



SMART Plug-in for managing IBM's DB2 Universal Database with HP Operations Manager

User's Guide

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Revisions

The version number on the title page of this document indicates software version. The print date on the title page changes each time this document is updated.

You will receive updated or new editions if you subscribe to the appropriate product support service.

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Print History

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Conventions

In this book, HP Operations Manager (HP OM) is used as a synonym for all versions of the management product otherwise known as

- HP OpenView IT/Operations (ITO) (obsolete)
- HP OpenView VantagePoint Operations (VPO) (obsolete)
- HP OpenView Operations for HP-UX or for Solaris (OVO for HP-UX, OVO for Solaris) and OVO for Windows (obsolete)
- HP Operations Manager for UNIX (HP OM for UNIX)
- HP Operations Manager for Windows (HP OM for Windows)

In essence, they are all the same product and can host the SMART Plug-in for IBM DB2 Universal database.

Table 1 shows the typographical conventions used in this book.

Table 1: *Typographical Conventions*

| Font Type | What the Font Type Represents | Example |
|----------------------|---|---|
| Italic | Book or manual titles, and main page names | Refer to the HP Smart Plug-In for HP-UX and Solaris: Administrator's Reference and the <code>opc(1M)</code> main page for more information. |
| | Provides emphasis | <i>You must follow these steps.</i> |
| | Specifies a variable that you must supply when entering a command | At the prompt type: <code>rlogin your_name</code> where you supply your login name. |
| | Parameters to a function | The <code>oper_name</code> parameter returns an integer response. |
| Bold | New terms | The monitor agent observes... |
| Computer | Text and items on the computer screen | The system replies: <code>Press Enter</code> |
| | Command names | Use the <code>grep</code> command... |
| | Function names | Use the <code>opc_connect()</code> function to connect ... |
| | File and directory names | <code>/opt/OV/bin/OpC/</code> |
| | Process names | Check to see if <code>opcmona</code> is running. |
| | Window/dialog box names | In the <code>Add Logfile</code> window... |
| Computer Bold | Text which you have to enter | At the prompt, type: <code>ls -l</code> |
| Keypcap | Keyboard keys | Press Return . |
| [Button] | Buttons on the user interface. | Click [Operator]. Click the [Apply] button. |

| | | |
|------------|---|--|
| Menu Items | A menu name followed by a colon (:) means that you select the menu, then the item. When the item is followed by an arrow (->), a cascading menu follows. | Select Actions: Utilities-> Reports... |
|------------|---|--|

Documentation Road Map

This section illustrates what information is available for the NiCE DB2SPI and where you can find it. The following manuals are available in PDF format only with the DB2SPI:

- User's Guide
- Reference Guide
- Software Release Notes

In addition to the documentation for the DB2SPI, related HP Software products also provide a comprehensive set of manuals, which aim to assist you in using the products and improving your understanding of the underlying concepts. Table 2 lists the documentation provided with products that are related to the DB2SPI.

Table 2: Related Documents

| HP Software Product Name | Manual Title |
|-------------------------------|--|
| Operations for UNIX / Windows | Administrators reference Concepts guide Configuring circuits for HP OM DCE agents concept and configuration guide HTTPS agents concept and configuration guide Installation guide Java GUI operator's guide (more available, please refer to the HP Software support pages) |
| Performance Manager | Administrator's Guide User's guide and tutorials |
| Performance Agent | Data Source and integration Guide Installation and Configuration User's Guide Tracking your Transactions Installation and Configuration Guide Application Response Measurement API Guide (Windows only) |

Introduction

This section describes what the DB2SPI is, what it can do, and how you can use it to improve the management of your DB2 environment. This section covers the following topics:

- What is DB2 UDB?
- What is the DB2SPI?
- Managing DB2 instances with the DB2SPI
- Limitations

What is DB2 UDB?

DB2 Universal Database (DB2 UDB) is a powerful relational database management system (RDBMS) from IBM. It is available on a number of different platforms, ranging from Windows, Linux to various UNIX platforms. DB2 is also available on mainframe computers (z/OS, IBM zSeries) and minicomputers (i5/OS, IBM iSeries). As of today the DB2 SPI supports DB2 UDB on Linux, UNIX, Windows and now also on the minicomputer operating system i5/OS (previously known as OS/400)

All details related to DB2 on i5/OS are covered in Appendix E: DB2SPI for i5/OS.

Scalability of DB2 for LUW platforms is provided by a range of different editions whose names reflect the product's scope and scale, for example, "Express", "Workgroup" and "Enterprise" Edition.

DB2 is also available for distributed DB2 environments. These setups are only supported by the "Enterprise Server Edition with Database Partition Feature". The Database Partitioning Feature allows load and data distribution across a large number of physical and logical processing units.

What is the DB2SPI?

The DB2SPI is designed to simplify the management of DB2 databases by integrating specific DB2 components into HP Operations Manager for Windows and UNIX. The integration of the two products allows you to use the powerful problem-management features of the OM to manage and monitor the DB2 environment from one central location. The DB2SPI provides the following high-level features:

- Monitoring of DB2 log files and processes and proper alerting if essential processes are discovered to have died or entries in the monitored log files relate to serious or critical issues in the DB2 environment
- Integrating DB2 applications into the OM GUI (DB2 administration capabilities)
- Collecting a large amount of performance data
- Threshold monitoring of selected performance data

- Definition and management of multiple DB2 instances and databases
- Integration of DB2 instances and databases into the HP Software Service Navigator (HP OM for UNIX) resp. the integrated service view (HP OM for Windows), thus treating them as services
- Graphing of collected performance data with HP Performance Manager Software
- Service reports are provided with the HP Reporter Software integration, enabling comprehensive reporting of the DB2 system status

Managing DB2 instances with the DB2SPI

Initial Configuration

A DB2 environment may consist of a number of individual DB2 instances, each being the home for a set of databases. The databases themselves may be spread across multiple (physical) systems in partitioned database environments (DPF). The DB2SPI allows you to monitor any number of DB2 instances in a DB2 environment.

With the initial configuration of the DB2SPI the user can define which DB2 instances and databases shall be monitored. This is a two step process. In the first step an elementary discovery of the instances installed is performed and results in an extensible list (Discovery Filter). These instances are displayed and their monitoring can be turned off or on. Within each monitored instance, all databases are managed by default, but databases can also be excluded individually in the second step of the configuration. If a database is managed, all its underlying objects (partitions, tablespaces, bufferpools, and processes) are also monitored by default. This may be changed later on.

During the initial configuration also information of the location of the DB2SPI diagnostic and notification log files is collected as well.

Discovery Filter

Since the DB2SPI must supports multiple DB2 versions of the same or different levels installed on the same system the "Discovery Filter" is applied before the actual discovery is executed.

This filter scans the standard DB2 installation paths on the system to determine the different instances available. It also provides the operator with the possibility to enable or disable instances for the drilldown DB2 SPI discovery process. .

If instances are not found during the "Discovery Filter" scan, they can be added manually.

The "Discovery Filter" is executed during the initial configuration, but can also be started at any time using the "Discovery Filter" Tool from the DB2SPI Admin toolbox, for example after installing DB2 version 9 based instances.

DB2SPI Discovery

For convenience, new databases belonging to monitored instances are discovered automatically, and dropped databases are removed from the monitoring scope.

The DB2SPI discovery performing this automatic configuration adaptation is executed at regular intervals by a schedule policy. By default it runs once an hour and analyzes all instances, which are enabled for discovery by the "Discovery Filter" Tool.

Also the service views in the Operator Console are updated. New partitions, tablespaces or bufferpools are discovered and monitored automatically, if their hosting database is monitored at the time of discovery.

The following table shows the settings applied to the various DB2 entities that might be detected during the discovery. A "+" means the entity is monitored, a "-" means not monitored.

Table 3: Monitoring state for discovered objects

| Activity (Setup, Discovery or Filter Definition) | Instance | Database | Tablespaces, Bufferpools, Processes |
|--|-------------------------------|----------------------------|-------------------------------------|
| Initial Configuration | User decides + / - | User decides + / - | Same as database |
| New instance discovered | - not monitored by default | - not monitored by default | - not monitored by default |
| New database discovered | | + / -, as the instance | + / -, as the instance |
| New tablespace discovered | | | + / - as the database |
| New buffer pool discovered | | | + / - as the database |
| New partition discovered | | | + / - as the database |
| Manual configuration | | | |
| "Entity Filter" tool | User decides + / - | User decides + / - | User decides + / - |
| "Discovery Filter" tool | Add instance and switch + / - | | |

Adaptation of the DB2SPI Configuration

An "Entity Filter" tool allows to change the monitoring status of every DB2 object (entity) in the configuration, from high level DB2 databases down to the level of tablespaces, bufferpools and processes. It also allows to configure the log file configure paths for monitoring.

Instances are configured using the “Discovery Filter” tool, either by the automatic detection cycle or by manual addition and interaction. Instances which are switched to unmonitored (“-“) by this tool will not be visible in the “Entity Filter”

Resulting Data

The DB2SPI monitors all instance-specific log files and processes separately and provides detailed information about the instances and databases where problems have been detected.

Individual databases belonging to a monitored instance can be omitted from monitoring via the “Entity Filter”, for example, to ignore test databases or others under development.

Note that the DB2SPI collects performance data for all DB2 instances monitored on a given DB2 server and for all databases making up these instances, if they are configured to be monitored. This can generate a significant amount of data. For example, the DB2SPI collects data for more than 130 metrics from each enabled database in each individual DB2 instance. The data collected is kept in the HP Software Performance Agent (PA) or embedded performance component (CODA) database for a defined period before they are removed automatically. The global usage of PA / CODA for DB2 data collection can be switched on and off with a configuration parameter or from the Operations Manager application desktop.

Limitations

Depending on the wealth of metric data collection, the number of databases monitored on one system and the power of that system, some additional CPU load may be observed.

Before You Begin

This section provides important information that you should be aware of to ensure that the systems on which you intend to install the NiCE DB2SPI are suitable before you attempt to install the software. The section comprises the following topics:

- DB2SPI Basic Architecture
- Installation Prerequisites
- Disk Space Requirements
- Memory (RAM) Requirements
- Performance Data Collection Tools
- Self-Healing Collector

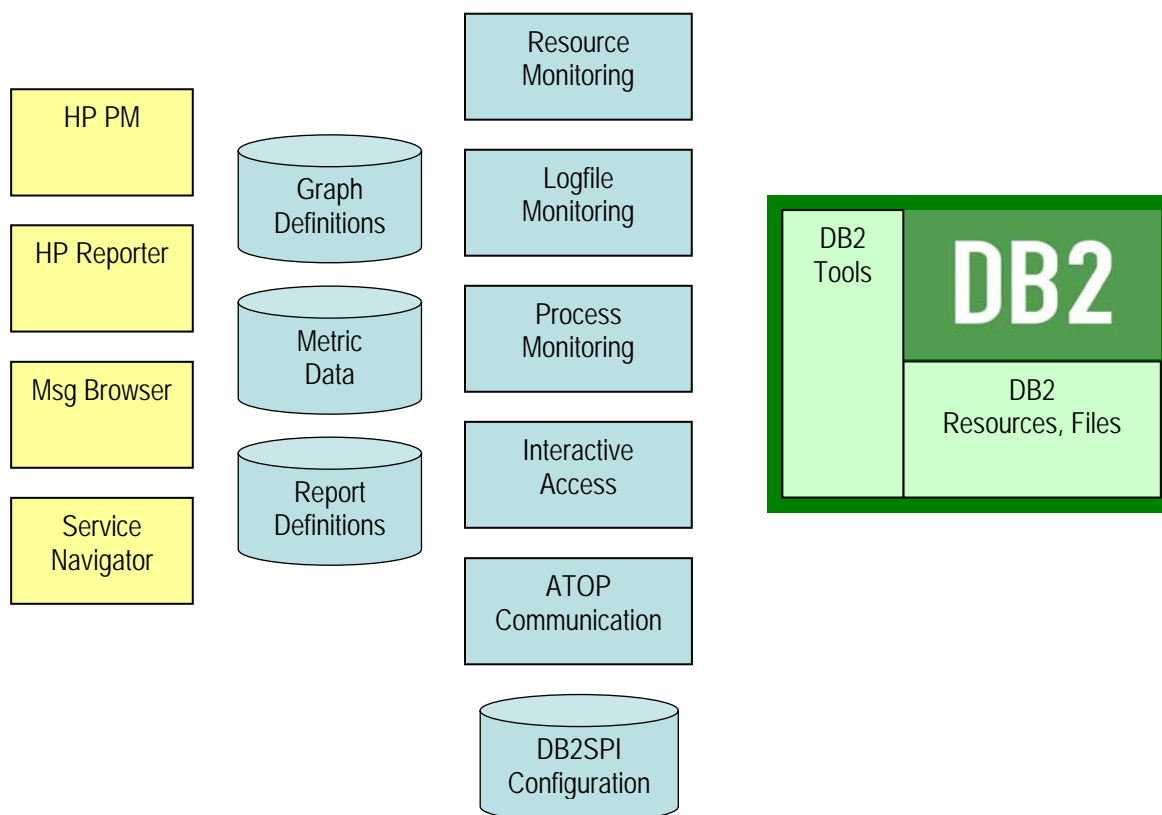
DB2SPI Basic Architecture

Building Blocks

The DB2SPI consists of various components that are installed or distributed in the managed environment:

- HP Operations Manager intrinsic components, for example policies
- Perl scripts, database access libraries and binary programs on the management server and the managed nodes
- A common communication interface for application interaction (ATOP, **A**pplication **T**unnel for **O**perations) on the management server, the managed nodes, HP OM for UNIX Java display stations and HP OM for Windows management consoles.
- Reports are provided for the HP Reporter to enable efficient service reporting of performance data and database availability. Note, that the HP Performance Agent (PA, formerly known as MWA) or the embedded performance agent (CODA) is required for that.
- Graphs are provided for the HP Performance Manager to enable the graphical display of current performance data and database availability. Note, that the HP Performance Agent (PA, formerly known as MWA) or the embedded performance agent (CODA) is required for that.

