



Environmental Instance Provider

provider overview

The Environmental Instance Provider provides information about the cooling and power subsystem.

description

The Environmental Provider is a Web-Based Enterprise Management (WBEM) instance provider. It provides information about cooling devices (Cabinet and IO Fans) and power supplies (AC Lines and Bulk power supplies) on supported PA-RISC systems running HP-UX. It also provides information about the temperature and voltage status of the system.

The Environmental Provider allows any client to query for information about cooling devices and power supplies on a managed system using a management application that is compliant with the CIM 2.7 schema; for example, HP Systems Insight Manager. The Common Information Model (CIM) is an extensible, object-oriented data model that contains information about different parts of an enterprise

The Environmental Provider implements the cooling and power supply related CIM classes, proposed in the DMTF CIM 2.7 revision. In addition to the properties that belong to the standard CIM classes, the Environmental Provider serves information that is specific to HP servers, by implementing HP-specific CIM classes, derived from the standard DMTF classes.

The following Managed Object Format (MOF) classes are handled by the this Provider:

- HP_Fan
- HP_FanModule
- HP_FanLocation
- HP_CoolingRedundancyGroup
- HP_PowerSupply
- HP_PowerSupplyModule
- HP_PowerSupplyLocation
- HP_PowerRedundancyGroup
- HP_CoolingCollection
- HP_PowerCollection
- HP_SystemTemperatureCollection
- HP_SystemVoltageCollection

In addition, the Environmental Provider also implements association classes to associate the instances of the different CIM classes mentioned above. These include:

- HP_RealizesFan
- HP_FanModuleInLocation
- HP_MemberOfCoolingRedundancy
- HP_HostedCoolingCollection
- HP_MemberOfCoolingCollection
- HP_RealizesPowerSupply
- HP_PowerSupplyModuleInLocation
- HP_MemberOfPowerRedundancy
- HP_HostedPowerCollection
- HP_MemberOfPowerCollection

- HP_HostedTemperatureCollection
- HP_HostedVoltageCollection

(Note that HP_SystemTempCollection and HP_SystemVoltageCollection do not have any members of collection associated through subclasses of CIM_MemberOfCollection association class)

The MOF classes mentioned above (i.e. all MOF classes prefixed with “HP_”) are HP-specific extensions to the CIM Schema, and are registered in the “root/cimv2” namespace.

For all the MOF classes mentioned above, the Environmental Provider supports the following standard CIM operations:

- enumerateInstanceNames()
- enumerateInstances()
- getInstance()

The following CIM operations are not supported by the Environmental Provider:

- createInstance()
- deleteInstance()
- modifyInstance()

requirements

HP UX WBEM Services A.02.00.09 or later, OnlineDiag containing EMS version A.04.20 or later and STM version A.49.10 or later should already be installed.

supported managed resources

This provider provides “logical” information about system cooling devices & power supply devices, “physical” attributes of the same modules, and details of the physical locations of these hardware modules.

This provider also supports the consolidated status for cooling & power subsystem as well as system thermal & voltage subsystems.

Note that the Environmental Instance Provider provides only the information about the above resources. It does not provide any management, diagnostic or configuration capabilities for the above resources.

setting up this provider

The installation scripts do all the necessary setup. No special setup is required.

installing this provider

The installation of the bundle SysFaultMgmt will set up this provider.

Ensure HPWBEM services A.02.00.09 or later, OnlineDiag containing EMS version A.04.20 or later and STM version A.49.10 or later is already installed.

Use swinstall to install the product: “swinstall –s *Fully_Qualified_Depot_Name* SysFaultMgmt”

On installation, the shared-library files, executable binaries, configuration files and MOF definition and registration files will be available in the /opt/sfm/ directory, as follows:

- The provider library is libsfmproviders.1. This is available in /opt/sfm/lib/, along with all the other libraries it uses to implement the Environmental Instance provider. A symbolic link is made in /opt/wbem/providers/lib/libsfmproviders.sl to link to the libsfmproviders.1 library in /opt/sfm/lib/.
- The CIM MOF files, containing the definitions of the HP-specific MOF classes, (namely HP_Cooling_Power.mof) will be available in /opt/sfm/schemas/mof. This directory will also include the provider registration file, namely SFMProviderR.mof. Note: All the HP-specific MOF classes will be registered under the “root/cimv2” namespace.
- The /opt/sfm/bin/ directory will contain the binary executable files that are used by the Environmental Instance Provider. This includes the “fmControl” utility that is used for sending notifications to the Environmental Instance Provider (e.g. on updating the configuration file).
- The /opt/sfm/conf/ directory will contain the (XML) configuration files of the System Fault Management (SFM) product.
- The /opt/sfm/msgcat/ directory will contain the catalog files for all the supported locales. (This is

used for the localization of the message strings in Environmental Instance Provider).

- The /opt/sfm/log/ directory will contain log files generated during the execution of the Environmental Instance Provider.

