

XPlatProviders

Microsoft Cross-Platform Providers

Microsoft Corporation
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1 Introduction

Welcome to the Microsoft Cross-Platform Providers (XPlatProviders), a set of CMPI providers for Linux and Unix platforms. This document describes how to build, install, and use these providers.

1.1 License

XPlatProviders is published under the Microsoft Public License, which is described here <http://opensource.org/licenses/ms-pl.html>.

1.2 Platforms

XPlatProviders has been tested on the following platforms.

- HP-UX 11i v2 and v3 (PA-RISC and IA64)
- Sun Solaris 8 and 9 (SPARC) and Solaris 10 (SPARC and x86)
- Red Hat Enterprise Linux 4 (x86/x64) and 5 (x86/x64) Server
- Novell SUSE Linux Enterprise Server 9 (x86) and 10 SP1 (x86/x64)
- IBM AIX v5.3 and v6.1 (POWER)

1.3 The CMPI Standard

XPlatProviders implement the Common Manageability Programming Interface (CMPI) standard. They are compatible with CIM servers that implement this standard, described here <http://www.opengroup.org/bookstore/catalog/c061.htm>. XPlatProviders has only been tested with the OpenPegasus CMPI interface, although it may work with other CMPI-compliant CIM servers as well.

2 Installing

This chapter explains how to unpack, configure, build, and install XPlatProviders.

2.1 Overview

The remainder of this chapter explains in detail how to build and install. This section gives a quick overview of this process. If you are in a hurry, just reading this section may suffice.

The build procedures are similar to those described in the chapter 7 of the "GNU Coding Standards" (<http://www.gnu.org/prep/standards/standards.html>). In general, you must type the following sequence of commands.

```
# unzip xplatproviders-1.0.0.tar.Z
# tar xf xplatproviders-1.0.0.tar
# cd xplatproviders-1.0.0
# ./configure --with-cmpi-headers=PATH
# make
# make install
```

`PATH` is the location of the standard CMPI header files (installed by your CIM implementation).

This installs everything under the `/opt/xplatproviders` directory. The provider module itself is installed here.

```
/opt/xplatproviders/lib/libSCXCoreProviderModule.so
```

You will later need to copy this library to wherever the CIM server expects to find it and then register the provider. If this process is unclear, please read on. Otherwise, skip to the chapter entitled 'Provider Registration'.

2.2 Prerequisites

The XPlatProviders build scripts require the following software.

- The native C++ compiler.
- GNU make
- GNU BASH

Please be sure these are installed and on the path. All references to the `make` command below refer to GNU make.

2.3 Unpacking the distribution

XPlatProviders is distributed as a compressed tar file. The first step is to uncompress and un-tar the distribution as shown below.

```
$ uncompress xplatproviders.tar.Z
$ tar xf xplatproviders.tar
```

This creates a directory called `xplatproviders-1.0.0`, which this document refers to as the root directory.

2.4 Configuring the distribution

XPlatProviders should be configured with the `configure` script from the root of the distribution. The following configures XPlatProviders to find the CMPI headers in the `/usr/include/cmpi` directory.

```
$ ./configure --with-cmpi-headers=/usr/include/cmpi
```

The `--with-cmpi-headers` option is required so that the build scripts can find the standard CMPI headers. The given directory must contain the following files.

```
cmpiip.h
cmpidt.h
cmpift.h
cmpimacs.h
cmpios.h
```

The following command prints a help message and a complete list of options.

```
$ ./configure --help
```

Most options pertain to directory locations. Each default directory location is shown below along with an option to change it.

```

/opt/xplatproviders (--prefix)
/opt/xplatproviders/lib (--libdir)
/opt/xplatproviders/conf (--confdir)
/opt/xplatproviders/log (--logdir)
/opt/xplatproviders/run (--rundir)
/opt/xplatproviders/mof (--mofdir)

```

In this document, we refer to each these locations using one of the following shorthands.

```

{prefix}
{libdir}
{confdir}
{logdir}
{rundir}
{mofdir}

```

The default prefix of the directory locations (`/opt/xplatproviders`) can be changed with the `--prefix` option. Each location can be customized using one of the other options above.