Figure 1: Components of the DB2SPI



Installation Prerequisites

This section describes the various platforms and software versions supported by the DB2SPI. Make sure that a supported version of OM is installed and running on both the management server and the managed node and, in addition, that a supported version of DB2 is installed and running on the DB2 server.

This includes the aspects:

- DB2 versions and platforms supported
- OM platform versions
- Perl on both the management server and the managed nodes
- Disk space and memory requirements
- Performance data collection tools

DB2 Versions

The DB2SPI 03.50 supports DB2 UDB version 8.2 and 9.1.

The DB2SPI supports the DB2 Enterprise Server Edition. For other editions please refer to the respective support matrix.

For supported i5/OS based DB2 databases see the actual support matrix on the NiCE Customer Portal. <https://portal.nice.de/Portal/login.jsp>

IBM DB2 Fix Pack Support

This software has been verified with DB2 Version V8 Fix Pack 7 (equivalent to Version 8.2.0) or higher, and with DB2 V9 Fix Pack 1 and later. Be careful to always use the latest Fix Pack (DB2 V9 Fix Pack 3 has been superseded by Fix Pack 3a for example.)

DB2 V8 Internal Changes Activation

In case a database has been updated to DB2 Version V8 Fix Pack 7 or higher from a previous DB2 level the "db2updv8" command must have been executed.

This can be verified by executing the following commands from the DB2 CLP (must be done for each database):

```
connect to <database_name>

select routinename from SYSCAT.routines where
routinename = 'SNAP_GET_DB'

terminate
```

Result should show:

```
ROUTINENAME
-----
-
SNAP_GET_DB

1 record(s) selected.
```

In case the result set is blank, please contact your DBA to run "db2updv8" from an account with "sysadm" privileges.

For more information refer to the following IBM Website
<http://publib.boulder.ibm.com/infocenter/db2luw/v8/index.jsp?topic=/com.ibm.db2.udb.doc/core/r0010843.htm>

In case a version previous to DB2 V8 Fix Pack 7 shall be monitored, please contact our product support with the Fix Pack version used.

DB2SPI Operation during DB2 Maintenance

In case DB2 has to go into maintenance mode for a Fix Pack upgrade, offline backup, etc. it is recommended to disable monitoring for the affected instance. Before taking a DB2 instance offline (db2stop), all applications must be disconnected. The DB2SPI must be regarded as a DB2 application and should be stopped from attaching to the instance where the outage is planned.

There are two recommended ways to achieve this:

- Disable the entire SPI. Use the following command on the command line of the DB2 server or the "DB2SPI Disable" tool for this (recommended for single instance DB2 environments):

```
db2s_start db2s_db2spi.pl [on|off]
```

- In case there are multiple instances and the other instances must be monitored while one instance is being maintained the following command should be used on the command line of the DB2 server or the appropriate DB2SPI Admin tool:

```
db2s_start db2s_entyfilter.pl
```

DB2 Server Operating Systems

The DB2SPI supports DB2 servers running on the following operating systems:

- AIX
- HP-UX
- Solaris
- Red Hat Enterprise Linux
- SuSE Enterprise Server
- Windows Server

The versions of the DB2 server operating systems depend on the HP OM agents that are installed on these systems and can be determined from their support matrix.

The current support matrix can be obtained from the NiCE Customer Portal.

<https://portal.nice.de/>

For csh Users

The ksh shell must be available in the default PATH of the user. This can be verified with

```
which ksh
```

The "noclobber" parameter must NOT be set in the global or local shell profile. This can be verified with

```
"set" | grep noclobber
```

This must be ensured for each DB2 instance user using the C shell.

Perl on Managed Nodes

On the DB2 server nodes that need to be managed as well as on the management server, Perl is an essential component, because most large parts of the DB2SPI are written in Perl. The Perl versions 5.6.1 and 5.8 are supported on these nodes, as installed with the HP operations agent.

This software is delivered with all operations agents version 7.x and higher (DCE agents and HTTPS agents) and it is installed automatically when distributing the agent software to the managed nodes.

Note: The Perl 5.6.1 delivered with HP DCE agents (version 7.x) and older HTTPS agents (up to version 8.16) for AIX managed nodes is not functional. Hence, an AIX Perl needs to be installed separately on AIX nodes, or the HTTPS must be upgraded to the latest version. You can check this on the node by entering "opcagt -version".

An agent Perl replacement must be installed, available from the NiCE customer portal. Please see the DB2SPI Release Notes for details.

Note that NO OTHER Perl installation will be used by DB2SPI and DB2SPI does NOT interfere with those installations. Only the HP agent Perl will be used and hence those other installations can be maintained independent from the DB2SPI.

Table 4: OVO 7.x & HP Operations Manager 8.x Agent Perl paths

| Operating System | Path to Perl Executable |
|------------------|---|
| AIX | /usr/lpp/OV/contrib/perl/bin/perl (DCE Agent) /usr/lpp/OV/nonOV/perl/a/bin/perl (HTTPS agent) |
| HP-UX | /opt/OV/contrib/perl/bin/perl (DCE Agent) /opt/OV/nonOV/perl/a/bin/perl (HTTPS Agent) |
| Solaris | /opt/OV/contrib/perl/bin/perl (DCE Agent) /opt/OV/nonOV/perl/a/bin/perl (HTTPS Agent) |
| Linux | /opt/OV/contrib/perl/bin/perl /opt/OV/nonOV/perl/a/bin/perl (HTTPS Agent) |
| Windows | /usr/OV/bin/perl (UNIX DCE Agent) /Program Files/HP OpenView/nonOV/perl/a/bin/perl (UNIX HTTPS Agent) \\Program Files\HP OpenView\Installed Packages\{790C06B4-844E-11D2-972B-080009EF8C2A}\bin (Windows DCE Agent) \\Program Files\HP\HP BTO Software\nonOV\perl\bin (Windows HTTPS Agent) |

Perl on the Management Server

Some functionality is provided on the management server (UNIX or Windows), so the same requirement as for managed nodes also applies to the management server.

As it is a managed node anyway, the same rules will be applied as given above.

During installation of the product, DB2SPI determines the version of the HP agent and links itself to the proper HP agent Perl. Note, that this link may become invalid when upgrading the server agent at a later time (e.g. from DCE to HTTPS or vice versa).

HP Operations Management Server Versions

Operations for UNIX Management Server

The DB2SPI 03.61 supports Operations Manager for UNIX 7.x and Operations Manager for UNIX 8.x on the following platforms:

- HP-UX
- Solaris

Please note that this list may change with the support of the respective platforms by HP and NiCE.

Operations for Windows Management Server

The DB2SPI 03.51 can be installed in English Operations Manager for Windows 7.5 and Operations Manager for Windows 8.0 environments.

At the time of this release Operations Manager for Windows 8.1 was about to be released. Please check the DB2SPI support matrix on the NiCE customer portal at the time of installation if this is supported as well.

Environment Requirements on the Managed Nodes

The DB2 servers that should be monitored with the help of the DB2SPI will in the following be called "managed nodes".

The managed nodes need to have an HP operations agent installed, as well as the appropriate HP operating system policies and instrumentation (also known as "HP OS-SPI") in order to be able to function properly.

The operations management server must be a managed node itself and have the agent software installed. This is required to make use of the ServiceNavigator (HP OM for UNIX) and HP Reporter integration. If this requirement is not fulfilled, functionality of the DB2SPI will be limited.

Actions and commands of the DB2SPI required on the management server are copied to the correct location during package installation. The policy "DB2_ownlog0" is distributed when performing an "Install and Update Software and Configuration" to the management server after the DB2SPI has been installed. Details about this step will be given later.

- With HP OM for UNIX the DB2 servers must be "controlled" managed nodes in the respective management domain. If they should be set up as "monitored only" or "message allowed" some functionality, like service tree updates, will not be available due to restrictions imposed by HP Operations in these cases.
- With HP OM for Windows, the Self-Healing Service commands that are required on the management server are distributed, when instrumentation is deployed to the management server, after the DB2SPI has been installed. Details about this step will be given later.

As stated earlier, the operations agent supplies Perl 5.6.1 or 5.8 which is essential on both the management server and the managed nodes.

Internal command forwarding requires that the command line buffer of the operating system must at least be 1024 byte. Please use the `ulimit -s` command to verify your command line buffer size.

In order for the DB2SPI to work correctly it must be possible to determine the model string using the appropriated system commands from the agent account. (use `opcdeploy / ovdeploy` to verify).

| Platform | Command |
|-------------|----------|
| HP-UX | model |
| AIX | uname -M |
| Sun Solaris | uname -i |

Note that there is no such need for Linux or Windows based DB2 servers.

Disk Space Requirements

Space for Binaries and Configuration

The DB2SPI requires hardly any disk space on both the management server and the managed nodes to store programs and configuration data.

- about 100 MB disk space is required on the management server
- less than 10 MB disk space is required on managed UNIX nodes
- less than 12 MB disk space is required on managed Windows nodes

Runtime Data

However, quite some space is required at runtime, particularly when performance monitoring is enabled. The amount of disk space required at run time depends to a large extent on the number of DB2 instances and databases that the DB2SPI is configured to monitor.

An indefinable amount should be expected to be consumed by temporary and log files. However, this should not exceed two MB in most configurations.

The DB2SPI also comes with an embedded self-monitoring that notifies the user if its own log file is growing too large. In this case the log file should be analyzed in order to detect any unstable situations.

The main part of disk space will therefore be used for storing performance data.

To make a rough estimation of the amount of free disk space required by the DB2SPI, assuming that performance monitoring is enabled and the Performance Agent is preserving the data it collects for graphing and reporting for one year, you can use the following formula:

- 75 MB for the HP Reporter data collection
 - 5 MB x [number of databases to be managed]
 - 50 MB x [number of tablespaces to be managed]

where:

| | |
|-----------------------|---|
| number of databases | total number of databases monitored in all instances on the respective DB2 server |
| number of tablespaces | total number of tablespaces monitored in all instances and databases on the respective DB2 server |

During configuration on a specific DB2 server, the time frame for the data storage can be reduced to one half, one fourth or one twelfth. This keeps six, three or one months of data available for performance graphing and reporting.

Note that the amount required is calculated based on the settings during the initial configuration. Adding huge databases with a large number of tablespaces, for example, will not lead to a recalculation of required disks pace and may lead to a significant shorter time frame for storage. This is not a DB2SPI limitation, but in the underlying HP PA.

Please get in touch with our product support to help retaining the data in such scenarios.

Memory (RAM) Requirements

DB2SPI will require available RAM as follows:

- 10 Mb on the HP OM management server
- 30 Mb on the HP OM managed nodes (DB2 servers)

Performance Data Collection Tools

In order to store metric data collected by the DB2SPI, the DS12DDF package must be installed on the HP OM management server and the respective instrumentation must have been deployed to the managed nodes (the DB2 servers).

Self-Healing Collector

In order to make use of the HP self-healing services, the respective instrumentation must also be deployed to the managed nodes and the management server.

Installing the DB2SPI

In this section, you will find information describing in detail the steps you need to perform to install the SMART Plug-in for DB2 separately. Note that when installing from the HP OpenView Application CD-ROM this is mostly automated, but for separate installation (e.g. after download from an FTP site) all the listed steps are required.

This section covers the following topics:

- Package and Component Identification
- Installing the DB2SPI Software on OM for Windows
- Installing the DB2SPI Software on OM for UNIX
- Installing the ATOP Communication Layer

The installation of DB2SPI components integrated into other products (HP Reporter and HP Performance Manager) is not explained here, but in the respective sections in the appendix.

Package and Component Identification

The DB2SPI consists of a set of individual components:

- The DB2SPI application package for HP Operations Manager.
This is the main trunk of software, consisting of tools, monitors, and help pages and so on that will be uploaded into the HP Operations Manager database. There is one component included in this package:
 - ATOP – the cross-platform communication layer for the DB2SPI
 - The DB2SPI console package for HP Operations Manager console for use on any server other than the HP Operations Management Server
 - OVPM Graphs – a configuration file when using HP PM for UNIX for graphing the performance data
 - The DB2SPI graphing integration into HP PM for Windows, as an InstallShield package
 - The DB2SPI report integration into HP Reporter as an InstallShield package

In the subsequent sections the necessary steps are described to install these packages on the respective systems.

Upgrading DB2SPI from an earlier Version

The upgrade process is described in the most recent "DB2SPI Release Notes". Please refer to that document.



Installing the DB2SPI Software on OM for Windows

Installation Procedure using the MSI Package

DB2SPI 03.51 must be installed on the management server via InstallShield. Please perform the following steps:

1. Install the DB2SPI by executing the file `DB2SPI-0351.msi`. It can be found on the installation CD

InstallShield will guide you through the installation.

