



## Temperature Sensor Instance Provider

### Provider Overview

#### Description

The Temperature Sensor Provider is a Web-Based Enterprise Management (WBEM) instance provider. On HP 9000 and HP Integrity® systems running a supported version of HP-UX, the Temperature Sensor Provider retrieves information related to the ambient temperature in the system.

HP SMH or HP SIM uses the Temperature Sensor Provider, compliant with the CIM 2.7 Schema, to query for information about the managed system's temperature sensors.

It implements the sensor related CIM classes, proposed in the DMTF CIM 2.7 revision. In addition to the properties that belong to the standard CIM classes, the Temperature Sensor Instance Provider retrieve information that is specific to HP servers, by implementing HP-specific CIM classes, derived from the standard DMTF classes.

The following MOF class is handled by this Provider:

- HP\_NumericSensor

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

- HP\_SystemSensor
- HP\_MemberOfSystemTemperatureCollection

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 Temperature Sensor Provider supports the following standard CIM Operations:

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

The following CIM operations are not supported by the Temperature Sensor Provider:

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

The Temperature Sensor Provider is not a CIM Method Provider, and does not support extrinsic method invocation on instances on any of the MOF classes mentioned above. The invocation of any of these methods will result in a CIM\_ERR\_NOT\_SUPPORTED exception.

#### Requirements

For the list of software requirements for using the Temperature Sensor Provider, see the SFM Release Notes at: <http://docs.hp.com/en/diag>.

#### Release history

This provider will be available in the March 2008 release of SysFaultMgmt.

#### Supported managed resources

This provider provides logical information about ambient temperature sensors, and attributes for the same including details like the current temperature.

Please note that the Temperature Sensor 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

### Installing this Provider

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

Use swinstall to install the product: "swinstall -s Fully\_Qualified\_Depot\_Name SysFaultMgmt"

(Detailed instructions for installation of the System Fault Management product are available in the System Fault Management Administrator's Guide, available at <http://docs.hp.com/en/diaq>.)

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 Temperature Sensor 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\_NumericSensor.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 /var/opt/sfm/conf/ directory will contain the (XML) configuration files of the SFM product.
- The /opt/sfm/msgcat/C directory will contain the catalog files for all the supported locales. (This is used for the localization of the message strings in the Temperature Sensor Provider.
- The /var/opt/sfm/log/ directory will contain log files generated during the execution of the Temperature Sensor Provider.

### Configuring this Provider

Temperature Sensor Instance 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 - /var/opt/sfm/conf/FMLoggerConfig.xml