The `--libdir` option specifies the installation directory for the XPlatProviders provider module (`libSCXCoreProviderModule.so`). This is where the CIM server expects to find its providers (also called the 'provider directory'). Alternatively, you can use the default location (`/opt/xplatproviders/lib`) and copy or link the library to its final location during provider registration.

The `--with-namespace` option specifies which CIM namespace the providers will be registered for. The default is `root/cimv2`. This option modifies the OpenPegasus provider registration MOF files (installed under the directory given by `--mofdir`). The `--with-namespace` option only applies to OpenPegasus. More is said about registration later.

The configure script creates three files:

```

./options.mak
./source/code/include/scxcorelib/options.h
./GNUmakefile

```

To see which options you used to configure, type `'make options'`. This prints the following (after configuring as shown in example above).

```

--prefix=/opt/xplatproviders
--libdir=/opt/xplatproviders/lib
--confdir=/opt/xplatproviders/conf
--logdir=/opt/xplatproviders/log
--rundir=/opt/xplatproviders/run
--mofdir=/opt/xplatproviders/mof
--mofdir=/opt/xplatproviders/mof
--with-namespace=root/cimv2
--with-cmpi-headers=/usr/include/cmpi

```

Taking to time to examine this file before building is worthwhile.

2.5 Building the distribution

After configuring, type `'make'`. This processes (`GNUmakefile`), builds all components, and prints the following message (if successful).

`XPlatProviders build is complete`

If you do not see this message, the build failed. The most common cause is a missing prerequisite. Please see the 'Prerequisites' section above.

2.6 Installing the distribution

After building XPlatProviders, install it by typing `'make install'`. Components are installed in the locations selected by the `configure` command. To see the options again, type `'make options'`.

3 Provider Registration

This chapter explains how to register the XPlatProviders. This chapter only applies to the OpenPegasus server. For other CIM servers, please see the server documentation.

3.1 Installing the provider

To install, simply copy `libSCXCoreProviderModule.so` to the CIM server's provider directory (installation dependent). For example, you might find that the OpenPegasus provider directory is here:

```
/usr/lib/Pegasus/providers
```

In which case you install as follows.

```
# cd {libdir}/libSCXCoreProviderModule.so /usr/lib/Pegasus/providers
```

3.2 Adding the XPlatProviders CIM classes

Now add the XPlatProviders CIM classes to the OpenPegasus CIM repository. Do this with the OpenPegasus `cimmo` command. First be certain that the OpenPegasus server is running (see OpenPegasus documentation). And then type the following commands.

```
# cimmo -n NAMESPACE {mofdir}/scx.mof
```

NAMESPACE is the CIM namespace the providers are registered for. This must match the namespace selected during configuration (defaults to `root/cimv2` unless changed with `-with-namespace` option). You can check this value by typing `'make options'` in the distribution root directory. If it does not match, you will have to reconfigure and rebuild.

3.3 Registering the providers

Finally register the providers. Be sure that the OpenPegasus server is running (see OpenPegasus documentation). Do this as follows:

```
# cimmo -n root/PG_InterOp {mofdir}/scx_core_r.mof
```

3.4 Verifying the registration

Verify the registration with whatever client tools are available. These tools vary so consult the documentation. If the OpenPegasus `cimcli` is present, try this.

```
# cimcli -n NAMESPACE ni SCX_UnixProcess
```

4 Provider Classes

This chapter discusses the CIM classes and methods implemented by XPlatProviders. See `scx.mof`, located in the MOF installation directory (`--mofdir`) for more details.

4.1 SCX_Agent

There is a single instance of this class. It provides information about the XPlatProviders package and the system it is installed on. The following instance was obtained from a Suse 10.1 system.

```
Name = "scx"
Caption = "SCX Agent meta-information"
Description = "Developer_Build - 20090426"
VersionString = "1.0.4-249"
MajorVersion = 1
MinorVersion = 0
RevisionNumber = 4
BuildNumber = 249
BuildDate = "2009-04-26T00:00:00Z"
Architecture = "x86";
OSName = "SUSE Linux Enterprise Server"
OSType = "Linux"
OSVersion = "10.1"
Hostname = "scxcore-suse01.scx.com"
OSAlias = "SLES"
UnameArchitecture = "i686"
MinActiveLogSeverityThreshold = "INFO"
```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.1.1 Name

This key property uniquely identifies the single instance of this class. The value is always "scx", which stands for "System-Center X-Platform".