Verifying Installation of the DB2SPI Software

To verify that the installation of the DB2SPI completed successfully on the HP OM for Windows management server, carry out the following steps:

1. Open the Windows® "Control Panel" and use the "Add/Remove Programs" tab to display the list of installed software. You should find the following entries:

DB2SPI

2. Check that the ATOP server process is registered correctly a service. You can do this by opening the "Control Panel → Administrative Tools → Services". You should see the following entry in the list of installed services:

ATOP2 Server Service

3. Check that the elements listed in are present in the OM for Windows Console GUI:

Table 5 : DB2SPI Components in HP OM for Windows

| HP OM Component | HP OM Component Name |
|-----------------|----------------------|
| Node Groups | DB2-AIX |
| | DB2-HPUX |
| | DB2-LINUX |
| | DB2-OS400 |
| | DB2-SOLARIS |
| | DB2-WINDOWS |
| Tool Groups | DB2 |
| | DB2SPI Admin |
| | DB2SPI for OS400 |
| User Roles | DB2 Operator |
| | DB2SPI Admin |
| Policy Groups | DB2SPI |

For the DB2SPI and its Console package, installation/removal logging is now written to `<InstallDir>\install\DB2SPI\log`.

The filenames are:

- DB2SPI_install.log
- DB2SPI_Console_install.log

Installing the DB2SPI Software on OM for UNIX

Installation Procedure using the SD Package

The section considers installation on "Operations Manager for UNIX". This is used as a generic expression for both management server versions (OVO/UNIX 7.x and OM for UNIX 8.x) and both management platforms (HP-UX and Solaris) with their supported operating system versions.

DB2SPI 03.61 uses a communication component (ATOP) that is installed automatically with the bundle. For the installation on the OM for UNIX management server, carry out the following steps:

1. Login to the OM for UNIX management server as user `root`.
2. If not already present, create a directory to mount the CD-ROM:

```
mkdir /<mount_point>
```

For example: `mkdir /cdrom`

3. As user `root`, mount the CD-ROM.

On a HP-UX system, enter:

```
mount -r -F cdfs -o cdcase \  
/dev/<cdrom_device_name> /<mount_point>
```

For example, for a local CD-ROM you might enter:

```
mount -r -F cdfs -o cdcase /dev/dsk/c0t2d0 /cdrom
```

On Solaris systems, you have the choice to use automatic mounting of the CD-ROM or applying the same steps as on HP-UX.

With the automount facility, you just have to wait a little bit until the CD-ROM is recognized. Then, it is available as `/cdrom/<cd-name>`.

For the DB2SPI, this reads as `/cdrom/db2spi_0350`, and this is the `<mount_point>` for all further steps.

Note: The `-o cdcase` switch is required because the CD-ROM is compatible for UNIX and Windows.

Note that you can also use SAM on HP-UX (admin on Solaris) to mount the CD-ROM to a specific path in the `Disks and File Systems` window.

4. Use the `swinstall` command to install the DB2SPI software bundle. Enter:

```
swinstall -s /<mount_point>/<depot_location> DB2SPI
```

In our example, this might read as:

```
swinstall -s /cdrom/db2spi.sd DB2SPI
```

The `swinstall` command installs the software bundle from the SD depot and performs basic configuration. The software bundle contains all the DB2SPI software, configuration files, and documentation.

Alternatively, use the `swinstall` GUI and mark and install the DB2SPI software bundle.

Verifying Installation of the DB2SPI

To verify that the installation of the DB2SPI completed successfully on the OM for UNIX management server, carry out the following steps:

1. Check the list of installed software. On the HP-UX (Solaris) command line, enter:

```
swlist | grep DB2SPI
```

In the list that is displayed, look for the following entry:

```
DB2SPI      A.03.61      DB2 SMART Plug-In for HP OVO / HP
Operations Manager
```

2. Check that the ATOP server process is registered correctly as an OV service. Note, that you must have `/opt/OV/bin` in your search path to do so. Enter:

```
ovstatus atop_server
```

The response must list ATOP Server to be "RUNNING"

3. Check that the elements listed in Table 6 are present in the OM GUI:

Table 6: DB2SPI Components in OM for UNIX

| Component Type | Component Name |
|--------------------|----------------------|
| Node Groups | DB2-AIX |
| | DB2-HPUX |
| | DB2-LINUX |
| | DB2-OS400 |
| | DB2-SOLARIS |
| | DB2-WINDOWS |
| Message Groups | DB2 |
| | DB2_OS400 |
| | DB2SPI |
| Application Groups | DB2 Tools |
| | DB2SPI Admin |
| | DB2SPI for OS400 |
| User Profiles | DB2 Operator Profile |
| | DB2SPI Admin Profile |

| | | |
|-----------------|----------------|--------------------|
| Template Groups | DB2SPI AIX | DB2SPI Base |
| | | DB2SPI Base (UNIX) |
| | DB2SPI HP-UX | DB2SPI Base |
| | | DB2SPI Base (UNIX) |
| | DB2SPI Linux | DB2SPI Base |
| | | DB2SPI Base (UNIX) |
| | DB2SPI MgmtSvr | |
| | DB2SPI OS400 | |
| | DB2SPI Solaris | DB2SPI Base |
| | | DB2SPI Base (UNIX) |
| | DB2SPI Windows | DB2SPI Base |

4. If either of these steps fails to produce the desired results, check the following log files for more specific information relating to installation problems:

```
/var/adm/sw/swagent.log
```

```
/var/adm/sw/swinstall.log
```

Preparing the Management Server for Service Tree Updates

Per default, remote action security on an OVOU is set to deny Automatic Actions from a DCE node on the Management Server or another node.

This is needed for DB2SPI Service Tree discovery. Remote Actions from DCE nodes must be allowed on the Management Server so the service tree can be built up correctly. This can be achieved by placing and editing the file `/etc/opt/OV/share/conf/OpC/mgmt_sv/remactconf.xml` on the OVOU Management Server.\

The following may be added to this files, if this situation is applicable in your environment:

```
<rule>
  <doc>Target node MgmtSrv OK if sender DB2SPI</doc>
  <if>
    <target>
      <mgmtsrv/>
    </target>
    <source>
      <nodegroup>DB2-AIX</nodegroup>
      <nodegroup>DB2-HPUX</nodegroup>
      <nodegroup>DB2-LINUX</nodegroup>
      <nodegroup>DB2-OS400</nodegroup>
      <nodegroup>DB2-SOLARIS</nodegroup>
      <nodegroup>DB2-WINDOWS</nodegroup>
    </source>
    <certified>>false</certified>
  </if>
```

```
<allow/>  
</rule>
```

On OM for Windows 8.0, a Remote Action Security Server Policy must be created or a rule must be added to one to allow actions from a DCE node on the Management Server if settings are effective which deny this.

Important automatic Changes on the Management Server

During the installation of the DB2SPI, some automatic configuration takes place on the management server.

Perl Link

A link is created in the `/opt/OV/db2spi/bin` directory that points to the OVO agent Perl, which depends on the type of agent used on the management server. Please be aware that changing the agent type (DCE to HTTPS or vice versa) at a later time will invalidate this link. It must be reconfigured manually in order to use any management server based DB2SPI functionality.

Selective Distribution Support

If selective distribution is enabled on the management server, i.e., the file `/etc/opt/OV/share/conf/OpC/mgmt_sv/seldist` exists, the DB2SPI is integrated in this configuration file.

If so, some lines for the DB2SPI selective distribution are added that can be used during normal instrumentation deployment later on.

ATOP Server Installation

On the OM for UNIX management server a new OV service, `atop_server`, is established for the multi-platform communication as described below.

Installing the ATOP Communication Layer

The DB2SPI uses a communication layer of its own for the execution of input / output applications on the managed nodes. This layer is the Application Tunnel for Operations (ATOP). It provides input / output functionality across all platforms the DB2SPI may be installed on.

It consists of two parts:

- The ATOP server is installed on the HP Operations Management server and the management consoles automatically with the DB2SPI or DB2SPI Console package. Only in the case of OM for UNIX management consoles using the Java GUI a separate installation is necessary.
- The ATOP client is installed on the managed node when deploying the DB2SPI scripts (instrumentation).

In order to work correct, the configuration has to be consistent between all three types – management server, managed nodes, management consoles.

This is achieved automatically for the ATOP client on the managed nodes when distributing the DB2SPI to them, and the management consoles also get a default configuration with the installation of the ATOP service.

If there is a firewall between any of the types (management server, managed nodes, management consoles), the communication ports used by ATOP need to be open. This might be done by opening the ATOP default ports on the firewall, or the ATOP port may be configured to use ports which are open already. In the second case, the server and client ports have to be consistent between all three types of servers (management server, managed nodes, management consoles).

For more detailed information about ATOP, refer to the Chapter "Concepts and Architecture".

ATOP Server Setup

Terminal Server Usage

Although ATOP does not support Terminal Services in general, it may be used under the right circumstances.

A separate whitepaper describes how to open a remote session on the OM for Windows server that will pass on all windows opened on the OM for Windows server including ATOP windows. The main issue is that remote sessions will pass on most windows but not ATOP windows. To get ATOP windows it is necessary to open a **console session** using the "/console" parameter with the call of the Remote Desktop client on the Connecting Windows client.

Please refer to that document, which can be found on the NiCE customer portal server.

ATOP on the OM for Windows Management Server

ATOP server is automatically set up as a Windows® service on the management server when DB2SPI is being installed. This means, that the DB2SPI tools can be executed from the OM for Windows console on the management server.

ATOP on the OM for Windows Console

ATOP server is automatically set up as a Windows® service on the management console when the DB2SPI_console package is being installed. This means, that the DB2SPI tools can be executed from the OM for Windows console on the management console.

ATOP on the OM for UNIX Management Server

For Motif GUI users of OM for UNIX, there is no special action necessary, as they connect to the OM for UNIX management server to obtain their X-windows. There ATOP is set up as an OpenView service automatically when ATOP is being installed with the DB2SPI software.

Thus, no extra configuration steps must be taken if you are using the Motif GUI.

ATOP on the OM for UNIX Java GUI Display Station

The DB2SPI supports full application interaction in the HP OM for UNIX Java GUI environment with the embedded ATOP technology. However, since it is not a component of the HP OM for UNIX Java GUI itself, some service and programs need to be installed on the Java GUI station similar to the Java GUI itself.

Note: The Java GUI is a requirement on the OVO/UNIX management station where ATOP is to be installed.

After successful installation of the DB2SPI on the management server, a web-based installation procedure just like the Java GUI is provided, and in order to show the strong relation, the installation procedure is found close to the Java GUI.

Upgrading ATOP on the Java GUI from an earlier Version

The upgrade is simply a re-installation after the older version has been removed.

Installation via Web-Browser

On the Java GUI station, start a web browser and access the page:

For OVO/UNIX 7.x environments:

http://<management_server>:8880/ITO_OP/ATOP/

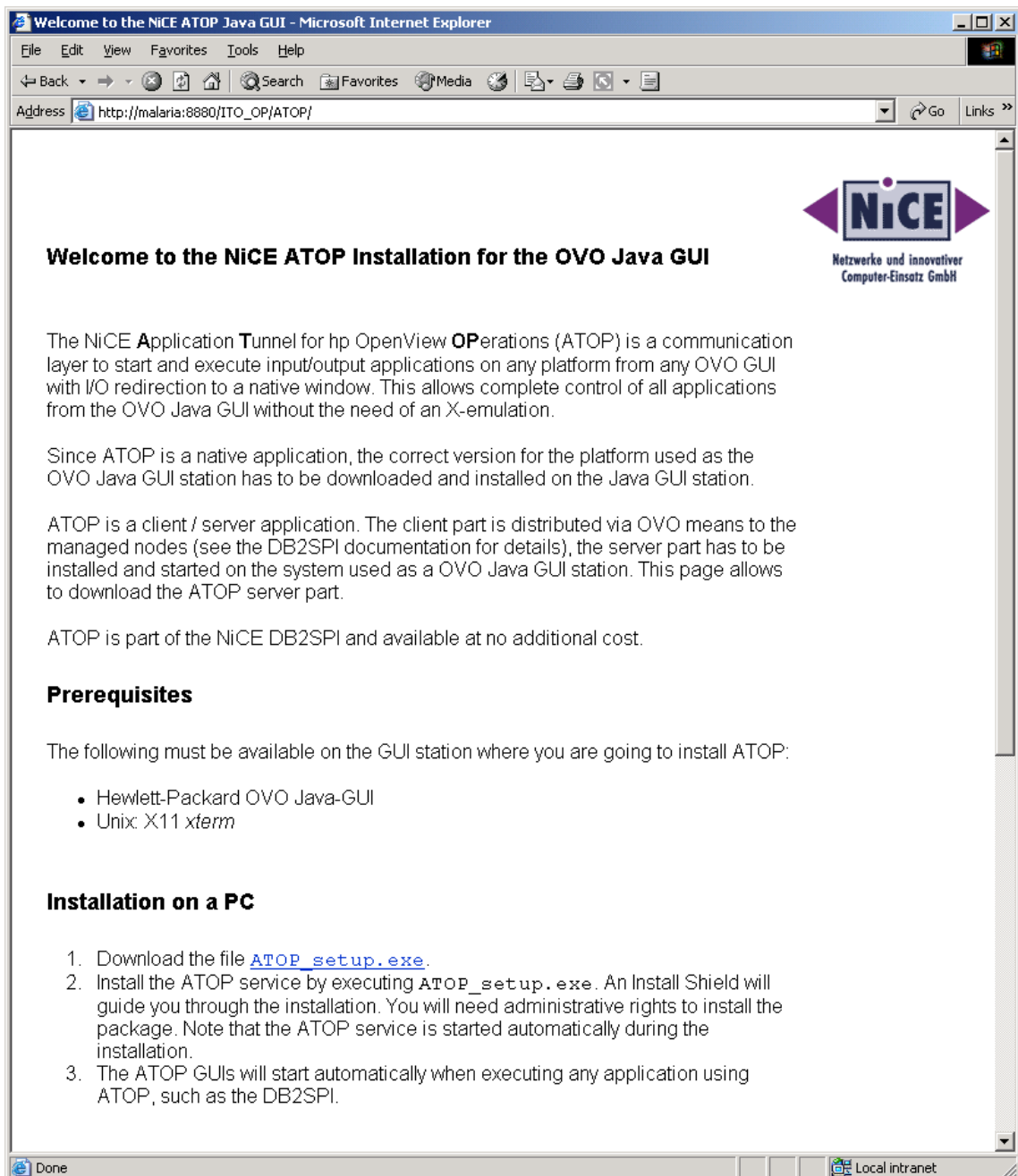
For OM for UNIX 8.x environments:

http://<management_server>:3443/ITO_OP/ATOP/

Don't miss the slash "/" at the end of the line.