The Environmental Instance Provider supports all the platforms that are supported by SFM. It does not however report instances of the power and cooling subsystems in certain platforms. For the list of those platforms see the SFM Release Notes available at,

- <http://docs.hp.com/en/diag>

Configuring this provider

Environmental Provider uses a common configuration file along with other SFM Providers. So editing the configuration file will affect the other providers as well. The configuration file can be found in – /opt/sfm/conf/FMLoggerConfig.xml

The file specifies the logging threshold severity, and the location of the logfile. The contents of the file are as follows:

```
<SFMConfig>
  <LoggerConfig>
    <Severity> WARNING </Severity>
    <Target> /opt/sfm/log/sfm.log </Target>
  </LoggerConfig>
</SFMConfig>
```

In order to change the logging configuration, the following steps are to be followed:

1. Edit the configuration file /opt/sfm/conf/FMLoggerConfig.xml to change the threshold logging level and/or target.

a) **Threshold:** Possible values are (in increasing severity)

INFORMATIONAL

WARNING

ERROR

CRITICAL

NOTE The INFORMATIONAL logging severity will generate a lot of log messages. It is strongly advised not to use this severity level for a long time, for the generated log-files may use a lot of disk space. The default (and recommended) threshold in the runtime environment is WARNING.

b) **Target:** Possible values include:

(i) STDOUT: All log messages are delivered to console.

(ii) The complete path to the file where the log messages are to be written

NOTE: The current implementation of the logging mechanism assumes that the path to the log file (target specified in the configuration file) already exists. i.e., if the target is specified as "/abc/def/ghi.log", the path "/abc/def/" should already exist, and the root user should have write permissions.

2. Run /opt/sfm/bin/fmControl command to specify the changed configuration file. i.e.

```
$ /opt/sfm/bin/fmControl /opt/sfm/conf/FMLoggerConfig.xml
```

Note that the complete path of the configuration file must be provided to the fmControl command.

schema supported by this provider

The "Description" section explains in brief the different MOF classes supported by the Environmental Instance Provider. The following tables list all the supported properties corresponding to these MOF classes, along with the properties inherited from the standard CIM MOF classes, as per CIM 2.7 schema specifications.

Note:

The Environmental Instance Provider supports all key properties that correspond to the CIM classes.

All non-key properties that are not supported by the Environmental Instance Provider are also listed below with comment "Not Supported".

Table 1: HP_Fan Properties (Logical Information):

Table 1 describes the properties of the HP_Fan CIM class. It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
string Caption	Inherited from CIM_ManagedElement	Caption value can be one of the following, depending on the fan type: Unknown, Other, Cabinet Blower, Compute Cabinet I/O Fans, I/O Expansion Cabinet Utility Chassis Fan, I/O Expansion Cabinet I/O Fan
string Description	Inherited from CIM_ManagedElement	"This is a cooling device with following details: Cabinet Number: x, Fan Number: x, Type of cooling device:Cabinet Blower"
string ElementName	Inherited from CIM_ManagedElement	This value can be one of the following, depending on the fan type: Unknown, Other, Cabinet Blower, Compute Cabinet I/O Fans, I/O Expansion Cabinet Utility Chassis Fan, I/O Expansion Cabinet I/O Fan
String Name	Inherited from CIM_ManagedSystemElement	This value can be one of the following, depending on the fan type: Unknown, Other, Cabinet Blower, Compute Cabinet I/O Fans, I/O Expansion Cabinet Utility Chassis Fan, I/O Expansion Cabinet I/O Fan
datetime InstallDate;	Inherited from CIM_ManagedSystemElement	Not Supported
uint16 OperationalStatus []	Inherited from CIM_ManagedSystemElement	<p>The Value-Map associated with this property (as per the CIM 2.7.2 Schema Specification) is as follows:</p> <p>ValueMap {"0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13", "14", "15", "16", "17"},</p> <p>Values {"Unknown", "Other", "OK", "Degraded", "Stressed", "Predictive Failure", "Error", "Non-Recoverable Error", "Starting", "Stopping", "Stopped", "In Service", "No Contact", "Lost Communication", "Aborted", "Dormant", "Supporting Entity in Error", "Completed"}</p> <p>The first index in the OpStatus Array indicates the overall status of the instance of the fan.</p> <p>If a fan is working, OpStatus[0] will be set to "OK", if a fan is failed, OpStatus[0] will be "Error", for any other values, it will be set to "Unknown".</p>
string StatusDescriptions[]	Inherited from CIM_ManagedSystemElement	In the above mentioned cases, strings will be "Fan Not Working", "Fan OK", "Fan Status Unknown" respectively.
Uint16 EnabledStatus	Inherited from CIM_EnabledLogicalElement	Not Supported
String OtherEnabledStatus	Inherited from CIM_EnabledLogicalElement	Not Supported