4.1.2 Caption

A human readable name for this instance.

4.1.3 Description

The build date of XPlatProviders.

4.1.4 VersionString

The version of XPlatProviders (major, minor, revision, and build number).

4.1.5 MajorVersion

The major version number of the XPlatProviders package.

4.1.6 MinorVersion

The minor version number of the XPlatProviders package.

4.1.7 RevisionNumber

The revision number of the XPlatProviders package.

4.1.8 BuildNumber

The build number of the XPlatProviders package.

4.1.9 BuildDate

The build date of the XPlatProviders package.

4.1.10 Architecture

The system architecture (e.g., x86 or IA64)

4.1.11 OSName

The system's operating system type (e.g., Linux or SunOS)

4.1.12 OSType

The system operating system version (e.g. 10 or 5.10)

4.1.13 OSVersion

The system operating system version (e.g. 10 or 5.10)

4.1.14 KitVersionString

A string representing the complete software version of the installed kit.

4.1.15 Hostname

The hostname of the machine (including domain name if available).

4.1.16 OSAlias

Short name version of the OSName that provides an abbreviated name of OS without formatting.

4.1.17 UnameArchitecture

Output of `uname -m` or `uname -p`.

4.1.18 MinActiveLogSeverityThreshold

Lowest log severity threshold currently in use in the agent, which is one of the following: "HYSTERICAL", "TRACE", "INFO", "WARNING", "ERROR", "SUPPRESS".

4.2 SCX_DiskDrive

Each instance of this class provides information about a disk drive attached to the current system. A typical instance looks like this.

```
EnabledState = 5
RequestedState = 12
EnabledDefault = 2
SystemCreationClassName = "SCX_ComputerSystem"
SystemName = "scxcore-suse01.scx.com"
CreationClassName = "SCX_DiskDrive"
DeviceID = "sda"
MaxMediaSize = 17179869184
Caption = "Disk drive information"
Description = "Information pertaining to a physical unit of secondary storage"
Name = "sda"
IsOnline = TRUE
InterfaceType = "SCSI"
Model = ""
TotalCylinders = 2088
TotalHeads = 255
TotalSectors = 63
```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.2.1 Caption

A human readable caption for this disk.

4.2.2 Description

A textual description of this disk.

4.2.3 Name

A unique key property that uniquely identifies this disk.

4.2.4 IsOnline

True if the disk is online.

4.2.5 InterfaceType

Type of interface (e.g., SCSI, IDE).

4.2.6 Manufacturer

Name of the disk manufacturer if available.

4.2.7 Model

Model of the disk if available.

4.2.8 TotalCylinders

Total number of cylinders on this disk.

4.2.9 TotalHeads

Total number of heads on this disk.

4.2.10 TotalSectors

Total number of sectors on this disk.

4.2.11 TotalTracks

Total number of tracks on this disk.

4.2.12 TracksPerCylinder

The number of tracks per cylinder if available.

4.2.13 RemoveByName()

```
boolean SCX_DiskDrive.RemoveByName(  
    [IN] string Name)
```

Remove the disk with the given `Name` from the list of monitored disks.

4.3 SCX_FileSystem

Each instance of this class provides information about a file system on this computer. Here is an example instance obtained from a Linux system. This instance represents the root file system.

```
EnabledState = 5;  
RequestedState = 12;  
EnabledDefault = 2;  
CSCreationClassName = "SCX_ComputerSystem";  
CSName = "scxc core-suse01.scx.com";  
CreationClassName = "SCX_FileSystem";  
Name = "/";  
Root = "/";  
BlockSize = 4096;  
FileSystemSize = 16376020992;  
AvailableSpace = 6574993408;  
ReadOnly = FALSE;  
EncryptionMethod = "Not Encrypted";  
CompressionMethod = "Not Compressed";  
CaseSensitive = TRUE;  
CasePreserved = TRUE;  
MaxFileNameLength = 255;  
FileSystemType = "reiserfs";  
PersistenceType = 2;  
Caption = "File system information";  
Description = "Information about a logical unit of secondary storage";  
IsOnline = TRUE;
```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.3.1 Caption

A human-readable caption for this instance.

4.3.2 Description

A human-readable description of this instance.