The following screen will appear:

Figure 2: Web page for ATOP installation on Java GUI display station



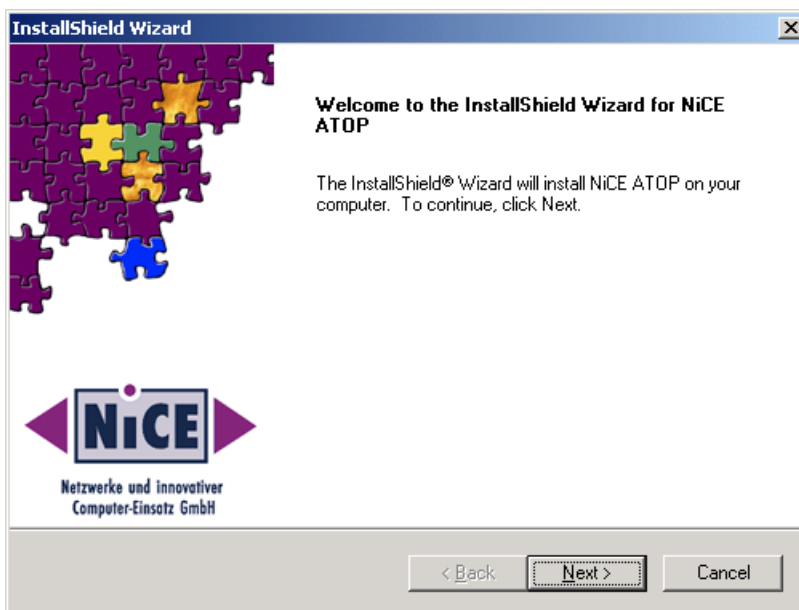
In this screen, select the platform of the Java GUI Display station and download the appropriate ATOP package. Follow the installation instructions as given of the web page.

Executing ATOP Setup on Java GUI Stations on Windows

By starting **ATOP_Setup.exe** from the web screen in OVO/UNIX environments or by directly starting it from the installation CD, an InstallShield guided ATOP server component installation is performed.

The installation process itself is done via InstallShield and you simply follow the instructions given during the setup. You have to accept the license agreement to continue when asked for. However, ATOP usage is covered by the license of the DB2SPI itself.

Figure 3: InstallShield window to set up ATOP on your PC



We are installing the ATOP Java GUI in the same branch as the OM for UNIX Java GUI to indicate the strong relation between them. You cannot operate ATOP without the OM for UNIX Java GUI.

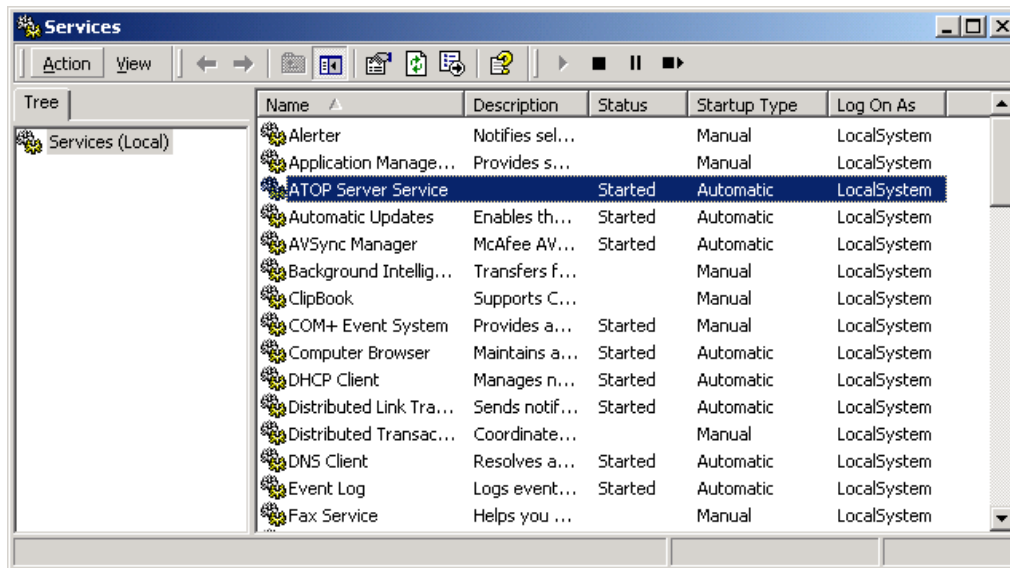
Upon completion of the installation, a final screen showing the success of the installation is displayed.

Verification of Installation on Windows

In Microsoft Windows environments, an ATOP service is added to the system, which is started automatically with the system startup. It acts as the communication access point for applications requesting input/output on the Java GUI station.

From the Start menu, access "Settings → Control Panel → Administrative Tools → Services". You should find an entry named "ATOP Server Service" as shown in the following picture:

Figure 4: ATOP server service on Windows



Getting Started

This chapter gives a brief outline of the steps required to get the DB2SPI up and running quickly in most environments for the experienced Operations Manager user. To set up the DB2SPI and see the first messages in the message browser, you need to carry out the following high-level steps, each of which is described in detail in the sections that follow:

- Setup Steps in OM for Windows Environments
- Setup Steps in OM for UNIX Environments
- Installing DB2SPI Licenses
- Operations Manager Administrative Tasks
- Configuring DB2 Instances
- Distributing the DB2SPI Policies

Setup Steps in OM for Windows Environments

1) Installing DB2SPI Licenses on the Management Server

Before deploying any DB2SPI components to the managed nodes, you need to install the DB2SPI licenses for your environment on the management server.

Although the DB2SPI will start with a 60-day trial license automatically on the managed nodes, it is wise to run with the regular licenses from the very start, if they are available already.

It is strongly recommended to register at the NiCE Customer Portal to obtain the latest news, patches, permanent licenses, contributed software etc. directly from the manufacturer of the product.

The link to the NiCE Customer Portal is

<https://portal.nice.de/Portal/login.jsp>

2) Assigning DB2SPI Administrator Responsibility

In this step, you configure one or more Operations Manager operators in such a way as to allow them to see DB2SPI-related messages, typically used for the self-management of the DB2SPI, and use DB2SPI administration applications.

3) Assigning Operator Responsibility

In this step, you configure the appropriate Operations Manager operators in such a way as to allow them to see DB2-related messages generated by the DB2SPI.

4) Preparing the Management Server Utilities

In this step, you set up the central components of the DB2SPI located on the management server to process the automatic service tree updates.

5) Distributing the DB2SPI Instrumentation and Configuration Items

In this step, you distribute the DB2 management instrumentation and configuration provided with the DB2SPI to the DB2 servers, which are now HP OM managed nodes.

6) Configuring DB2 Instances

In this step, you configure the DB2SPI to recognize the DB2 instances present on the DB2 servers you want to monitor with HP OM.

7) IBM DB2 V8 on UNIX platforms only: Execute the DB2SPI tool "Create Partitionmap".

On large system allow some time to complete (e.g on a DPF system with 2000 SMS tablespaces this might take up to one hour).

This is not required for DB2 V9 databases.

8) Adding Nodes to Node Groups

In this step, you add the DB2 servers you want to manage with HP OM to the appropriate DB2 node groups.

9) Assigning DB2SPI Policies to individual Nodes

In this step, you may assign the DB2SPI policies to individual DB2 servers you want to be monitored with HP OM rather than adding those nodes to the predefined node groups.

Setup Steps in OM for UNIX Environments

1) Make sure that "Selective Distribution" gets aware of the DB2SPI (optional)

This step is required only if you are using the selective distribution configuration file `/etc/opt/OV/share/conf/OpC/mgmt_sv/seldist`

The DB2SPI automatically includes the proper definitions into the OVO configuration file to make use of this functionality.

Run the `opcseldist` utility to re-configure the distribution manager (`opcdistm`):
`/opt/OV/bin/OpC/utills/opcseldist --reconfig` while OVOU is running. After a new start of OVOU this step is not necessary, because the `opcdistm` process reads the `seldist` configuration file during each startup.

2) Installing DB2SPI Licenses on the Management Server

Before deploying any DB2SPI components to the managed nodes, you should install the DB2SPI licenses for your environment on the management server.

Although the DB2SPI will start with a 60-day trial license automatically on the managed nodes, it is wise to run with the regular licenses from the very start, if they are available already.

It is strongly recommended to register at the NiCE Customer Portal to obtain the latest news, patches, permanent licenses, contributed software etc. directly from the manufacturer of the product.

The link to the NiCE Customer Portal is

<https://portal.nice.de/Portal/login.jsp>

3) Assigning DB2SPI Administrator Responsibility

In this step, you configure one or more OVO operators in such a way as to allow them to see DB2SPI-related messages, typically used for the self-management of the DB2SPI, and use DB2SPI administration applications.

4) Assigning Operator Responsibility

In this step, you configure the appropriate OVO operators in such a way as to allow them to see DB2-related messages generated by the DB2SPI.

5) Adding Nodes to Node Groups

In this step, you add the DB2 servers you want to monitor with OVO/UNIX to the appropriate DB2 node groups.

6) Assigning DB2SPI Policies (Templates) to individual Nodes

In this step, you may assign the DB2SPI templates to individual DB2 servers you want to monitor with OVO rather than adding those nodes to the predefined node groups.

7) Distributing the DB2SPI Instrumentation and Configuration Items

In this step, you distribute the DB2 management configuration provided with the DB2SPI to the DB2 servers, which are now OVO managed nodes.

8) Configuring DB2 Instances

In this step, you configure the DB2SPI to recognize the DB2 instances present on the DB2 servers you want to monitor with OVO.

9) Distributing the DB2SPI Policies

In this step, you distribute the DB2SPI templates to the DB2 servers you want to manage with OVO.

Installing DB2SPI Licenses

When delivered via HP's Application CD, two licenses are required – one in order to install it permanently on the HP OM management server and one per managed node for the execution of the SPI code.

The former is obtained from HP as described in the `SPI_CD_Install.pdf` document; section "How to Obtain a SPI License/Password".

The latter are node-specific runtime licenses that must be obtained from the manufacturer of the product, NiCE GmbH in Germany. The installation is described next.

Note that this is essential, as the DB2SPI functionality on the managed nodes is available only if properly licensed, regardless if it is the original product obtained from NiCE or the OEM product sold by HP. When started for the first time, a 60-day trial period is granted by the SPI, but operation will terminate unless a valid runtime license has been added.



Runtime License Installation

Upon initial installation of the DB2SPI, no runtime licenses are installed as the license files are not part of the product. The DB2SPI binaries are delivered without any runtime license.

For convenience of the user a 60-day trial period is automatically activated in case no valid license can be found.

Runtime Licenses can be obtained from NiCE as described in "How to obtain Runtime Licenses" on page 177. This section explains how these licenses can be activated initially with the DB2SPI after installation.

Make sure you have placed the DB2SPI License Update File in a common folder (directory) on the management server.

On OM for Windows systems, this will typically be the `C:\TEMP`.