Uint16 RequestedStatus	Inherited from CIM_EnabledLogicalElement	Not Supported
Uint16 EnabledDefault	Inherited from CIM_EnabledLogicalElement	Not Supported
string SystemCreationClassName [Key]	Inherited from CIM_LogicalDevice	Fixed string "CIM_ComputerSystem"
string SystemName [Key]	Inherited from CIM_LogicalDevice	The host name of the server.
string CreationClassName [Key]	Inherited from CIM_LogicalDevice	This is set to the name of the instantiated sub-class, i.e. "HP_Fan".
string DeviceID [Key]	Inherited from CIM_LogicalDevice	Device ID will be the unique physical location of the fan in string format. E.g. 0-ff-ff-ff-0-ff-63
Uint16 Availability	Inherited from CIM_LogicalDevice	Not Supported
Uint32 LastErrorCode	Inherited from CIM_LogicalDevice	Not Supported
String ErrorDescription	Inherited from CIM_LogicalDevice	Not Supported
boolean ErrorCleared	Inherited from CIM_LogicalDevice	Not Supported
string OtherIdentifyingInfo[]	Inherited from CIM_LogicalDevice	Not Supported
Uint64 PowerOnHours	Inherited from CIM_LogicalDevice	Not Supported
Uint64 TotalPowerOnHours	Inherited from CIM_LogicalDevice	Not Supported
string IdentifyingDescriptions[]	Inherited from CIM_LogicalDevice	Not Supported
Uint16 AdditionalAvailability[]	Inherited from CIM_LogicalDevice	Not Supported
Uint64 MaxQuiesceTime	Inherited from CIM_LogicalDevice	Not Supported
Boolean activeCooling	Inherited from CIM_CoolingDevice	This flag indicates that the Cooling Device provides active (as opposed to passive) cooling. This value is set to "true".
Boolean VariableSpeed	Inherited from CIM_CoolingDevice	Not Supported.
Uint64 DesiredSpeed	Inherited from CIM_CoolingDevice	Not Supported.
Uint8 type	HP_Fan	It represents the type of this fan instance. The valuemap is as follows: ValueMap {"0", "1", "2", "3", "4", "5", "6"}, Values {"Unknown", "Other", "Cabinet Blower", "Compute Cabinet I/O Fans", "I/O Expansion Cabinet Utility Chassis Fan", "I/O Expansion Cabinet I/O Fan", "Processor Fan", "Cell Fan"}]

Table 2: HP_FanModule properties

Table 2 describes the properties of the HP_FanModule class. It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
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string Caption	Inherited from CIM_ManagedElement.	Caption value can be one of the following, depending on the fan type: Unknown, Other, Cabinet Blower, Compute Cabinet I/O Fans, I/O Expansion Cabinet Utility Chassis Fan, I/O Expansion Cabinet I/O Fan
string Description	Inherited from CIM_ManagedElement.	"This is a cooling device with following details: Cabinet Number: x, Fan Number: x, Type of cooling device:Cabinet Blower"
string ElementName	Inherited from CIM_ManagedElement	This value can be one of the following, depending on the fan type: Unknown, Other, Cabinet Blower, Compute Cabinet I/O Fans, I/O Expansion Cabinet Utility Chassis Fan, I/O Expansion Cabinet I/O Fan
String Name	Inherited from CIM_ManagedSystemElement	This value can be one of the following, depending on the fan type: Unknown, Other, Cabinet Blower, Compute Cabinet I/O Fans, I/O Expansion Cabinet Utility Chassis Fan, I/O Expansion Cabinet I/O Fan
datetime InstallDate;	Inherited from CIM_ManagedSystemElement	Not Supported
Uint16 OperationalStatus	Inherited from CIM_ManagedSystemElement.	<p>The Value-Map associated with this property (as per the CIM 2.7.2 Schema Specification) is as follows:</p> <p>ValueMap {"0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13", "14", "15", "16", "17"},</p> <p>Values {"Unknown", "Other", "OK", "Degraded", "Stressed", "Predictive Failure", "Error", "Non-Recoverable Error", "Starting", "Stopping", "Stopped", "In Service", "No Contact", "Lost Communication", "Aborted", "Dormant", "Supporting Entity in Error", "Completed"}</p> <p>The first index in the OpStatus Array indicates the overall status of the instance of the fan.</p> <p>If a fan is working, OpStatus[0] will be set to "OK", if a fan is failed, OpStatus[0] will be "Error", for any other values, it will be set to "Unknown".</p>
string StatusDescriptions[]	Inherited from CIM_ManagedSystemElement	In the above mentioned cases, strings will be "Cooling Device is OK", "Cooling Device is not working", "Cooling device is in Unknown state" respectively.
String Tag [Key]	Inherited from CIM_PhysicalElement	This string will be set to a unique value, indicating the physical location of the fan in string format. E.g. 0-ff-ff-ff-0-ff-63
String CreationClassName [Key]	Inherited from CIM_PhysicalElement	The name of the subclass being instantiated, i.e. "HP_FanModule".
String ElementName	Inherited from CIM_PhysicalElement	value can be one of the following, depending on the fan type: Unknown, Other, Cabinet Blower, Compute Cabinet I/O Fans, I/O Expansion Cabinet Utility Chassis Fan, I/O Expansion Cabinet I/O Fan
String Manufacturer	Inherited from CIM_PhysicalElement	This will be set to "Hewlett-Packard"
String Model	Inherited from CIM_PhysicalElement	Not Supported
String SKU	Inherited from CIM_PhysicalElement	Not Supported
String SerialNumber	Inherited from CIM_PhysicalElement	Not Supported