4.3.3 IsOnline

True if this file system is online (mounted).

4.3.4 RemoveByName

```
boolean RemoveByName(
    [IN] string Name)
```

Removes from the list of monitored file systems.

4.4 SCX_LogFile

Each instance of this class provides information about a ‘log’ file, on which `SCX_LogFile.GetMatchedRows()` has been called. It defines a single static method, described below.

4.4.1 GetMatchedRows

```
uint32 GetMatchedRows(
    [IN] string filename,
    [IN] string regexps[],
    [IN] string qid,
    [OUT, ArrayType("Ordered")] string rows[]);
```

Gets rows from the named file that match any of the supplied regular expressions. On the first invocation, it returns all matching lines in the file. On subsequent calls, only lines that appeared since the previous call are returned. After the first call, a CIM instance of `SCX_LogFile` is created. To begin where the previous call left off, you must pass in exactly the same values for the `filename`, `regexps`, and `qid` parameters.

4.5 SCX_UnixProcess

Each instance of this class provides information about a Unix (or Linux) process. The following instance provides information about the Unix `init` process obtained from a Linux system.

```
EnabledState = 5
RequestedState = 12
EnabledDefault = 2
CSCreationClassName = "SCX_ComputerSystem"
CSName = "scxcore-suse01.scx.com"
OSCreationClassName = "SCX_OperatingSystem"
OSName = "SuSE Distribution"
CreationClassName = "SCX_UnixProcess"
Handle = "1"
Name = "init"
Priority = 76
ExecutionState = 6
```

```

CreationDate = "20090416105118.035100-420"
KernelModeTime = 19300
UserModeTime = 2000
ParentProcessID = "0"
RealUserID = 0
ProcessGroupID = 0
ProcessSessionID = 0
ModulePath = "/sbin/init"
Parameters = "init [3]"
ProcessNiceValue = 20
ProcessWaitingForEvent = "_stext"
Caption = "Unix process information"
Description = "A snapshot of a current process"

```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.5.1 Caption

A human-readable caption for this instance.

4.5.2 Description

A human-readable description of this instance.

4.5.3 TopResourceConsumers()

```

string TopResourceConsumers(
    [IN] string resource,
    [IN] uint16 count)

```

Returns a list of processes that are the top `count` consumers of the given `resource`. The `resource` parameter is one of the following.

- "CPUTime"
- "BlockReadsPerSecond"
- "BlockWritesPerSecond"
- "BlockTransfersPerSecond"
- "PercentUserTime"
- "PercentPrivilegedTime"
- "UsedMemory"
- "PercentUsedMemory"
- "PagesReadPerSec"

The returned string is formatted with one process per line (includes the `pid` and process name).

The following call, finds the top 10 consumers of memory.

```

TopResourceConsumers("UsedMemory", 10)

```

4.6 SCX_IPProtocolEndpoint

Each instance of this class provides information about an IP protocol endpoint. The following instance provides information about Ethernet interface `eth1`.

```

ElementName = "eth1"
RequestedState = 12
EnabledDefault = 2
SystemCreationClassName = "SCX_ComputerSystem"
SystemName = "scxcore-suse01.scx.com"
CreationClassName = "SCX_IPProtocolEndpoint"
EnabledState = 2
Name = "eth1";
IPv4Address = "10.195.173.73"
SubnetMask = "255.255.254.0"
ProtocolIFType = 4096
Caption = "IP protocol endpoint information"
Description = "Properties of an IP protocol connection endpoint"
IPv4BroadcastAddress = "10.195.173.255"

```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.6.1 Caption

A human-readable caption for this instance.

4.6.2 Description

A human-readable description of this instance.

4.6.3 IPv4BroadcastAddress

The IPV4 broadcast IP for this ProtocolEndpoint.