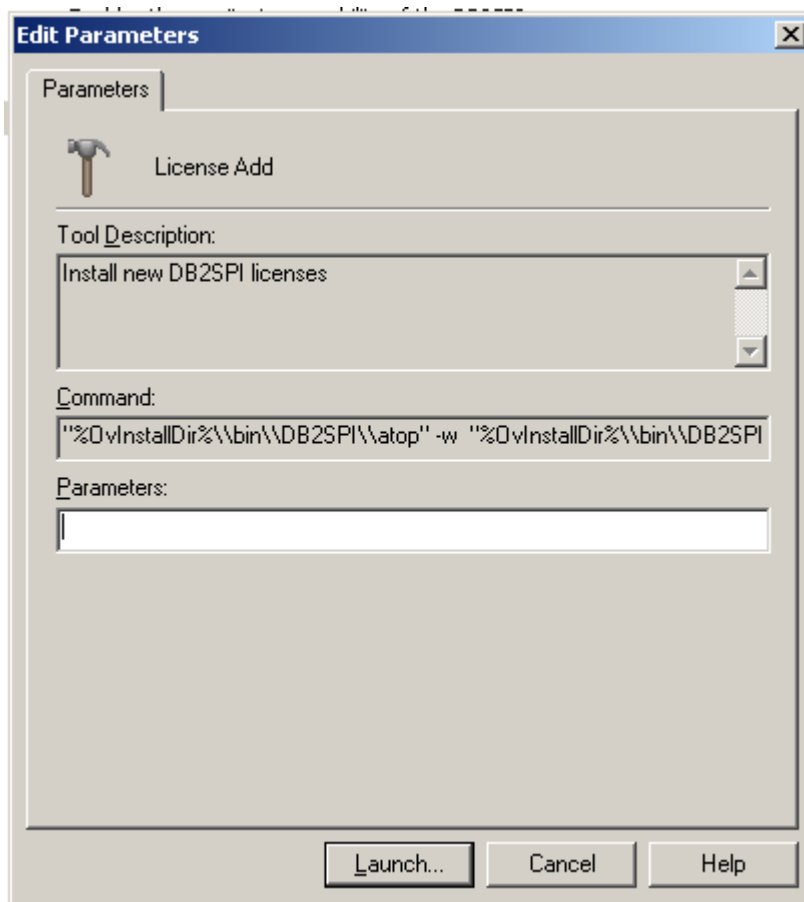
Note that the DB2SPI cannot be operated without a valid runtime license installed on each node. The process of obtaining, installing and maintaining licenses is simple and mostly automatic.

Installing Licenses in OM for Windows Environments

To put the runtime license in the proper directories for deployment:

1. In the OM for Windows GUI, execute the "Add Licenses" tool from the "DB2SPI Admin" tools group.
2. In the window popping up, you need to specify the License Update file with full path information that you placed in a common folder on the management server.

Figure 5: Add DB2SPI License into OM for Windows



3. Then press "OK" to start the process.

An application output window will appear showing the progress of the license installation.

You may close that window when the installation has completed.

Figure 6: "License Add" Output

```

ATOP Window - Press ^C to terminate the application
In order to install licenses you have to accept
the license terms for the DB2SPI.
Do you want to read the license terms for the DB2SPI [yn]? y
*****
* DB2SPI License Terms *
*****

This software end user license agreement is a legal agreement between
you and NiCE GmbH. It provides a license to use the software and
contains warranty information and liability disclaimers.
By installing the software and using the software, you are confirming
your acceptance of the software and agreeing to become bound by the
terms of this agreement. If you do not agree to be bound by these
terms, then uninstall the software from your computer.

1. Ownership
1.1. The license gives you limited license to use the Software.
    NiCE GmbH and its suppliers retain all right, title and interest,
    including all copyright and intellectual property rights, in and to,
    the Software and all copies thereof. All rights not specifically
    granted in this license agreement, including Federal and
    International Copyrights, are reserved by NiCE GmbH and its
    suppliers.

Press RETURN or Q to quit ...q
Do you accept the license terms for the DB2SPI [yn]? y
Done with ibm/rs6000/aix/monitor
Done with sun/sparc/solaris/monitor
Done with hp/s700/hp-ux10/monitor
Done with hp/s700/hp-ux11/monitor
Done with hp/s800/hp-ux10/monitor
Done with hp/s800/hp-ux11/monitor
Done with hp/pa-risc/hp-ux11/monitor
Done with linux/intel/linux24/monitor
Done with linux/intel/linux22/monitor
Done with ms/intel/nt/monitor
Done with hp/pa-risc/hpux1100/monitor
Done with hp/ia64/hp-ux11_32/monitor
Done with hp/ipf32/hpux1122/monitor
Done with sun/sparc/solaris7/monitor
Done with ms/x86/winnt/monitor
Done with linux/x86/linux24/monitor

Finished update of DB2SPI licenses. You need to deploy them to the managed nodes now.

Press any key to close the window ...

lassa.nicelab.de 15.250.250.26 /opt/OV/db2spi/bin/db2s_start db2s_nicelice.pl /tmp/beta_0300_200f

```

The license installation requires that the NiCE License Conditions are accepted.

Before any license is installed, therefore the following questions are asked:

- Do you want to read these license terms? [y|n]:
(possible answers: "y" or "n")

- Do you accept the license terms for the DB2SPI? [y|n]:
(possible answers: "y" or "n")

The display of the license conditions is paged and can be aborted at every page break inserted automatically.

The license(s) can only be installed if the conditions are accepted. If you say "n" (no) when asked for the acceptance of the conditions, no license will be added to the instrumentation for later deployment.

You may close this window when the installation has completed.

Operations Manager Administrative Tasks

Assigning DB2SPI Administrator Responsibility on HP OM for UNIX

The installation of the DB2SPI on a HP OM for UNIX adds two new, DB2-specific user profiles to the HP OM user profile bank, the DB2SPI Admin Profile and the DB2 Operator Profile.

You can use the DB2SPI Admin Profile to create a new HP OM user whose role it will be to manage the DB2SPI itself.

Alternatively, you can use the DB2SPI Admin Profile to expand an already existing operator's responsibilities to include the management of the DB2SPI. This HP OM user will then be able to see all messages from all nodes in any DB2 node group with the message group DB2SPI.

Note, that the management of the DB2 databases is performed via the DB2 operator profile described in "Assigning DB2 Operator Responsibility" on page 47.

The user with an DB2 operator profile will see all messages in any DB2 node group that are sent for the DB2 message group.

Creating a new DB2SPI Administrator in HP OM for Windows

To create a new DB2SPI administrator using the DB2SPI Administrator user role:

1. In the OM for Windows HP Operations Manager Console, open the "User Roles Editor".
2. Select the "DB2SPI Administrator Role" and click on "Properties".
3. In the "Users" tab you can now assign this role to certain users. Click on the "Add" button and select the user you want to assign this user role to. Click on "Add", then on "OK".

Note: You can only assign a user role to users which are in the HP-OVE-OPERATORS user group (see also HP OM for Windows documentation).

Assigning DB2 Operator Responsibility on HP OM for UNIX

You can now use the DB2-specific user profile to create a new HP OM user whose role it will be to manage the DB2 servers. Alternatively, you can use one of the DB2-specific profiles to expand an already existing operator's responsibilities to include the management of the DB2 servers. This enables the operator to see all messages from all nodes in any DB2 node group with the message group DB2.

Creating a new DB2 Operator on HP OM for Windows

To create a new DB2 operator using the DB2SPI Operator user role:

1. In the OM for HP Operations Manager Console, open the "User Roles Editor".
2. Select the "DB2SPI Operator" Role and click on "Properties".
3. In the "Users" tab you can now assign this role to certain users. Click on the "Add" button and select the user you want to assign this user role to. Click on "Add", then on "OK".

Note:

You can only assign a user role to users which are in the HP-OVE-OPERATORS user group (see also OM for Windows documentation).

Adding Nodes to Node Groups

The DB2SPI comes pre-configured with a set of platform-specific node groups for the DB2 servers. These node groups are automatically assigned to the appropriate DB2 template groups during the installation and initial configuration of the DB2SPI. In this step, you only need to add the DB2 servers to the appropriate operating-system-specific nodes group, namely:

- DB2-AIX
- DB2-HPUX
- DB2-SOLARIS
- DB2-LINUX
- DB2-WINDOWS
- DB2-OS400

Adding Nodes to DB2 Node Groups

For HP OM for Windows this step has to be performed after "Configuring DB2 Instances". See "Policy Deployment with HP OM for Windows".

This is because when adding a node to a node group the policies are not only assigned, but automatically deployed if this HP OM for Windows feature is turned on.

Assigning DB2SPI Policies to individual Nodes

Usually, you will have all your DB2 servers in the appropriate default node groups as described in “Adding Nodes to Node Groups” on page 47. However, you may also want to assign the template groups (or even individual policies) to a specific DB2 server. If there is no need to add individual nodes, you may proceed with the next chapter.

Individual Assignment

For HP OM for Windows this step has to be performed after “Configuring DB2 Instances”.

See “Policy Deployment with HP OM for Windows” on page 62.

Preparing the Management Server Utilities

A DB2SPI log file on the management server can be monitored using a log file policy.

To use this functionality, the Management Server must be a managed node itself.

It is not necessary to deploy DB2SPI related instrumentation to the Management Server for this monitoring.

Preparing an HP Operations Management Server

To monitor the DB2SPI log file on the Management Server, the policy/template `DB2SPI_ownlog0` has to be deployed to the Management Server node.

On HP OM for UNIX, this template is automatically assigned to this node.

Only templates have to be redistributed on this node after DB2SPI installation.

On HP OM for Windows, this policy has to be deployed. It is available in the Policy Group `DB2SPI->DB2SPI MgmtSvr`. It is recommended to associate this policy group with the Management Server node.

Distributing the DB2SPI Configuration Items

When working with DB2 installed in a cluster environment, you have to perform the following distribution for all nodes belonging to the cluster, regardless if DB2 is currently executing on them or not.

Setup of Managed Nodes using HP OM for Windows/UNIX

In order to activate the functionality provided with the DB2SPI, you need to deploy the instrumentation to the managed nodes which host the DB2 servers. Please refer to the HP OM for UNIX Administrators Guide to distribute Commands and Monitors using HP OM for UNIX.

When using HP OM for Windows, right-click on the managed node (DB2 server) in the Console Tree and select "All Tasks → Deploy Instrumentation". You need to deploy

- DB2SPI (this includes ATOP)
- SHS Data Collector
- SPI Data Collector

Note: You should not distribute the DB2SPI policies at this point in time to a DB2 server. This is because the DB2SPI is able to recognize and manage multiple DB2 instances and you need to configure DB2SPI components to recognize the multiple instances before you activate monitoring on the DB2 servers by distributing the DB2SPI policies.

If you accidentally distribute the DB2SPI policies using HP OM for UNIX, undo it. For this purpose, de-assign the node from the DB2SPI node group, re-distribute policies and then start over.

Alternatively, you may also launch the tool "DB2SPI Disable" to stop all HP OM agent related activities.

Configuring DB2 Instances

In this section, you use the DB2SPI administrator's application "Config Setup" to tell the DB2SPI, which subset of the DB2 database instances are to be monitored using DB2SPI and HP OM. The following aspects will be described:

- Configuration Setup Checklist
- Preparatory Steps to Manage DB2 Servers in Clusters
- Non-root HP OM Agent on UNIX Nodes
- HP OM Agent Requirement on Windows Nodes
- Distinctions between UNIX and Windows Nodes
- Configuration Workflow
-

Integration into Switch-Over Process for DB2 Clusters

Due to the determination of the DB2 version during this configuration process, the database must be up and running.

Before starting the configuration, make sure that DB2 is up and running.
For all instances to be managed the "START DATABASE MANAGER" must have been given.

Configuration Setup Checklist

The following information should be assembled and decisions should be reached **before** starting the configuration process:

Table 7: Configuration Setup Checklist

| For DB2 servers running on Windows: | |
|--|---|
| Localization of the DB2 installation: | US / DE /FR ? |
| Name of the DB2 admin user: | |
| Domain of the user account: | |
| Password of the DB2 admin user: | |
| For all DB2 server: | |
| Which instances should be monitored? | |
| Name | Verify that it is started |
| | |
| | |
| Which databases should be monitored? | |
| Name | Excluded from monitoring? y / n |
| | |
| | |
| | |
| Global configuration for all instances and databases | |
| Monitor DB2 on i5/OS (OS400) systems? | y / n |
| Should DB2 be integrated in Performance Agent for system resource utilization? | y / n |
| Should replication be monitored? | y / n |
| Define the time frame for the graphical data store: Required disk space is estimated after selection with the option to change the selected definition. | 1 month 3 months 6 months 1 year |

Preparatory Steps to Manage DB2 Servers in Clusters

The DB2 server can be operated either standalone or in a cluster. For standalone configuration you may safely ignore this section.

The DB2SPI can support a DB2 cluster installation with little effort in preparing the managed node appropriately.

UNIX Managed Clusters

On UNIX clusters, the following preparations must be done:

- Create a directory `/var/opt/OV/db2spi` (HP-UX, Solaris, Linux) resp. `/var/lpp/OV/db2spi` (AIX) on the shared disk. This directory will later contain all the shared runtime data (log files, metric stores etc.)
- Create a directory `/etc/opt/OV/db2spi` on the shared disk. This directory will later contain all the configuration data for the DB2SPI operating.

If this preparation has been done, the configuration described next must be done on one node only. However, this node must currently host the DB2 server software package. Configuration data as well as runtime data are shared between the nodes of the cluster.

Windows Managed Clusters

On Windows clusters, data disk sharing in the OV directory trees is currently not supported.

Therefore, the configuration described next must be done on each node of the cluster while the DB2 server resource group is currently active on it.

Non-root HP OM Agent on UNIX Nodes

If you are running the HP OM HTTPS agent on the managed in a non-root account (UNIX nodes only), you have to take an additional step before any DB2SPI tool can be executed.

This step consists in the definition of allowed users the DB2SPI may switch to, the setup of the proper environment. It is described in "Running the Agent in a non-root Account" on page 74.

Note that the DB2SPI can neither be configured nor operated in non-root agent environment without having executed this preparation.

Please note also that OV Performance or Measure Ware Agents (OVPA/MWA) need to be restarted manually after the instance configuration has been created, and this is possible only from a "root" session. An integration between the DB2SPI and OVPA/MWA is only possible if the non-root Agent user has sufficient permissions to write to the file `/var/opt/perf/parm`. Otherwise the setup will fail.