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

```
<SFMConfig>
  <LoggerConfig>
    <Severity> WARNING </Severity>
    <Target> /var/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 /var/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  
MILESTONE  
STOPLOGGING

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 should be writeable by root user.

2. Run /opt/sfm/bin/sfmconfig program to specify the changed configuration file. i.e.

\$ /opt/sfm/bin/sfmconfig /var/opt/sfm/conf/FMLoggerConfig.xml

Note that the complete path of the configuration file must be provided to the smconfig program.

## Using this Provider

### Schema supported by this Provider

The "Description" section explains in brief the different MOF classes supported by the Temperature Sensor 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:

1. All key properties corresponding to the CIM classes are supported by the Temperature Sensor Provider .
2. All non-key properties that are not supported by the Temperature Sensor Provider are not listed below

Table 1: HP_NumericSensor Properties (Logical Information):		
Table 1 describes the properties of the HP_NumericSensor 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
String Caption	Inherited from CIM_ManagedElement	"Temperature Sensor n" where n represents the number of the temperature sensor instance(The Sensor Number).
String Description	Inherited from CIM_ManagedElement	"Temperature Sensor n detects for NumericSensorType. StatusDescription." where n represents the number of the temperature sensor instance, NumericSensorType represents the value of NumericSensorType and StatusDescription represents the value of StatusDescriptions[0].
String ElementName	Inherited from CIM_ManagedElement	"Temperature Sensor n" where n represents the Sensor Number
uint16 OperationalStatus[];	Inherited from CIM_ManagedSystemElement	2 (OK) – if temperature reported by the sensor is within normal operating range; 2 (OK) – if temperature reported by the sensor has exceeded its non-critical threshold and has set fans to full speed; 6 (Error) – if temperature reported by the sensor has exceeded its threshold and the system is gracefully shutting down
uint16 StatusDescriptions[0]	Inherited from CIM_ManagedSystemElement	"Temperature reported by the sensor is within normal operating range" – if temperature reported by the sensor is within normal operating range; "Temperature reported by the sensor has exceeded its non-critical threshold and the fans have been set to full speed" – if temperature reported by the sensor has exceeded its threshold and has set fans to full speed; "Temperature reported by the sensor has exceeded its threshold and the system is gracefully shutting down" – if OperationalStatus is 6 (Error)
uint16 HealthState	Inherited from CIM_ManagedSystemElement	5 (OK) – if OperationalStatus[0] value is 2 (OK); 20 (Major Failure) – if OperationalStatus[0] value is 6

		(Error)
String Name	Inherited from CIM_ManagedSystemElement	"Temperature Sensor n" where n represents the sensor number
String CreationClassName	Inherited from CIM_LogicalDevice	Is always set to "HP_NumericSensor"
String DeviceID	Inherited from CIM_LogicalDevice	Contains the sensor record ID which is an Unique identifier for this temperature sensor instance
String SystemCreationClassName	Inherited from CIM_LogicalDevice	Is set to HP_ComputerSystem.CreationClassName
String SystemName	Inherited from CIM_LogicalDevice	Is set to the name of the server i. e. HP_ComputerSystem.Name
Uint16_t EnabledDefault	Inherited from CIM_EnabledLogicalElement	Is set to 2 indicating Enabled.
Uint16_t EnabledState	Inherited from CIM_EnabledLogicalElement	Is set to 5 indicating Not Applicable
Uint16_t RequestedState	Inherited from CIM_EnabledLogicalElement	Is set to 12 indicating not Available
uint16 HealthState	Inherited from CIM_ManagedSystemElement	5 (OK) – if OperationalStatus[0] value is 2 (OK); 20 (Major Failure) – if OperationalStatus[0] value is 6 (Error)
String Name	Inherited from CIM_ManagedSystemElement	"Temperature Sensor n" where n represents the sensor number
String CreationClassName	Inherited from CIM_LogicalDevice	Is always set to "HP_NumericSensor"
String DeviceID	Inherited from CIM_LogicalDevice	Contains the sensor record ID which is an Unique identifier for this temperature sensor instance
String SystemCreationClassName	Inherited from CIM_LogicalDevice	Is set to HP_ComputerSystem.CreationClassName
String SystemName	Inherited from CIM_LogicalDevice	Is set to the name of the server i. e. HP_ComputerSystem.Name
Uint16_t EnabledDefault	Inherited from CIM_EnabledLogicalElement	Is set to 2 indicating Enabled.
Uint16_t EnabledState	Inherited from CIM_EnabledLogicalElement	Is set to 5 indicating Not Applicable
Uint16_t RequestedState	Inherited from CIM_EnabledLogicalElement	Is set to 12 indicating not Available
uint16 SensorType	Inherited from CIM_Sensor	Is set to 2 indicating type of sensor is Temperature Sensor
String CurrentState	Inherited from CIM_Sensor	Is set to "Normal" – if OperationalStatus[0] is 2 (OK); "Critical" – if OperationalStatus[0] is 6 (Error);
String[] PossibleStates	Inherited from CIM_Sensor	This array of strings can have the following values Array can contain any of the following values: PossibleStates[9] = "Normal"; PossibleStates[3] = "Critical";