4.7 SCX_OperatingSystem

The instance of this class represents the operating system on the current system. The following instance was obtained from a Linux Suse 10.1 system.

```

Caption = "SUSE Linux Enterprise Server 10 (i586)"
Description = "SUSE Linux Enterprise Server 10 (i586)"
EnabledState = 5
RequestedState = 12
EnabledDefault = 2
CSCreationClassName = "SCX_ComputerSystem"
CSName = "scxcore-suse01.scx.com"
CreationClassName = "SCX_OperatingSystem"
Name = "SuSE Distribution"
OSType = 36
OtherTypeDescription = "2.6.16.54-0.2.8-smp #1 SMP Mon Jun 23 13:41:12 UTC 2008"
Version = "2.6.16.54-0.2.8-smp"
LastBootUpTime = "20090416105118.029909-420"

```

```

LocalDateTime = "20090610135832.699909-420"
CurrentTimeZone = -420
NumberOfLicensedUsers = 0
NumberOfUsers = 13
NumberOfProcesses = 114
MaxNumberOfProcesses = 8192
TotalSwapSpaceSize = 778240
TotalVirtualMemorySize = 1292288
FreeVirtualMemory = 1157120
FreePhysicalMemory = 386048
TotalVisibleMemorySize = 514048
SizeStoredInPagingFiles = 778240
FreeSpaceInPagingFiles = 771072
MaxProcessMemorySize = 0
MaxProcessesPerUser = 4096
OperatingSystemCapability = "32 bit"
SystemUpTime = 4763234

```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.7.1 Caption

A human-readable caption for this instance.

4.7.2 Description

A human-readable description of this instance.

4.7.3 OperatingSystemCapability

The capability of this operating system, either '32 bit' or '64 bit'.

4.7.4 SystemUpTime

The elapsed time, in seconds, since the OS was booted. A convenience property, versus having to calculate the time delta from `LastBootUpTime` to `LocalDateTime`.

4.7.5 ExecuteCommand()

```

boolean ExecuteCommand(
    [IN] string Command,
    [OUT] sint32 ReturnCode,
    [OUT] string StdOut,
    [OUT] string StdErr,
    [IN] uint32 timeout)

```

Execute a command, with the option of terminating the command after a timeout specified in seconds. Never times out if `timeout` is zero.

4.7.6 ExecuteShellCommand()

```

boolean ExecuteShellCommand(
    [IN] string Command,

```

```

[OUT] sint32 ReturnCode,
[OUT] string StdOut,
[OUT] string StdErr,
[IN] uint32 timeout)

```

Execute a command in the default shell, with the option of terminating the command after a timeout specified in seconds. Never times out if `timeout` is zero.

4.7.7 ExecuteScript()

```

boolean ExecuteScript(
    [IN] string Script,
    [IN] string Arguments,
    [OUT] sint32 ReturnCode,
    [OUT] string StdOut,
    [OUT] string StdErr,
    [IN] uint32 timeout)

```

Execute a script, with the option of terminating the script after a timeout specified in seconds. Never times out if `timeout` is zero.

4.8 SCX_StatisticalInformation

This is a base class for two other classes defined below. It defines one local property defined below. See the superclass for a description of inherited features.

4.8.1 IsAggregate

True if data is aggregated from several instances.

4.9 SCX_ProcessorStatisticalInformation

Instances of this class capture statistical information about processors on the current system. An instance is defined for each processor and an additional instance is defined that aggregates statistical information about all processors. The following instance was obtained from a dual-processor Linux system and has statistical information about the first processor.

```

IsAggregate = FALSE
Caption = "Processor information"
Description = "CPU usage statistics"
Name = "0"
PercentIdleTime = 0
PercentUserTime = 0
PercentNiceTime = 0
PercentPrivilegedTime = 0
PercentInterruptTime = 0
PercentDPCTime = 0
PercentProcessorTime = 100
PercentIOWaitTime = 0

```

A second instance has the following properties.

```

IsAggregate = FALSE

```

```

Caption = "Processor information"
Description = "CPU usage statistics"
Name = "1"
PercentIdleTime = 0
PercentUserTime = 0
PercentNiceTime = 0
PercentPrivilegedTime = 0
PercentInterruptTime = 0
PercentDPCTime = 0
PercentProcessorTime = 100
PercentIOWaitTime = 0

```

And finally, a third instance aggregates these two instances and is shown below (note that `IsAggregate` is `TRUE`).

```

IsAggregate = TRUE
Caption = "Processor information"
Description = "CPU usage statistics"
Name = "_Total"
PercentIdleTime = 0
PercentUserTime = 0
PercentNiceTime = 0
PercentPrivilegedTime = 0
PercentInterruptTime = 0
PercentDPCTime = 0
PercentProcessorTime = 100
PercentIOWaitTime = 0

```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.9.1 Caption

A human-readable caption for this instance.