String Version	Inherited from CIM_PhysicalElement	Not Supported
String PartNumber	Inherited from CIM_PhysicalElement	Not Supported
String OtherIdentifyingInfo	Inherited from CIM_PhysicalElement	Not Supported
boolean PoweredOn	Inherited from CIM_PhysicalElement	Not Supported
datetime ManufactureDate	Inherited from CIM_PhysicalElement	Not Supported
string VendorEquipmentType	Inherited from CIM_PhysicalElement	Not Supported
string UserTracking	Inherited from CIM_PhysicalElement	Not Supported
boolean CanBeFRUed	Inherited from CIM_PhysicalElement	Not Supported
Boolean Removable	Inherited from CIM_PhysicalComponent	Not Supported
Boolean Replacable	Inherited from CIM_PhysicalComponent	Not Supported
Boolean HotSwappable	Inherited from CIM_PhysicalComponent	Not Supported

Table 3: HP_PoweSupply Properties (Logical Information):

Table 3 describes the properties of the HP_PowerSupply CIM class. It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
String Caption	Inherited from CIM_ManagedElement	Caption value can be one of the following, depending on the device type: Compute Cabinet Bulk Power Supply, Compute Cabinet Backplane Power Supply, Compute Cabinet I/O Chassis Enclosure Power Supply, Compute Cabinet AC Input Line, I/O Expansion Cabinet Bulk Power Supply, I/O Expansion Cabinet Backplane Power Supply, I/O Expansion Cabinet I/O Chassis Enclosure Power Supply, I/O Expansion Cabinet AC Input Line, Cooling Device Slot, Power Device Slot
string Description	Inherited from CIM_ManagedElement	"This is a power supply device with following details: Cabinet Number: 0, Power Module Number: 0, Type of power supply device: Compute Cabinet Bulk Power Supply"
string ElementName	Inherited from CIM_ManagedElement	This value can be one of the following, depending on the device type: Compute Cabinet Bulk Power Supply, Compute Cabinet Backplane Power Supply, Compute Cabinet I/O Chassis Enclosure Power Supply, Compute Cabinet AC Input Line, I/O Expansion Cabinet Bulk Power Supply, I/O Expansion Cabinet Backplane Power Supply, I/O Expansion Cabinet I/O Chassis Enclosure Power Supply, I/O Expansion Cabinet AC Input Line, Cooling Device Slot, Power Device Slot
String Name	Inherited from CIM_ManagedSystemElement	This value can be one of the following, depending on the device type: Compute Cabinet Bulk Power Supply, Compute Cabinet Backplane Power Supply, Compute Cabinet I/O Chassis Enclosure Power Supply, Compute Cabinet AC Input Line, I/O Expansion Cabinet Bulk

		Power Supply, I/O Expansion Cabinet Backplane Power Supply, I/O Expansion Cabinet I/O Chassis Enclosure Power Supply, I/O Expansion Cabinet AC Input Line, Cooling Device Slot, Power Device Slot
datetime InstallDate;	Inherited from CIM_ManagedSystemElement	Not Supported
uint16 OperationalStatus []	Inherited from CIM_ManagedSystemElement	The Value-Map associated with this property (as per the CIM 2.7.2 Schema Specification) is as follows: ValueMap {"0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13", "14", "15", "16", "17"}, Values {"Unknown", "Other", "OK", "Degraded", "Stressed", "Predictive Failure", "Error", "Non-Recoverable Error", "Starting", "Stopping", "Stopped", "In Service", "No Contact", "Lost Communication", "Aborted", "Dormant", "Supporting Entity in Error", "Completed"} The first index in the OpStatus Array indicates the overall status of the instance of the power supply device. If a power module is working, OpStatus[0] will be set to "OK", if it is failed, OpStatus[0] will be "Error", for any other values, it will be set to "Unknown".
string StatusDescriptions[]	Inherited from CIM_ManagedSystemElement	In the above mentioned cases, strings will be "Power Supply is not working ", "Power Supply is OK", "Power Supply is in unknown state" respectively.
Uint16 EnabledStatus	Inherited from CIM_EnabledLogicalElement	Not Supported
String OtherEnabledStatus	Inherited from CIM_EnabledLogicalElement	Not Supported
Uint16 RequestedStatus	Inherited from CIM_EnabledLogicalElement	Not Supported
Uint16 EnabledDefault	Inherited from CIM_EnabledLogicalElement	Not Supported
string SystemCreationClassName [Key]	Inherited from CIM_LogicalDevice	Fixed string "CIM_ComputerSystem"
string SystemName [Key]	Inherited from CIM_LogicalDevice	The host name of the server.
string CreationClassName [Key]	Inherited from CIM_LogicalDevice	This is set to the name of the instantiated sub-class, i.e. "HP_PowerSupply".
string DeviceID [Key]	Inherited from CIM_LogicalDevice	Device ID will be the unique physical location of the power supply in string format. E.g. 0-ff-ff-ff-0-ff-44
String[] OtherIdentifyingInfo	Inherited from CIM_LogicalDevice	First element in this array will specify the grid to which this power supply is attached, if the power supply type is A/C Line. Note: If the type is not A/C Line, these do not need to be populated.
Uint16 Availability	Inherited from CIM_LogicalDevice	Not Supported
Uint32 LastErrorCode	Inherited from CIM_LogicalDevice	Not Supported