Sint32 CurrentReading	Inherited from	Indicates Current reading of temperature sensor.

	CIM_Sensor	
Uint16 BaseUnits	Inherited from CIM_Sensor	Indicates the Units in which the temperature reading in Current Reading and lower critical etc should be interpreted. Value 2 indicates deg C 3 Indicates deg F 4 indicates deg K
Uint16 RateUnits	Inherited from CIM_Sensor	Is set to 0 indicating unspecified.
Sint32 UnitModifier	Inherited from CIM_Sensor	Is set to 0 indicating unspecified.
Uint16[] SupportedThresholds	Inherited from CIM_Sensor	SupportedThresholds[0] = 1 (UpperThresholdNotCritical) if the system will set fans to full speed if the threshold is crossed; SupportedThresholds[0] = 3 (UpperThresholdCritical) set if the system will gracefully attempt to shutdown the system if the threshold is crossed; SupportedThresholds[0] = 5 (UpperThresholdFatal) if the system will immediately power down the system if the threshold is crossed.
Uint16[] SettableThresholds	Inherited from CIM_Sensor	Is always empty
Sint32 UpperThresholdNonCritical	Inherited from CIM_Sensor	Contains the threshold temperature that CurrentReading must exceed to be in a non-critical state. This is only set if the system will set fans to full speed if the threshold is crossed.
Sint32 UpperThresholdCritical	Inherited from CIM_Sensor	Contains the threshold temperature that CurrentReading must exceed to be in a critical state. This is only set if the system will gracefully attempt to shutdown the system if the threshold is crossed.
Sint32 UpperThresholdFatal	Inherited from CIM_Sensor	Contains the threshold temperature that CurrentReading must exceed to be fatal. This is only set if the system will immediately power down the system if the threshold is crossed.
Uint16 NumericSensorType	Part of HP_NumericSensor	Enumeration describing the type of temperature sensor 0:Unknown 1:Other 2:System Board 3: Host System board 4:I/O board 5:CPU board 6:Memory board 7:Storage bays 8:Removable Media Bays 9:Power Supply Bays 10:Ambient / External / Room 11:Chassis 12:Bridge Card 13:Management board 14:Remote Management Card 15:Generic Backplane 16:Infrastructure Network 17:Blade Slot in Chassis/Infrastructure 18:Front Panel

		19:Back Panel 20:IO Bus 21:Peripheral Bay 22:Device Bay 23:Switch
String OtherSensorTypeDescription	Inherited from CIM_Sensor	Not Supported
sint32 NominalReading	Part of HP_NumericSensor	Not Supported
Sint32 NormalMax	Part of HP_NumericSensor	Not Supported
Sint32 NormalMin	Part of HP_NumericSensor	Not Supported
Sint32 MaxReadable	Part of HP_NumericSensor	Not Supported
Sint32 MinaxReadable	Part of HP_NumericSensor	Not Supported
Sint32 Accuracy	Part of HP_NumericSensor	Not Supported
Sint32 Tolerance	Part of HP_NumericSensor	Not Supported
Boolean IsLinear	Part of HP_NumericSensor	Not Supported
Unit16 AdditionalAvailability	Part of HP_NumericSensor	Not Supported
Unit16 Availability	Part of HP_NumericSensor	Not Supported
Unit16 EnabledThresholds	Part of HP_NumericSensor	Not Supported
Boolean ErrorCleared	Part of HP_NumericSensor	Not Supported
String ErrorDescription	Part of HP_NumericSensor	Not Supported
Unit32 Hysteresis	Part of HP_NumericSensor	Not Supported
String IdentifyingDescriptions	Part of HP_NumericSensor	Not Supported
Datetime InstallDate	Part of HP_NumericSensor	Not Supported
Unit64 MaxQuiesceTime	Part of HP_NumericSensor	Not Supported
String OtherEnabledState	Part of HP_NumericSensor	Not Supported
String OtherIdentifyingInfo	Part of HP_NumericSensor	Not Supported
Unit64 PollingInterval	Part of	Not Supported

	HP_NumericSensor	
Unit16 PowerManagementCapabilities	Part of HP_NumericSensor	Not Supported
Boolean PowerManagementSupported	Part of HP_NumericSensor	Not Supported
Unit64 PowerOnHours	Part of HP_NumericSensor	Not Supported
Unit32 Resolution	Part of HP_NumericSensor	Not Supported
String Status	Part of HP_NumericSensor	Not Supported
Unit16 StatusInfo	Part of HP_NumericSensor	Not Supported
Datetime TimeOfLastStateChange	Part of HP_NumericSensor	Not Supported
Unit64 TotalPowerOnHours	Part of HP_NumericSensor	Not Supported
Unit32 LastErrorCode	Part of HP_NumericSensor	Not Supported

Table 2: HP\_SystemSensor properties

Table 2 describes the properties of the HP\_SystemSensor 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.

PropertyName	PropertyInheritance	(Property Value (and Data source))
HP_ComputerSystem REF GroupComponent	Part of HP_SystemSensor	The instance of Hp_ComputerSystem that contains this sensor
HP_NumericSensor REF PartComponent	Part of HP_SystemSensor	The HP_NumericSensor instance.

Table 3: HP\_MemberOfSystemTemperatureCollection Properties (Logical Information):

Table 3 describes the properties of the HP\_MemberOfSystemTemperatureCollection 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

PropertyName	PropertyInheritance	(Property Value (and Data source))
HP_SystemTemperatureCollection REF Collection	Part of HP_MemberOfSystemTemperatureCollection	The Collection that aggregates members.
HP_NumericSensor REF Member	Part of HP_MemberOfSystemTemperatureCollection	The aggregated member of the Collection.

## Links to more information

- WBEM information  
For a CIM tutorial, go to <http://www.wbemsolutions.com/tutorials/CIM/>

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

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