4.9.2 Description

A human-readable description of this instance.

4.9.3 Name

This key property uniquely identifies this instance. It holds the processor number.

4.9.4 PercentIdleTime

Percentage of time during the sample interval that the processor was idle.

4.9.5 PercentUserTime

Percentage of non-idle processor time spent in user mode.

4.9.6 PercentNiceTime

Percentage of non-idle processor time spent in user mode.

4.9.7 PercentPrivilegedTime

Percentage of non-idle processor time spent in privileged.

4.9.8 PercentDPCTime

Percentage of time spent receiving and servicing DPC (Deferred Procedure Calls).

4.9.9 PercentProcessorTime

Percentage of time that the processor spent executing a non-idle thread.

4.9.10 PercentIOWaitTime

Percentage of time that the processor spent waiting for IO operations to complete.

4.10 SCX_MemoryStatisticalInformation

A single instance of this class provides memory statistics for the current system. The following instance was obtained from a Linux system.

```
IsAggregate = TRUE
Caption = "Memory information"
Description = "Memory usage and performance statistics"
Name = "Memory"
AvailableMemory = 378
PercentAvailableMemory = 75
UsedMemory = 124
PercentUsedMemory = 25
PagesPerSec = 0
PagesReadPerSec = 0
PagesWrittenPerSec = 0
AvailableSwap = 753
PercentAvailableSwap = 99
UsedSwap = 7
PercentUsedSwap = 1
```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.10.1 Caption

A human-readable caption for this instance.

4.10.2 Description

A human-readable description of instance.

4.10.3 Name

This key property uniquely identifies the memory instance.

4.10.4 AvailableMemory

Available physical memory in megabytes.

4.10.5 UsedMemory

Used physical memory in percent.

4.10.6 PercentUsedMemory

Used physical memory in percent.

4.10.7 PagesPerSec

Pages read or written from/to disk per second to resolve hard page faults.

4.10.8 PagesReadPerSec

Pages read from disk per second to resolve hard page faults.

4.10.9 PagesWrittenPerSec

Pages written to disk per second to resolve hard page faults.

4.10.10 AvailableSwap

Available swap space in megabytes.

4.10.11 PercentAvailableSwap

Available swap space in percent.

4.10.12 UsedSwap

Used swap space in megabytes.

4.10.13 PercentUsedSwap

Used swap space in percent.

4.11 SCX_EthernetPortStatistics

Each instance of this class provides statistical information about an Ethernet port. For example, the following instance provides statistics for the Ethernet interface `eth1`.

```

InstanceID = "eth1"
SampleInterval = "0000000000000000.000000:000"
BytesTransmitted = 1634798148
BytesReceived = 2938050399
PacketsTransmitted = 40129891
PacketsReceived = 72116482
Caption = "Ethernet port information"
Description = "Statistics on transfer performance for a port"
BytesTotal = 4572848547
TotalRxErrors = 147
TotalTxErrors = 0
TotalCollisions = 0

```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.11.1 Caption

A human-readable caption for this instance.

4.11.2 Description

A human-readable description of instance.

4.11.3 BytesTotal

The total number of bytes sent or received through the port.

4.11.4 TotalRxErrors

The aggregated number of receive errors.

4.11.5 TotalTxErrors

The aggregated number of transmit errors.

4.11.6 TotalCollisions

The aggregated number of collisions.

4.12 SCX_DiskDriveStatisticalInformation

Each instance of this class provides statistical information about a disk drive. For example, consider the following instance.

```

IsAggregate = TRUE
Caption = "Disk drive information"
Description = "Performance statistics related to a physical unit of secondary storage"
Name = "_Total"
IsOnline = TRUE
BytesPerSecond = 0
ReadBytesPerSecond = 0
WriteBytesPerSecond = 0
TransfersPerSecond = 0
ReadsPerSecond = 0
WritesPerSecond = 0
AverageReadTime = 0.0000000000000000e+00
AverageWriteTime = 0.0000000000000000e+00
AverageTransferTime = 0.0000000000000000e+00
AverageDiskQueueLength = 0.0000000000000000e+00

```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.12.1 Caption

A human-readable caption for this instance.