String ErrorDescription	Inherited from CIM_LogicalDevice	Not Supported
boolean ErrorCleared	Inherited from CIM_LogicalDevice	Not Supported
string OtherIdentifyingInfo[]	Inherited from CIM_LogicalDevice	Not Supported
UInt64 PowerOnHours	Inherited from CIM_LogicalDevice	Not Supported
UInt64 TotalPowerOnHours	Inherited from CIM_LogicalDevice	Not Supported
string IdentifyingDescriptions[]	Inherited from CIM_LogicalDevice	Not Supported
UInt16 AdditionalAvailability[]	Inherited from CIM_LogicalDevice	Not Supported
UInt64 MaxQuiesceTime	Inherited from CIM_LogicalDevice	Not Supported
Boolean isSwitchingSupply	Inherited from CIM_PowerSupply	Not Supported
UInt32 Range1InputVoltageLow	Inherited from CIM_PowerSupply	Not Supported
UInt32 Range1InputVoltageHigh	Inherited from CIM_PowerSupply	Not Supported
UInt32 Range1InputFrequencyLow	Inherited from CIM_PowerSupply	Not Supported
UInt32 Range1InputFrequencyHigh	Inherited from CIM_PowerSupply	Not Supported
UInt32 Range2InputVoltageLow	Inherited from CIM_PowerSupply	Not Supported
UInt32 Range2InputVoltageHigh	Inherited from CIM_PowerSupply	Not Supported
UInt32 Range2InputFrequencyLow	Inherited from CIM_PowerSupply	Not Supported
UInt32 Range2InputFrequencyHigh	Inherited from CIM_PowerSupply	Not Supported
UInt16 ActiveInputVoltage	Inherited from CIM_PowerSupply	Not Supported
UInt16 TypeOfRangeSwitching	Inherited from CIM_PowerSupply	Not Supported
UInt32 TotalOutputPower	Inherited from CIM_PowerSupply	Not Supported
UInt8 type	HP_PowerSupply	Type of this instance of PowerSupply. ValueMap {"0", "1", "2", "3", "4", "5", "6", "7", "8", "9"}, Values {"Unknown", "Other", "Compute Cabinet Bulk Power Supply", "Compute Cabinet System Backplane Power Supply", "Compute Cabinet I/O chassis enclosure Power Supply", "Compute Cabinet AC Input Line", "I/O Expansion Cabinet Bulk Power Supply", "I/O Expansion Cabinet System Backplane Power Supply", "I/O Expansion Cabinet I/O chassis enclosure Power Supply", "I/O Expansion Cabinet AC Input Line"}}

Table 4: HP_PowerModule properties

Table 4 describes the properties of the HP_PowerSupplyModule class. It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
String Caption	Inherited from CIM_ManagedElement.	Caption value can be one of the following, depending on the device type: Compute Cabinet Bulk Power Supply, Compute Cabinet Backplane Power Supply, Compute Cabinet I/O Chassis Enclosure Power Supply, Compute Cabinet AC Input Line, I/O Expansion Cabinet Bulk Power Supply, I/O Expansion Cabinet Backplane Power Supply, I/O Expansion Cabinet I/O Chassis Enclosure Power Supply, I/O Expansion Cabinet AC Input Line, Cooling Device Slot, Power Device Slot
String Description	Inherited from CIM_ManagedElement.	"This is a power supply device with following details: Cabinet Number: 0, Power Module Number: 0, Type of power supply device: Compute Cabinet Bulk Power Supply"
String ElementName	Inherited from CIM_ManagedElement	Caption value can be one of the following, depending on the device type: Compute Cabinet Bulk Power Supply, Compute Cabinet Backplane Power Supply, Compute Cabinet I/O Chassis Enclosure Power Supply, Compute Cabinet AC Input Line, I/O Expansion Cabinet Bulk Power Supply, I/O Expansion Cabinet Backplane Power Supply, I/O Expansion Cabinet I/O Chassis Enclosure Power Supply, I/O Expansion Cabinet AC Input Line, Cooling Device Slot, Power Device Slot
String Name	Inherited from CIM_ManagedSystemElement	Caption value can be one of the following, depending on the device type: Compute Cabinet Bulk Power Supply, Compute Cabinet Backplane Power Supply, Compute Cabinet I/O Chassis Enclosure Power Supply, Compute Cabinet AC Input Line, I/O Expansion Cabinet Bulk Power Supply, I/O Expansion Cabinet Backplane Power Supply, I/O Expansion Cabinet I/O Chassis Enclosure Power Supply, I/O Expansion Cabinet AC Input Line, Cooling Device Slot, Power Device Slot
datetime InstallDate;	Inherited from CIM_ManagedSystemElement	Not Supported
Uint16 OperationalStatus	Inherited from CIM_ManagedSystemElement.	<p>The Value-Map associated with this property (as per the CIM 2.7.2 Schema Specification) is as follows:</p> <p>ValueMap {"0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13", "14", "15", "16", "17"},</p> <p>Values {"Unknown", "Other", "OK", "Degraded", "Stressed", "Predictive Failure", "Error", "Non-Recoverable Error", "Starting", "Stopping", "Stopped", "In Service", "No Contact", "Lost Communication", "Aborted", "Dormant", "Supporting Entity in Error", "Completed"}</p> <p>The first index in the OpStatus Array indicates the overall status of the instance of the power supply device.</p> <p>If a power module is working, OpStatus[0] will be set to "OK", if it is failed, OpStatus[0] will be "Error", for any other values, it will be set to "Unknown".</p>
String StatusDescriptions[]	Inherited from CIM_ManagedSystemElement	In the above mentioned cases, strings will be "Power Supply Not Working", "Power Supply OK", "Power Supply Status Unknown" respectively.
String Tag [Key]	Inherited from CIM_PhysicalElement	This string will be set to a unique value, indicating the Physical Location of the physical Power Supply Module.