When using OVPA 4.5 please verify that the file `/var/opt/OV/conf/perf/datasources` has sufficient permissions that the non-root Agent user can write to it. Otherwise the setup will fail.

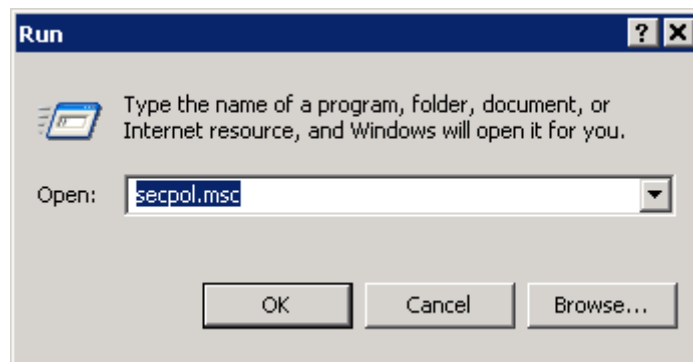
For older version of OVPA (MWA) check the file `/var/opt/perf/perflbd.rc` for the same reason.

Operations Manager Agent Requirement on Windows Nodes

An issue may be related to Windows security policies and the configuration of the Operations Manager agent. The 'system' account and therefore the Operations Manager agent is unable to logon as the respective DB2 administrative user. As a result, DB2SPI's "Config Setup" tool cannot determine the information required from DB2 UDB. You need to check the following user rights assignments on the Windows managed node.

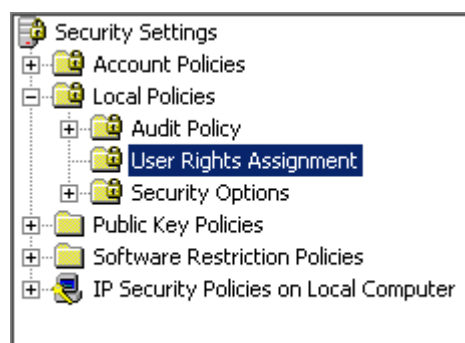
This can be done by the MMC snap-in `secpol.msc` – open up a 'Run' Dialog via Start-Menu and enter '`secpol.msc`' here:

Figure 7: Open security Policy editor



On the left hand of the dialog you'll find the respective element under 'Local Policies-->User Rights Assignment'.

Figure 8: Locate „User Rights Assignments“



Please verify that the 'System' account under which the agent is running is listed in the 'security setting' field.

Figure 9: Required Security Policies

| Policy | Security Setting |
|---------------------------------------|-------------------------|
| Access this computer from the net... | Everyone, Administr... |
| Act as part of the operating system | |
| Add workstations to domain | |
| Adjust memory quotas for a process | LOCAL SERVICE, NE... |
| Allow logon through Terminal Servi... | Administrators, Rem... |
| Back up files and directories | Administrators, Back... |
| Bypass traverse checking | Everyone, Administr... |
| Change the system time | Administrators, Pow... |
| Create a pagefile | Administrators |
| Create a token object | |
| Log on as a batch job | SUPPORT_388945a0 |
| Log on as a service | NETWORK SERVICE |
| Remove computer from docking st... | Administrators, User... |
| Replace a process level token | LOCAL SERVICE, NE... |
| Restore files and directories | Administrators, Back... |

The Operations Manager agent ('system') account should be allowed to:

- Act as part of the Operating System
- Bypass traverse checking
- Create a token object
- Replace a process level token

Additionally, the DB2 administrative user must have the right 'Log on as a service' assigned.

Distinctions between UNIX and Windows Nodes

The DB2SPI can recognize and manage different DB2 instances running on a single DB2 server. In general, the setup is very similar on both platforms. However, due to the way how users are set up for DB2 in the UNIX and Windows world, some minor differences need to be considered.

If you want to be able to access a DB2 instance later, you will need the following information from the DB2 server:

A DB2 administrator responsible for the respective DB2 server must provide the information about the various DB2 accounts listed.

- Administration User (on UNIX based DB2 servers)

On UNIX managed nodes the DB2SPI switches to the instance user environment in order to perform all operations upon DB2; some of them

require full control of the instance that can only be guaranteed by the instance owner. He may be set up with any kind of command shell.

- Administration Server and password (for Windows DB2 nodes only)

On Windows based DB2 servers, the user is asked for the name of the DB2 installation user (or any other user who is accepted by DB2 and allowed to perform the needed operations). In addition, the password for this user is requested (shown in plain text during entry!). However, it is then stored in encrypted form in the DB2SPI instance configuration file for later access to the databases.

At a later time, you may execute the tool `Instance List` from the DB2SPI `Tools` group to check which instance information has been configured.

Although the DB2SPI provides an auto-discovery of the instances available on the DB2 server, there is no automatic monitoring enabled for them. The user has to decide about the instances that need to be monitored.

Configuration Workflow

The configuration of the managed instances and databases is an important step on each DB2 server. Normally, this is executed only once after proper planning what is to be managed and what not.

We therefore describe all steps in great detail.

At the end of this section (" Configuration Setup " on page 59) a log recorded during a setup session has been added and that may help to see the flow in overview.

As the very first step on Windows DB2 servers you have to decide about the language of your installation. A list is shown with the languages supported and you may select one of them.

Automatic Checks and Preparations

When executing the `Config Setup` tool, it first checks if there are any DB2SPI policies active. If so, they are all disabled, because the configuration cannot be established or replaced while they are running.

It also checks if a DB2SPI license file is available. If no license file should be found on the managed node, the setup will install a 60-day trial license. Note that this type of license can only be extended by request to the manufacturer of the software as described in "Appendix D: DB2SPI Licensing" on page 177.

Workflow for Version Discovery and Basic Configuration

To enable DB2SPI support for V8 and V9 the configuration flow of the DB2SPI had to be changed compared to earlier releases of the DB2SPI.

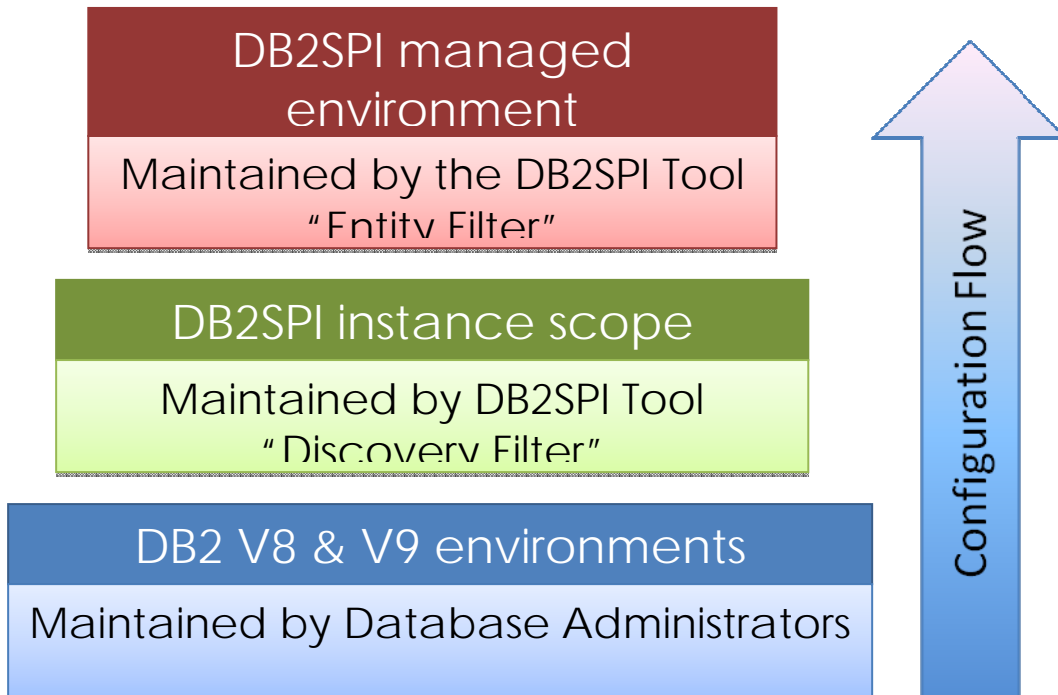
The configuration of the DB2SPI now consists of two steps, which are executed automatically during the setup:

- Definition of the DB2SPI instance scope

- Configuration of the DB2SPI managed environment

To change any part of the configuration at a later time, the DB2SPI Admin tools "Discovery Filter" and "Entity Filter" may be used.

Figure 10: Configuration flow



Configuration of the Instance Scope

The DB2SPI instance scope contains the list of instances that shall be visible to the DB2SPI. It does not make any assumptions about databases, tablespaces or other DB2 objects that belong to these instances. So this is kind of a high-level filter for the highest DB2 entity available.

If an instance is not included in the DB2SPI instance scope or set to "invisible", it is hidden from the DB2SPI. This also means that it will not appear in the service tree for the managed environment.

To set the instance scope the DB2SPI Tool "Discovery Filter" can be applied. This tool determines all instances and allows setting their visibility for the DB2SPI monitoring appropriately. It is executed automatically during the initial configuration.

It must be executed whenever a DB2 instance has been created that shall be monitored by the DB2SPI, or a DB2 instance formerly managed (monitored) has been dropped from the DB2 environment.

By default newly created instances are not included in the DB2SPI instance scope, so this must be done actively by the user.

Configuration of the DB2SPI Managed Environment

The configuration of the managed environment uses the DB2SPI tool "Entity Filter". This tool may also be executed separately at a later time to switch the monitoring for any entity.

To assist with the configuration of the managed environment, a detailed entity discovery is performed.

In a two-stage process the DB2SPI first looks for all instances and databases and then performs a detailed search for all components belonging to them. The entire configuration of partitions, bufferpools, tablespaces and processes is determined and saved in the DB2SPI instance configuration file. The DB2SPI also determines the DB2 edition, version and patch level as well as the installation paths for all instances automatically.

By default most of the discovered entities (partitions, bufferpools, tablespaces and some processes) are set to be "monitored". If any of these entities should not be monitored, use the DB2SPI Admin tool "Entity Filter" to switch off monitoring.

Select Instances and Databases

After the instance scope has been determined, the "Configuration Setup" shows all available instances on the DB2 server as a numbered list.

The default is that the instances detected are not visible to the DB2SPI. This is represented by a '(-)' following the name of the instance. To monitor an instance it must be made visible to the DB2SPI. This can be achieved by the option "switch the visibility state of an existing instance".

After making the necessary visibility changes for all instances which should be monitored by the DB2SPI, the user may proceed with the setup by selecting "continue with DB2SPI setup". The visible instances ("Instance Scope") are shown once again now their actual monitoring can be enabled or disabled. Please keep in mind the different statuses of an instance, their visibility status versus their monitoring status. Only visible ones can be monitored, but this can be switched on and off at any time.

i5/OS based Databases

You are asked to decide if DB2 on i5/OS400 systems should be monitored or not.

Do not select this if you do not have DB2 installations which should be monitored by the DB2SPI using this configuration setup.

Enable Database Monitoring

By default, all databases of a monitored instance are enabled for monitoring.

However, you may select databases that shall be excluded from monitoring from the very start during the configuration setup. A question is asked if any such exclusion is to be performed.

In case you decided to exclude one or more databases by entering "y", each database available in the respective instance is shown and you may decide if this database shall be excluded or not.

- Answer "y" (yes) if you want exclusion from monitoring (no messages, no performance data from this database)
- Answer "n" (no) if you want it to be monitored.

Excluded databases as well as instances may be included later on easily with the help of the tool "Entity filter".

Data Collection Setup during Instance Configuration

On most platforms, performance metrics can be collected with the OV Performance Agent (OVPA; also known as "MeasureWare agent", MWA) or the embedded performance agent (CODA). For a proper integration during DB2SPI configuration setup, the OVPA/MWA should be running and healthy. On UNIX, you can select to integrate into OVPA standard collector SCOPEUX.

Make sure to have the DSI2DDF tools installed on the management server and deployed to the managed node before running "Config Setup".

The DB2SPI checks the existence of `ddfcomp` on the managed node. If it should not exist during setup, no metric data will be stored for reporting or graphing.

During the configuration of the instances to be monitored the following steps are taken automatically for the setup of performance data collection:

- Determination of the DDF-Tools availability (i.e. `ddfcomp`) on the managed node.
- If available, set up specific data source descriptions for all configured instances to collect data for both OVPM and OV Reporter analysis.
- Shutdown and restart MWA/OVPA (if configured) to make it aware of the new configuration. This is done automatically on UNIX like systems and has to be done manually on Windows systems.

If `ddfcomp` cannot be detected, no data collection will take place. Only OVO based metric threshold monitoring (hence alarming) will be available, but no graphs, reports or history collection. A proper message about the omission of the metric collection setup is provided in this case.

The DB2SPI may collect a significant amount of data from tablespace monitoring in a so-called "drilldown" database. This is especially true for configurations that consist of a large number of DB2 tablespaces (more than 100). We have verified that the DB2SPI can collect data for as much as 3000 tablespaces!

In order to limit the file holding the collected data, the user is asked to select from a 1 / 3 / 6 / 12 month timeframe for the data collection in this drilldown database. As a guideline, take this and calculate your own need:

For 88 tablespaces, we have a disk space requirement of
256 / 512 / 1024 / 2048 Mb.