4.12.2 Description

A human-readable description of instance.

4.12.3 Name

A key property that uniquely identifies this instance.

4.12.4 IsOnline

True if this disk is online.

4.12.5 PercentBusyTime

Percent of time the disk is busy.

4.12.6 PercentIdleTime

Percent of time the disk is idle.

4.12.7 BytesPerSecond

Total Disk bytes per second.

4.12.8 ReadBytesPerSecond

Bytes read from disk per second.

4.12.9 WriteBytesPerSecond

Bytes written to from disk per second.

4.12.10 TransfersPerSecond

Total I/Os per second.

4.12.11 ReadsPerSecond

Read I/Os per second.

4.12.12 WritePerSecond

Write I/Os per second.

4.12.13 AverageReadTime

Average time, in seconds, of a read of data from the disk.

4.12.14 AverageWriteTime

Average time, in seconds, of a write of data to the disk.

4.12.15 AverageTransferTime

Average time, in seconds, of a disk transfer.

4.12.16 AverageDiskQueueLength

Average number of queued read/write requests.

4.13 SCX_FileSystemStatisticalInformation

Each instance of this class provides statistical information about a file system. The following instance provides statistics for the root file system.

```
IsAggregate = FALSE
Caption = "File system information"
Description = "Performance statistics related to a logical unit of secondary storage"
Name = "/"
IsOnline = TRUE
FreeMegabytes = 6271
UsedMegabytes = 9347
PercentFreeSpace = 40
PercentUsedSpace = 60
PercentBusyTime = NULL
PercentIdleTime = NULL
BytesPerSecond = 1583
ReadBytesPerSecond = 0
WriteBytesPerSecond = 1583
TransfersPerSecond = 0
ReadsPerSecond = 0
WritesPerSecond = 0
AverageTransferTime = NULL
AverageDiskQueueLength = NULL
```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.13.1 Caption

A human-readable caption for this instance.

4.13.2 Description

A human-readable description of instance.

4.13.3 Name

A key property that uniquely identifies this instance.

4.13.4 IsOnline

True if this file system is online (mounted).

4.13.5 FreeMegabytes

Available space in megabytes.

4.13.6 UsedMegabytes

Used space in megabytes.

4.13.7 PercentFreeSpace

Available space in percent.

4.13.8 PercentUsedSpace

Used space in percent.

4.13.9 PercentBusyTime

Percent of time filesystem is busy.

4.13.10 PercentIdleTime

Percent of time filesystem is idle.

4.13.11 BytesPerSecond

Total bytes per second.

4.13.12 ReadBytesPerSecond

Bytes read per second.

4.13.13 WriteBytesPerSecond

Bytes written per second.

4.13.14 TransfersPerSecond

Total I/Os per second.

4.13.15 ReadsPerSecond

Read I/Os per second.

4.13.16 WritesPerSecond

Write I/Os per second.

4.13.17 AverageTransferTime

Average time of transfer in seconds.

4.13.18 AverageDiskQueueLength

Average number of queued read/write requests.

4.14 SCX_UnixProcessStatisticalInformation

Each instance of this class provides statistical information about a Unix process. The following instance provides statistics for the `init` process.

```
CSCreationClassName = "SCX_ComputerSystem"
CSName = "scxcore-suse01.scx.com"
OSCreationClassName = "SCX_OperatingSystem"
OSName = "SuSE Distribution"
Handle = "1"
ProcessCreationClassName = "SCX_UnixProcessStatisticalInformation"
Name = "init"
CPUTime = 0
```

```
VirtualText = 499712
VirtualData = 233472
VirtualSharedMemory = 40
CpuTimeDeadChildren = 3170331
SystemTimeDeadChildren = 1418717
Caption = "Unix process information"
Description = "Performance statistics for an individual Unix process"
PercentUserTime = 0
PercentPrivilegedTime = 0
UsedMemory = 64
PercentUsedMemory = 8
PagesReadPerSec = 0
```

The following subsections describe the local properties and methods of this class. See the superclass for a description of inherited features.

4.14.1 Caption

A human-readable caption for this instance.

4.14.2 Description

A human-readable description of instance.

4.14.3 BlockReadsPerSecond

Block reads per second.

4.14.4 BlockWritesPerSecond

Block writes per second.