		E.g. 0-ff-ff-ff-ff-0-ff-44
String CreationClassName [Key]	Inherited from CIM_PhysicalElement	The name of the subclass being instantiated, i.e. "HP_PowerModule".
String ElementName	Inherited from CIM_PhysicalElement	Caption value can be one of the following, depending on the device type: Compute Cabinet Bulk Power Supply, Compute Cabinet Backplane Power Supply, Compute Cabinet I/O Chassis Enclosure Power Supply, Compute Cabinet AC Input Line, I/O Expansion Cabinet Bulk Power Supply, I/O Expansion Cabinet Backplane Power Supply, I/O Expansion Cabinet I/O Chassis Enclosure Power Supply, I/O Expansion Cabinet AC Input Line, Cooling Device Slot, Power Device Slot
String Manufacturer	Inherited from CIM_PhysicalElement	This will be set to "Hewlett-Packard"
String Model	Inherited from CIM_PhysicalElement	The model of the power supply device.
String SKU	Inherited from CIM_PhysicalElement	Not Supported
String SerialNumber	Inherited from CIM_PhysicalElement	This is populated with SerialNumber of the device.
String Version	Inherited from CIM_PhysicalElement	Not Supported
String PartNumber	Inherited from CIM_PhysicalElement	This is populated with PartNumber of the device.
String[] OtherIdentifyingInfo	Inherited from CIM_PhysicalElement	First element in this array will specify the grid to which this power supply is attached, if the power supply type is A/C Line. Note: If the type is not A/C Line, these do not need to be populated.
boolean PoweredOn	Inherited from CIM_PhysicalElement	Not Supported
Datetime ManufactureDate	Inherited from CIM_PhysicalElement	This contains the date of manufacturing.
string VendorEquipmentType	Inherited from CIM_PhysicalElement	Not Supported
string UserTracking	Inherited from CIM_PhysicalElement	Not Supported
boolean CanBeFRUed	Inherited from CIM_PhysicalElement	Not Supported
Boolean Removable	Inherited from CIM_PhysicalComponent	Not Supported
Boolean Replacable	Inherited from CIM_PhysicalComponent	Not Supported
Boolean HotSwappable	Inherited from CIM_PhysicalComponent	Not Supported

table 5: HP_FanLocation & HP_PowerLocation properties

Table 5 describes the properties of the HP_FanLocation & HP_PowerLocation It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
string Caption	Inherited from CIM_ManagedElement.	This value is returned as "Cooling Device Slot". Or "Power Device Slot"
string Description	Inherited from CIM_ManagedElement.	This value will be something like: "This is a cooling

		device with following details: Cabinet Number: 0, Fan Number: 0, Type of cooling device:Cabinet Blower:".
string ElementName	Inherited from CIM_ManagedElement	This value is returned as "Cooling Device Slot". Or "Power Device Slot"
String Name [Key]	Inherited from CIM_Location	The location is returned as a string, of the form "CabinetNumber = <Cabinet#> : SlotNumber = <Slot#> : "
String PhysicalPosition [Key]	Inherited from CIM_Location	A string indicating (uniquely) the position of the Fan Or PowerModule. E.g. 0-ff-ff-ff-0-ff-63
String[] PhysicalLocationLevels	Inherited from HP_PhysicalLocationInComplex	ValueMap { "0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13"}, Values { "Cabinet", "Cardcage", "Backplane", "Cell Slot", "Processor Module", "CPU Slot", "Reserved", "Source", "Detail", "DIMM Slot", "Impl. Dep", "Slot", "Extender", "Instance"}, It will be set as 0 11 for cabinet and Slot.
Uint8[] PhysicalLocationValues	Inherited from HP_PhysicalLocationInComplex	This will have the array of values for Cabinet & Slot number. E.g. 0 1
String CreationClassName	Inherited from HP_PhysicalLocationInComplex	"HP_FanLocation" Or "HP_PowerSupplyLocation"