The space required for the actual configuration (i.e., considering the monitored databases and their entities, down to the tablespace level) is calculated by the "Config Setup" tool and is displayed for your convenience.

Note: The Config Setup shows you if the data sources for DB2SPI are already defined by previous setups. In case the data sources are already present they can be reused if they have been created by DB2SPI Version 03.20 or later. . You will be informed by the following message:

```
Skipping datasource creation (already defined)
```

DB2 Replication Monitoring

The tool then asks if DB2 SQL Replication should also be monitored.

If answered "n", the respective DB2SPI component is disabled. Please note that it cannot be switched on at a later time without doing the complete configuration again.

If answered "y", a discovery is performed for all "Capture" schemata and "Apply" qualifiers defined on the node of our server. Configuration information is stored for the log file monitoring of DB2 Replication at a later time.

Discovery of DB2 Log Files and Finishing Setup

After these user actions, the DB2SPI continues to discover various additional configuration data automatically and directly from DB2:

- Location and name of administrative log files
- SQL capture and apply paths if SQL replication is setup and monitoring desired

After successful completion of DB2 instance setup, the tool "Config Setup" lists some additional activities that it has performed and then attempts to send a message to the Operations Manager message browser informing the HP OM users with DB2SPI profile / user roles that the DB2 instance setup has been successful.

Note that the following or a very similar warning may be displayed if an `opcmsg` policy is not yet present on the managed node hosting the DB2 server.

```
Message interface opcmsg(1) is unavailable / cannot be used
```

This is a normal warning message. A DB2SPI `opcmsg` policy will be installed during the deployment of the DB2SPI policies.

Note: Strange characters might appear at certain phases during the setup.

This happens if an instance user has a profile with 'Startup Screen' or alike. Since we switch into the instance user context, such user profile output may disturb the output of the tool.

Some Notes on the Discovery Process after the initial Configuration

With the "Config Setup", the instances are defined that can be monitored entirely and from the very start, i.e., all databases found in these instances are monitored automatically (unless excluded explicitly, as described above).

However, the DB2SPI permanently checks the configuration of DB2 for changes after the initial setup has been performed. This applies only to visible instances!

New instances that might have been created must be "registered" for the DB2SPI as follows:

- To make them "visible" to the DB2SPI, first start the "Discovery Filter" tool and declare this new instance to be "visible" for our deeper discovery.
- Wait about one hour to allow the DB2SPI performing a deeper discovery of all databases, partitions etc. of this new instance (not managed yet, however!)
- Newly discovered instances are not monitored by default.
- Enable their monitoring via the "Entity Filter" tool described in "Entity Filter" on page 81.

Newly discovered databases belonging to already known instances are monitored by default. This makes it very comfortable to add or remove databases without additional configuration effort of the DB2SPI.

If you want to disable some databases from being monitored you may run the "Entity Filter" tool from the DB2SPI Admin tools application group at any time to define exclusion lists of databases.

The instance configuration and all the subentities and their monitoring state also determine the elements shown or omitted in the DB2 branch of the ServiceNavigator display described in "Service Management with HP OM" on page 128.

Operations Manager Configuration Setup Example

A typical "Config Setup" session is shown next. All user entries are printed in bold type.

```
This operation may take some time, because we must
synchronize this action with the OVO agent
Running preliminary DB2 instance discovery
INFO: No DB2SPI instance scope configuration file yet

The following DB2 instances are in DB2SPI's instance scope:
  1. db2inst1  (-)
  2. db2inst2  (-)

Please choose your action:
  1      add instances to DB2SPI's scope
  2      switch the visibility state of an existing instance
  3      continue with DB2SPI setup
Enter one index: 2

Please select the instance to switch the visibility state for
```



```
1      db2inst1
2      db2inst2
3      db2inst3
Enter one index: 1
Visibility will be set to 'on' for instance 'db2inst1'
Is this correct? [y|n]: y

The following DB2 instances are in DB2SPI's instance scope:
1. db2inst1  (+)
2. db2inst2  (-)
3. db2inst3  (-)

Please choose your action:
1      add instances to DB2SPI's scope
2      switch the visibility state of an existing instance
3      continue with DB2SPI setup
Enter one index: 2

Please select the instance to switch the visibility state for
1      db2inst1
2      db2inst2
3      db2inst3
Enter one index: 2
Visibility will be set to 'on' for instance 'db2inst2'
Is this correct? [y|n]: y

The following DB2 instances are in DB2SPI's instance scope:
1. db2inst1  (+)
2. db2inst2  (+)
3. db2inst3  (-)

Please choose your action:
1      add instances to DB2SPI's scope
2      switch the visibility state of an existing instance
3      continue with DB2SPI setup
Enter one index: 3
Searching for instances and databases (please be patient) ...

Please enter the numbers for the instances to be monitored
(separated by space)
1      db2inst1
2      db2inst2
Enter indexes: 1 2
Do you want to monitor DB2 on i5/OS400 systems as well?
[y|n]: n
The following databases have been found for instance
'db2inst1':
SAMPLE

Do you want to exclude some databases from being monitored?
[y|n]: n
The following databases have been found for instance
'db2inst2':
SAMPLE

Do you want to exclude some databases from being monitored?
[y|n]: n
Do you want DB2 to be integrated into OVPA standard collector
SCOPEUX for system resource utilization? [y|n]: y
SCOPEUX integration has been established

Shutting down OVPA collection software
Shutting down scopeux, pid(s) 13725
Waiting on 13725 (10 more tries)
```



The OVPA collector, scopeux has been shut down successfully.
NOTE: The Transaction Tracking daemon, ttd will be left running. pid 13701

The OVPA scope collector is being started.
The Transaction Tracking daemon /opt/perf/bin/ttd, is already running.
It will be signaled to reprocess its configuration file.

The performance collection daemon /opt/perf/bin/scopeux has been started.

Do you want to monitor SQL replication? [y|n]: **n**
Adding performance measurement ...

Reporting Data Store 'DB2_SPI' will occupy 1.2881 MB of disk space for the default buffering of 7 days.

Graphing Data Store will occupy 4.0303 MB of disk space for the default buffering of 31 days.
Enter time frame for graphing data store [1M,3M,6M,1Y] >**1M**

Graphing Data Store will occupy 4.0303 MB of disk space for the default buffering of 31 days.
Do you want to proceed with this selection? [y|n]: **y**
Creating datasource 'DB2_SPI_GRAPH' ...
Looking for all bufferpools and tablespaces now ...

Reporting Data Store 'DB2SPI_DrillDown' will occupy 8.3633 MB of disk space for the default buffering of 7 days.

Thank you, initialization finished. Configuration is in '/var/opt/OV/conf/db2spi/db2s_instances.cfg'

Message interface opcmsg(1) is unavailable / cannot be used

Press any key to close the window ...

Integration into Switch-Over Process for DB2 Clusters

Note: This section applies to the DB2 server being managed by "classical" means of Operations Manager, i.e., without applying the "Cluster Awareness" available with HTTPS agents and virtual nodes, as described in the OM for UNIX 8.x documentation.

At this place, we explain the integration of DB2SPI switch-over into the DB2 switch-over process.

When making use of the "virtual node" concept of OM for UNIX 8.x, switch-over is automatically provided by the Operations Manager platform and no specific actions need to be taken by the user.

Running DB2 application packages (a.k.a. resource groups) under cluster control offers a great improvement for the availability of DB2.

The functionality of the DB2SPI must also be switched together with the DB2 server; otherwise lots of error messages would be created on nodes where DB2 is currently not running, but the DB2SPI (and the HP OM agents) are.

The specific switch-over scripts for the respective cluster administration software therefore need to be extended by adding the following function calls:

- To enable the DB2SPI when a package activation takes place:
`db2s_start db2s_db2spi.pl ON`
- To disable the DB2SPI when a package de-activation takes place:
`db2s_start db2s_db2spi.pl OFF`

You need to make sure that the cluster administration software is aware of the paths of the Operations Manager agent to use this functionality.

Distributing the DB2SPI Policies

After configuring the DB2SPI to recognize the DB2 instances running on the DB2 server you want to monitor with Operations Manager and assigning the DB2SPI policies, you need to distribute the DB2SPI policies to the DB2 servers, as follows.

If the DB2 server is installed in a cluster environment, the policies must be deployed to all physical nodes belonging to the cluster. However, they are activated only when the DB2SPI (and DB2) is active on the respective system.

Since DB2SPI 03.50 there is a policy for the management server as well. This log file policy monitors the DB2SPI's own log file on the Management server.

Policy Deployment with HP OM for Windows

You can deploy policies by doing one of the following:

- Add the DB2 server node to the appropriate DB2SPI node group. In this case the policies get automatically deployed to this managed node. This is described in the next section, "Adding Nodes to DB2 Node Groups "

- Manually deploy the appropriate DB2SPI policy group or specific policies (depending on the managed node platform). This is described in the section, "Individual Assignment in OM for Windows"

Deploying the DB2SPI policies to the DB2 server automatically activates monitoring on the DB2 server.

Note: If you stopped the Operations Manager agents in a previous step, restart them now.

Adding Nodes to DB2 Node Groups

To add a DB2 server running on HP-UX to the correct node group:

1. In the OM for Windows Console, open the "Nodes Editor".
2. In the Node tree, drag and drop the node on the DB2-HPUX Node Group.

Make sure that you had configured the node for the DB2SPI, before you add the node to a DB2SPI node group. Otherwise, you will immediately see some error messages in the message browser for this node (see sections "Distributing the DB2SPI Configuration Items" for more information).

3. The appropriate DB2SPI policy groups are automatically deployed to the node, after it was added to the DB2SPI node group.

Individual Assignment

Use the OM for Windows Console to assign the appropriate DB2SPI policies to the managed nodes (the DB2 servers), as follows:

1. In the "Policy deployment" section of the Console Tree, right-click the DB2 Policy group or specific policy you want to deploy and select "All Tasks → "Deploy on".
2. Select the node(s) you want to deploy the policies to and click on "OK".



Using the DB2SPI

This section describes what tools are available to both the DB2SPI administrator and the DB2SPI operator to assist them in the performance of their every-day tasks. The section covers the following areas:

- Components in the Operations Manager Administration Scope
- DB2SPI Administrator Tasks
- DB2 Operator Tasks

This section also describes the day-to-day tasks that a DB2SPI administrator and a DB2SPI operator can expect to carry out:

Components in the Operations Manager Administration Scope

DB2SPI Node Groups

During the installation of the DB2SPI software, the DB2SPI adds the node groups listed in Table 8 to the Operations Manager GUI.

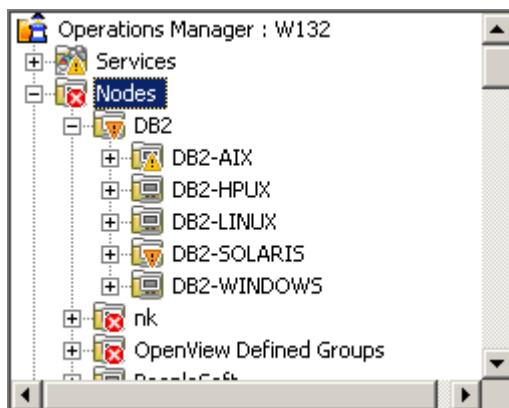
Table 8: DB2SPI Node Groups

| Node Group | Description |
|-------------|---|
| DB2-AIX | Contains all DB2 servers running on the supported AIX platforms |
| DB2-HPUX | Contains all DB2 servers running on the supported HP-UX platforms |
| DB2-Solaris | Contains all DB2 servers running on the supported Solaris platforms |
| DB2-LINUX | Contains all DB2 servers running on the supported LINUX platforms |
| DB2-WINDOWS | Contains all DB2 servers running on the supported Windows platforms |
| DB2-OS400 | DB2 server running on i5?OS (aka. OS/400) |

Note, that the DB2SPI automatically assigns the appropriate template groups to the DB2SPI operating system specific node groups. Consequently, it is not necessary to perform any additional steps to configure DB2 servers apart from adding the DB2 managed nodes to the appropriate, operating-system-specific node groups.

In OM for Windows, the DB2 Node Groups are just a branch in the "Nodes" part of the console tree as shown in Figure 11: DB2SPI Node Groups in OM for Windows.

Figure 11: DB2SPI Node Groups in OM for Windows



Maintaining DB2SPI Node Groups

The Operations Manager Administrator must make sure that the DB2 servers have been added to the appropriate platform-specific DB2SPI node groups created during the installation of the DB2SPI.

The DB2SPI installation process automatically assigns the appropriate DB2SPI policies to the DB2SPI node groups and assigns the DB2SPI appropriate DB2SPI node groups to the default DB2SPI user profiles.

However, this default node-group configuration is not required by the DB2SPI. If you prefer to set up special assignments for your own environment, or need more limited management capabilities, or perhaps simply for test reasons, you can choose to do without the default DB2SPI node groups.

Note If you do not use the DB2SPI node groups, you will have to configure the appropriate message-group and template-group assignments manually.

DB2SPI Tools

During the installation of the DB2SPI software, the DB2SPI adds the tools as shown in the next few figures.

On top level, just two application groups are added that allow a distinction between administrative (DB2SPI Admin) and operational (DB2) applications.

The applications "ChangeAdmUser" is applicable only on HP OM for Windows. All other applications may be executed on any platform for any DB2 server.

