]	Polygon shapes symmetrical about a vertical axis but without any vertex at the top center position. See (4, 2), (4, 4) for polygons of 5 and 6 sides.
CrossShape	[Method]	'+' shapes. See (5, 2), (5, 3), (5, 4), (5, 5), (6, 1), (6, 2), (6, 3) for '+' shape with arm width of 0.1 - 0.7.
Cross2Shape	[Method]	'X' shapes. See (6, 4), (6, 5), (7, 1), (7, 2), (7, 3), (7, 4), (7, 5) for 'X' shapes with arm width of 0.1 - 0.7.

langEnglish	0	Roman script
langFrench	1	Roman script
langGerman	2	Roman script
langItalian	3	Roman script
langDutch	4	Roman script
langSwedish	5	Roman script
langSpanish	6	Roman script
langDanish	7	Roman script
langPortuguese	8	Roman script
langNorwegian	9	Roman script
langHebrew	10	Hebrew script
langJapanese	11	Japanese script
langArabic	12	Arabic script
langFinnish	13	Roman script
langGreek	14	Greek script using smRoman script code
langIcelandic	15	modified smRoman/Icelandic script
langMaltese	16	Roman script
langTurkish	17	modified smRoman/Turkish script
langCroatian	18	modified smRoman/Croatian script
langTradChinese	19	Chinese (Mandarin) in traditional characters
langUrdu	20	Arabic script
langHindi	21	Devanagari script
langThai	22	Thai script
langKorean	23	Korean script

Nan	Meaning
1	Invalid square root (negative number, usually)
2	Invalid addition (indeterminate such as infinity + (-infinity))
4	Invalid division (indeterminate such as 0/0)
8	Invalid multiplication (indeterminate such as 0*infinity)
9	Invalid modulo such as (a mod 0)
17	Try to convert invalid string to a number like val("x7")
33	Invalid argument in a trig function
34	Invalid argument in an inverse trig function
36	Invalid argument in a log function
37	Invalid argument in Pow function
38	Invalid argument in toolbox financial function
40	Invalid argument in hyperbolic function
42	Invalid argument in a gamma function

Symbol	Description and result
0	Digit placeholder. For example, if the value 8.9 is to be displayed as 8.90, use the format #.00
#	Digit placeholder. This symbol follows the same rules as the 0 symbol. However, the application shall not display extra zeros when the number typed has fewer digits on either side of the decimal than there are # symbols in the format. For example, if the custom format is #.##, and 8.9 is in the cell, the number 8.9 is displayed.
?	Digit placeholder. This symbol follows the same rules as the 0 symbol. However, the application shall put a space for insignificant zeros on either side of the decimal point so that decimal points are aligned in the column. For example, the custom format 0.0? aligns the decimal points for the numbers 8.9 and 88.99 in a column.
. (period)	Decimal point.
%	Percentage. If the cell contains a number between 0 and 1, and the custom format 0% is used, the application shall multiply the number by 100 and add the percentage symbol in the cell.
, (comma)	Thousands separator. The application shall separate thousands by commas if the format contains a comma that is enclosed by number signs (#) or by zeros. A comma that follows a placeholder scales the number by one thousand. For example, if the format is #.0,, and the cell value is 12,200,000 then the number 12.2 is displayed.
E- E+ e- e+	Scientific format. The application shall display a number to the right of the "E" symbol that corresponds to the number of places that the decimal point was moved. For example, if the format is 0.00E+00, and the value 12,200,000 is in the cell, the number 1.22E+07 is displayed. If the number format is #0.0E+0, then the number 12.2E+6 is displayed.
\$ -+/():space	Displays the symbol. If it is desired to display a character that differs from one of these symbols, precede the character with a backslash (\). Alternatively, enclose the character in quotation marks. For example, if the number format is (000), and the value 12 is in the cell, the number (012) is displayed.
\	Display the next character in the format. The application shall not display the backslash. For example, if the number format is 0\!, and the value 3 is in the cell, the value 3! is displayed.
*	Repeat the next character in the format enough times to fill the column to its current width. There shall not be more than one asterisk in one section of the format. If more than one asterisk appears in one section of the format, all but the last asterisk shall be ignored. For example, if the number format is 0*x, and the value 3 is in the cell, the value 3xxxxxx is displayed. The number of x characters that are displayed in the cell varies based on the width of the column.
_ (underline)	Skip the width of the next character. This is useful for lining up negative and positive values in different cells of the same column. For example, the number format _(0.0_);(0.0) aligns the numbers 2.3 and -4.5 in the column even though the negative number is enclosed by parentheses.
"text"	Display whatever text is inside the quotation marks. For example, the format 0.00 "dollars" displays 1.23 dollars when the value 1.23 is in the cell.
@	Text placeholder. If text is typed in the cell, the text from the cell is placed in the format where the at symbol (@) appears. For example, if the number format is "Bob "@ Smith" (including quotation marks), and the value "John" is in the cell, the value Bob John Smith is displayed.

[Black] [Green] [White] [Blue] [Magenta] [Yellow] [Cyan] [Red]

To display	As	Use this code
Months	1-12	m
Months	01-12	mm
Months	Jan-Dec	mmm
Months	January-December	mmmm
Months	J-D	mmmmm
Days	1-31	d
Days	01-31	dd
Days	Sun-Sat	ddd
Days	Sunday-Saturday	dddd
Years	00-99	yy
Years	1900-9999	yyyy
Hours	0-23	h
Hours	00-23	hh
Minutes	0-59	m
Minutes	00-59	mm
Seconds	0-59	s
Seconds	00-59	ss
Time	4 AM	h AM/PM
Time	4:36 PM	h:mm AM/PM
Time	4:36:03 P	h:mm:ss A/P
Time	4:36:03.75	h:mm:ss.00
Elapsed time	1:02	[h] :mm
Elapsed time	62:16	[mm] :ss
Elapsed time	3735.80	[ss] .00

To display	As	Use this code
1234.59	1234.6	#####.#
8.9	8.900	#.000
.631	0.6	0.#
12	12.0	#.0#
1234.568	1234.57	#.0#
44.398	44.398	???.???
102.65	102.65	???.???
2.8	2.8	???.???
5.25	5 1/4	# ??/??
5.3	5 3/10	# ??/??
12000	12,000	#,####
12000	12	#,
12400000	12.4	0.0,,