table 6: HP_CoolingRedundancyGroup & HP_PowerRedundancyGroup properties

Table 6 describes the properties of the HP_CoolingRedundancyGroup & HP_PowerRedundancyGroup. It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
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Caption	Inherited from CIM_ManagedElement	"HP_CoolingRedundancyGroup" or "HP_PowerRedundancyGroup"
Description	Inherited from CIM_ManagedElement	This is a cooling (or power) redundancy group with following details: Cabinet Number: 0, Type of cooling subsystem:: Cabinet Blower (or power device type)
ElementName	Inherited from CIM_ManagedElement	This is a cooling redundancy group of type:Cabinet Blower
String Name (Key)	Inherited from CIM_RedundancyGroup	Hewlett-Packard:diags.sfm:<CreationClassName>:<LocalID>
String CreationClassName(Key)	Inherited from CIM_RedundancyGroup	"HP_CoolingRedundancyGroup" or "HP_PowerRedundancyGroup"
Uint16 RedundancyStatus	Inherited from CIM_RedundancyGroup	ValueMap { "0", "1", "2", "3", "4" }, Values { "Unknown", "Other", "Fully Redundant", "Degraded Redundancy", "Redundancy Lost" } Depending on the number of cooling or power devices failed, subsystem may be still functioning with full redundancy, or degraded redundancy. This redundancy state of the subsystem is reflected in this property.

table 7: HP_CoolingCollection , HP_PowerCollection, HP_SystemTemperatureCollection & HP_SystemVoltageCollection properties

Table 7 describes the properties of the HP_CoolingCollection, HP_PowerCollection, HP_SystemTemperatureCollection & HP_SystemVoltageCollection. It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
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String InstanceID (Key)	Inherited from CIM_SystemSpecificCollection	Hewlett-Packard:diags.sfm:<CreationClassName>:<LocalID> CreationClassName reflects the collection class name. LocalID is always 0, as we are creating only 1 instance of collection class.
String Caption	Inherited from HP_GroupSystemSpecificCollection	"HP_CoolingCollection" or "HP_PowerCollection" or HP_SystemTemperatureCollection or HP_SystemVoltageCollection
Uint16[] GroupOperationalStatus	Inherited from HP_GroupSystemSpecificCollection	<p>ValueMap {"0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13", "14", "15", "16", "17"},</p> <p>Values {"Unknown", "Other", "OK", "Degraded", "Stressed", "Predictive Failure", "Error", "Non-Recoverable Error", "Starting", "Stopping", "Stopped", "In Service", "No Contact", "Lost Communication", "Aborted", "Dormant", "Supporting Entity in Error", "Completed"},</p> <p>This property reflects the overall status of the subsystem. Any device failure is reflected in the overall status. CoolingCollection class represents only system cooling devices, so it considers only fan types of Cabinet Blower, Compute Cabinet I/O Fans, I/O Expansion Cabinet Utility Chassis Fan, I/O Expansion Cabinet I/O Fan and not any other instances of HP_Fan with other types, like ProcessorFan. Same holds true for PowerCollection. GroupOperationalStatus considers only the PowerSupply types mentioned in this document.</p> <p>Since cooling & power subsystems have redundancy, GroupOperationalStatus considers RedundancyStatus as well as individual device status in consideration. If any device is in 'not-OK' state, and system is not fully redundant, overall status will be reflected as 'not-OK'.</p> <p>E.g. Say, a cabinet needs 4 fans to be fully redundant and it has 5 to start with. Even if one fan fails, system is fully redundant. Thus, GroupOperationalStatus will be set to OK. If one more fan fails, system is no longer fully redundant. RedundancyStatus is set to redundancy degraded, and GroupOperationalStatus is set to Degraded.</p> <p>If RedundancyStatus is RedundancyLost and some fans are not working, GroupOperationalStatus is set to 'Stressed'.</p> <p>However, if all (installed) fans are working fine and system is not Fully Redundant, the GroupOperationalStatus is still set to 'OK', as we assume that all fans were not intended to be installed.</p> <p>Same algorithm is used for GroupOperationalStatus for PowerCollection as well.</p>
String[] GroupStatusDescriptions	Inherited from HP_GroupSystemSpecificCollection	<p>It can be one of the following</p> <p>"All member devices are OK."</p> <p>"At least one member device is degraded."</p> <p>"At least one member device is Stressed."</p> <p>"At least one member device has Unknown Status."</p>

table 8: HP_RealizesFan properties

Table 8 describes the properties of the HP_RealizesFan association class (associating HP_FanModule and HP_Fan). It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
HP_FanModule ref Antecedent	Property of HP_RealizesFan	Object path of the HP_FanModule Instance.
HP_Fan ref Dependent	Property of HP_RealizesFan	Object path of the HP_Fan Instance.

table 9: HP_RealizesPowerSupply properties

Table 9 describes the properties of the HP_RealizesPowerSupply association class (associating HP_PowerSupplyModule and HP_PowerSupply). It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
HP_PowerSupplyModule ref Antecedent	Property of HP_RealizesPowerSupply	Object path of the HP_PowerSupplyModule Instance.
HP_PowerSupply ref Dependent	Property of HP_RealizesPowerSupply	Object path of the HP_PowerSupply Instance.