4.14.5 BlockTransfersPerSecond

Block transfers per second.

4.14.6 PercentUserTime

Percentage of non-idle processor time spent in user mode.

4.14.7 PercentPrivilegedTime

Percentage of non-idle processor time spent in privileged mode.

4.14.8 UsedMemory

Used physical memory in kilobytes.

4.14.9 PercentUsedMemory

Ratio of Resident Set Size to Virtual Memory for process (essentially percentage of process loaded into memory).

4.14.10 PagesReadPerSec

Pages read from disk per second to resolve hard page faults.

5 Configuration Files

XPlatProviders uses the following two configuration files.

```
{confdir}/scxlog.conf
{confdir}/scxrunas.conf
```

These are discussed in the sections below.

5.1 scxlog.conf

This configuration file controls the provider logging facility. By default, all provider logging is directed to {logdir}/log/scx.log. The default logging threshold is 'WARNING'. The `scxlog.conf` file can redirect logging to multiple files and it may control the logging threshold for those files. For example, consider the following file.

```
FILE (
  PATH: /opt/xplatproviders/log/log1
  MODULE: WARNING
  MODULE: scx.core.providers TRACE
)
FILE (
  PATH: /opt/xplatproviders/log/log2
  MODULE: WARNING
  MODULE: scx.core.common TRACE
)
```

This log has two sections. Each section sends logging output to a specific file. The first section directs log output to `/opt/xplatproviders/log/myfile`. TRACE severity log messages are logged for the logging module called `scx.core.providers`. For the 'root' module (everything else), only WARNING severity log messages are logged. Any section may have multiple module lines.

The logging severities are as follows.

- **ERROR** - The system could not perform the task it was supposed to perform. Contact support.
- **WARNING** - Abnormal behavior that could be handled.
- **INFORMATION** - Information that is useful to someone trying to figure out the general state of the application. Example: Successful initialization.
- **TRACE** - Information that is useful to someone trying to follow general program execution flow.
- **HYSTERICAL** - Information that is useful to someone trying to follow very detailed program execution flow. This level will normally only be used for finding and fixing bugs and in those cases only for small modules.
- **SUPPRESS** - It must be possible to suppress messages using a severity threshold that is higher than any log message can have.

The logging modules are listed here.

```
scx
scx.core
```

```

scx.core.common
scx.core.common.pal
scx.core.common.pal.os
scx.core.common.pal.os.filepath
scx.core.common.pal.os.filestream
scx.core.common.pal.system
scx.core.common.pal.system.common
scx.core.common.pal.system.common.entityenumeration
scx.core.common.pal.system.common.entityinstance
scx.core.common.pal.system.cpu.cpuenumeration
scx.core.common.pal.system.cpu.cpuinstance
scx.core.common.util
scx.core.common.util.math
scx.core.common.util.stringaid
scx.core.providers
scx.core.providers.cpu
scx.core.providerssupport
scx.core.providerssupport.cmpibase

```

These are arranged in a hierarchy, so specifying `scx.core.providers` also affects the following modules (of which `scx.core.providers` is a prefix).

```

scx.core.providers
scx.core.providers.cpu
scx.core.providerssupport
scx.core.providerssupport.cmpibase

```

5.2 scxrunas.conf

This configuration file controls the execution of the following extrinsic methods (described above).

```

SCX_OperatingSystem.ExecuteCommand()
SCX_OperatingSystem.ExecuteShellCommand()
SCX_OperatingSystem.ExecuteScript()

```

The `SCX_OperatingSystem` provider runs in its own agent process. The process owner is the same as the user that initiated the CIM client request. The three methods above spawn a new process to execute the command or script. This configuration file controls three options that affect this new process. The following `scxrunas.conf` file has the default settings (the settings used if the file is empty or missing).

```

AllowRoot=false
ChRootPath=
CWD=/opt/xplatproviders/run

```

The `AllowRoot` option indicates whether the process may execute as root. By default it cannot. The `ChRootPath`, if non-empty, is the path on which a `chroot` system call is performed immediately after creating the process but before executing the command or script. By default `ChRootPath` is empty, indicating that no `chroot` is performed. The `CWD` option is the directory that the process executes in. By default it is the same as the `{rundir}` configured during installation.