table 10: HP_FanModuleInLocation properties

Table 10 describes the properties of the HP_FanModuleInLocation association class (associating HP_FanModule and HP_FanLocation). It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
HP_FanModule ref Element	Property of HP_PhysicalElementLocationInComplex	Object path of the HP_FanModule Instance.
HP_FanLocation ref PhysicalLocation	Property of HP_PhysicalElementLocationInComplex	Object path of the HP_FanLocation Instance.

table 11: HP_PowerSupplyModuleInLocation properties

Table 10 describes the properties of the HP_PowerSupplyModuleInLocation association class (associating HP_PowerSupplyModule and HP_PowerSupplyLocation). It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
HP_PowerSupplyModule ref Element	Property of HP_PhysicalElementLocationInComplex	Object path of the HP_PowerSupplyModule Instance.
HP_PowerSupplyLocation ref PhysicalLocation	Property of HP_PhysicalElementLocationInComplex	Object path of the HP_PowerSupplyLocation Instance.

table 12: HP_MemberOfCoolingRedundancy properties

Table 12 describes the properties of the HP_MemberOfCoolingRedundancy association class (associating HP_CoolingRedundancyGroup and HP_Fan). It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
HP_CoolingRedundancyGroup ref GroupComponent	Property of CIM_RedundancyComponent	Object path of the HP_CoolingRedundancyGroup Instance.
HP_Fan ref PartComponent	Property of CIM_RedundancyComponent	Object path of the HP_Fan Instance.

table 13: HP_MemberOfPowerRedundancy properties

Table 13 describes the properties of the HP_MemberOfPowerRedundancy association class (associating HP_PowerRedundancyGroup and HP_PowerSupply). It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
HP_PowerRedundancyGroup ref GroupComponent	Property of CIM_RedundancyComponent	Object path of the HP_PowerRedundancyGroup Instance.
HP_PowerSupply ref PartComponent	Property of CIM_RedundancyComponent	Object path of the HP_PowerSupply Instance.

table 14: HP_HostedCoolingCollection , HP_HostedPowerCollection, HP_HostedVoltageCollection, HP_HostedTemperatureCollection properties

Table 14 describes the properties of the HP_HostedCoolingCollection, HP_HostedPowerCollection , HP_HostedVoltageCollection, HP_HostedTemperatureCollection association class (associating CIM_ComputerSystem and HP_GroupSystemSpecificCollection). It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
CIM_ComputerSystem ref Antecedent	Property of HP_GroupHostedCollection	Object path of the CIM_ComputerSystem
HP_GroupSystemSpecificCollection ref Dependent	Property of HP_GroupHostedCollection	Object path of the HP_CoolingCollection , HP_PowerCollection , HP_HostedVoltageCollection OR HP_HostedTemperatureCollection Instance.

table 15: HP_MemberOfCoolingCollection & HP_MemberOfPowerCollection properties

Table 15 describes the properties of the HP_MemberOfCoolingCollection & HP_MemberOfPowerCollection association class (associating HP_CoolongCollection & HP_Fan and HP_PowerCollection & HP_PowerSupply respectively). It has three columns. The first is the property name (including type and units), the second is the property inheritance (indicating which class or superclass defines the property), and the third is the property's value and data source. Each row describes a property.

Property name	Property inheritance	Property value (and data source)
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HP_CoolingCollection or HP_PowerCollection ref Collection	Property of CIM_MemberOfCollection	Object path of the HP_CoolingCollection or HP_PowerCollection Instance.
HP_Fan or HP_PowerSupply ref Member	Property of CIM_MemberOfCollection	Object path of the HP_Fan or HP_PowerSupply Instance.

table 16: intrinsic methods for all the CIM classes supported by Environmental Instance Provider

Table 16 describes the intrinsic methods supported by this provider. It has three columns. The first is the method name, the second is a description of the provider's actions based on invoking that method, and the third is a list of any exceptions that could result from invoking the method. Each row describes a method.

Method name	Description	Exceptions thrown
enumerateInstances	Returns all instances of class with values of supported properties. (See tables above.)	CIMOperationFailedException
enumerateInstanceNames	Returns object path of all instances of class.	CIMOperationFailedException
getInstance	Returns an instance that matches the keys with values of supported properties. (See tables above.)	CIMOperationFailedException & CIMObjectNotFoundException
modifyInstance	This operation is not supported by the Environmental Instance Provider. This is indicated to the client, via exceptions.	CIMNotSupportedException
deleteInstance	This operation is not supported by the Environmental Instance Provider. This is indicated to the client, via exceptions.	CIMNotSupportedException
createInstance	This operation is not supported by the Environmental Instance Provider. This is indicated to the client, via exceptions.	CIMNotSupportedException

indications generated by this provider This Provider does not currently generate any indications.

For more information

- WBEM information
For a CIM tutorial, go <http://www.wbemsolutions.com/tutorials/CIM/>
- For more information on SFM, see System Fault Management Administrator's Guide at <http://docs.hp.com/en/diag>

For additional information on HP products and services, visit us at <http://www.hp.com>.

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