DB2SPI Admin Tools

The DB2SPI Admin Tools application group looks as follows in OM for Windows:

Figure 12: DB2SPI Admin Tools Group

| Name | Description |
|------------------------------|---|
| Change AdmUser | Changes the admin user account (Windows only) |
| Config Delete | Erase settings on selected node |
| Config Setup | Initializes settings on selected node |
| Datastore Delete | Delete the metric stores |
| Datastore Setup | Set up the metric stores |
| DB2SPI Disable | Disables monitoring capability of the DB2SPI |
| DB2SPI Enable | Enables the monitoring capability of the DB2SPI |
| Discovery Filter | This tool allows the maintenance of DB2SPI's discovery filter. The Discovery Fil... |
| Entity Filter | Define the list of entities to be monitored. |
| License Add | Install new DB2SPI licenses |
| License Check | Check the DB2SPI licenses for managed nodes |
| License List | List all DB2SPI licenses added on the MgmtSvr |
| OPCMON Disable | Disables metric forwarding to OVO via opcmon |
| OPCMON Enable | Enables the metric forwarding to OVO via opcmon |
| Performance Reports Disable | Disables the forwarding of metric data to performance agents |
| Performance Reports Enable | Enables the forwarding of metric data to performance agents |
| Self-Healing Info DB2 Server | Runs SHS data collector on the DB2 server |
| Self-Healing Info OVO Server | Runs SHS data collector on the OVO server |
| ServiceTree Update | Enforce update of the DB2 service tree |
| Show DB2SPI Log | Shows the DB2SPI log file |
| Snapshot Disable | Stops the DB2 snapshots from being created |
| Snapshot Enable | Starts the DB2 snapshots to be created |
| Trace Definition | Defines tracing of the DB2SPI |

DB2 Tools

The DB2 Tools application group shows the tools that are accessible to the DB2 operator and appear as follows:

Figure 13: DB2 Tools application group

| Name | Description |
|--------------------|---|
| DB2 Management | Applications for DB2 Management (Unix) |
| ASCII Report | Starts the ASCII Reports selection/creation |
| DB2 CLP | Starts the command line processor |
| Instance List | Lists instances |
| Instance Start | Starts a DB2 instance |
| Instance Stop | Stops a DB2 instance |
| Replication Sta... | Check the status of DB2 Replication |
| Show DB Config | Show the database configuration |
| Show Mgr Config | Displays the DB2 manager configuration data |
| Show Snapshot | Show snapshot data for a selected database |

The embedded "DB2 Management" group provides a large set of interactive, administrative tools described in "Advanced Management Tools" on page 102.

In Table 9 all applications are listed that are available for managed nodes.

Table 9: DB2SPI Application Groups for managed nodes

| Application Group | Application | Description |
|-------------------|---|---|
| DB2 Tools | ASCII Report | Select an area and create drill-down report for metrics of this area Executes the db2 utility on the managed node to enter commands interactively Displays the DB2 manager configuration data |
| | DB2 CLP | Executes the db2 utility on the managed node to enter commands interactively Displays the DB2 manager configuration data |
| | Instance List | Lists all managed DB2 instances and databases present on the DB2 server and their monitoring status |
| | Instance Start | Starts a DB2 instance |
| | Instance Stop | Stops a DB2 instance |
| | Replication Status | Check and report the status of DB2 replication |
| | Show DB Config | Display configuration of a selectable DB2 instance / database) |
| | Show Mgr Config | Display configuration of the DB2 manager |
| | Show Snapshot | Show metric data for a selectable instance / database |
| | DB2 Management | Interactive tools that allow administrative tasks on instances and databases |
| DB2SPI Admin | ChangeAdmUser (Windows) | Changes the DB2 Admin User account (Windows only) |
| | Config Setup | Define the instances that need to be managed |
| | Config Delete | Removes the instance definition file |
| | Datastore Delete | Delete the metric stores |
| | Datastore Setup | Set up the metric stores |
| | Entity Filter | Defines DB2 object exclusion lists for all managed objects |
| | DB2SPI Disable | Stop all monitoring of DB2 on the selected node |
| | DB2SPI Enable | Start all monitoring of DB2 on the selected node |
| Discovery Filter | This tool allows the maintenance of DB2SPI's instance scope. The instance scope defines what DB2 instances are visible to DB2SPI. | |

| Application Group | Application | Description |
|-------------------|------------------------------|---|
| | License Check | Check the DB2SPI license for the managed node |
| | PerfRep Disable | Stop forwarding metric data to OVPA/CODA agent |
| | PerfRep Enable | Start forwarding metric data to OVPA/CODA agent |
| | OPCMON Disable | Stop forwarding metric data to Operations Manager agent |
| | OPCMON Enable | Start forwarding metric data to Operations Manager agent |
| | Self-Healing Info DB2 Server | Collect data on the selected node for support calls |
| | ServiceTree Update | Enforce immediate DB2 service discovery |
| | Show DB2SPI log | Show the DB2SPI log file |
| | Snapshot Disable | Stop DB2 snapshot creation |
| | Snapshot Enable | Start DB2 snapshot creation |
| | Trace Definition | Define tracing of DB2SPI processes (use only for troubleshooting) |
| DB2SPI for OS400 | AdmUser Config | Change the user credentials for the OS400 connection |
| | Collection Start | Start the performance data collection on the OS400 Host |
| | Collection Stop | Stop the performance data collection on the OS400 Host |
| | Queue Transfer Start | Start the transfer of message queue data from the OS400 host |
| | Queue Transfer Stop | Stop the transfer of message queue data from the OS400 host |
| | Snapshot Disable | Stop the performance snapshot on the OS400 host |
| | Snapshot Enable | Start the performance snapshot on the OS400 host |

In Table 10 the applications are listed that are executed on the Operations Manager management server.

Table 10: DB2SPI Applications executable on Operations Manager server

| Application Group | Application | Description |
|-------------------|-------------|-------------|
|-------------------|-------------|-------------|

| | | |
|--------------|------------------------------|---|
| DB2 Tools | ServiceTree Assign | Assign the DB2 service tree to yourself (for OM for UNIX only) |
| DB2SPI Tools | License Add | Add DB2SPI licenses to the Operations Manager configuration (no deployment yet) |
| | License List | List all DB2SPI licenses added on the management server |
| | Self-Healing Info OVO Server | Collect data on the management server for support calls |

Note, that all these applications are executed in separate windows on the user's display station by making use of either Operations Manager-intrinsic methods or the DB2SPI-intrinsic windowing system (ATOP).

DB2SPI User Profiles (User Roles)

During the installation of the DB2SPI software, the DB2SPI adds the users and user profiles listed in Table 11 to the Operations Manager GUI.

Table 11: DB2SPI User Profiles

| User-Profile Name | Description |
|----------------------|--|
| DB2 Operator Profile | Operations Manager user profile for the DB2SPI user |
| DB2SPI Admin Profile | Operations Manager user profile for the DB2SPI administrator |

The responsibility matrix for the DB2SPI user profiles automatically assigns the message group DB2 and all the DB2 node groups to the DB2 Operator Profile user profile. Similarly, the message group DB2SPI and all the DB2 node groups are assigned by default to the DB2SPI Admin Profile user profile.

The DB2 Operator profile is responsible for:

- all messages with Message Group attribute "DB2" from any node contained in the node groups "DB2-AIX", "DB2-HPUX", "DB2-SOLARIS", "DB2-LINUX" or "DB2-WINDOWS"
- and, in addition, can execute any application in the Application Group "DB2"

The DB2SPI Admin profile is responsible for:

- the entire DB2 Operator profile
- all messages with Message Group attribute "DB2SPI" from any node contained in the node groups "DB2-AIX", "DB2-HPUX", "DB2-SOLARIS", "DB2-LINUX" or "DB2-WINDOWS"
- and, in addition, can execute any application in the Application Group "DB2SPI" (and, implicitly, those of the group DB2 since the DB2 operator profile is embedded)

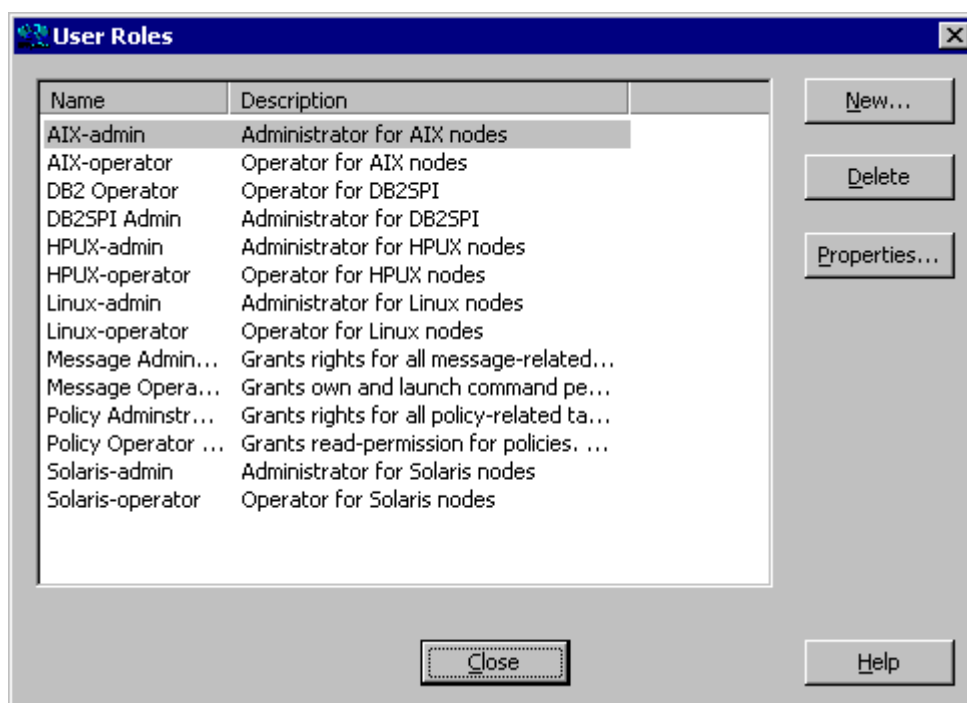
Maintaining DB2SPI Users in Operations Manager

The Operations Manager Administrator is responsible for assigning the DB2SPI user profiles to the appropriate users or using the DB2SPI user profiles to create new Operations Manager users.

User Roles in OM for Windows

After the successful installation of the DB2SPI, the `User Role Editor` shows the DB2 Users Roles as in the following example (Figure 14: The DB2SPI User Profiles).

Figure 14: The DB2SPI User Profiles



DB2SPI Policies

During the installation of the DB2SPI software, the DB2SPI adds the policies and template groups shown in Table 12 to the Operations Manager GUI.

Table 12: DB2SPI Message-Source Template Groups

| Top Template Group | Template Group | Description |
|--------------------|--------------------|---|
| DB2SPI AIX | DB2SPI Base | Base management components for DB2 servers (UNIX and Windows) |
| | DB2SPI Base (UNIX) | Common components for all UNIX(-like) systems |

| Top Template Group | Template Group | Description |
|--------------------|--------------------|--|
| DB2SPI HP-UX | DB2SPI Base | Base management components for DB2 servers (UNIX and Windows) |
| | DB2SPI Base (UNIX) | Common components for all UNIX(-like) systems |
| DB2SPI Linux | DB2SPI Base | Base management components for DB2 servers (UNIX and Windows) |
| | DB2SPI Base (UNIX) | Common components for all UNIX(-like) systems |
| DB2SPI Solaris | DB2SPI Base | Base management components for DB2 servers (UNIX and Windows) |
| | DB2SPI Base (UNIX) | Common components for all UNIX(-like) systems |
| DB2SPI Windows | DB2SPI Base | Base management components for DB2 servers (UNIX and Windows) |
| DB2SPI MgmtSvr | | This group contains the policy needed for monitoring the DB2SPI log file on the management server. |
| DB2SPI OS400 | | This group contains the policies needed for monitoring DB2 on OS400 |

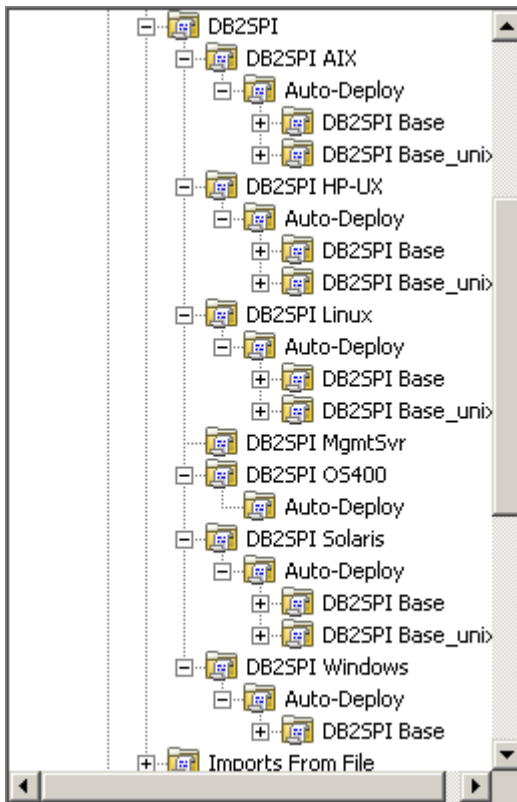
The platform-specific DB2SPI template groups (policy groups in OM for Windows) are automatically assigned to the platform-specific DB2SPI node groups when installing the DB2SPI. Individual nodes need to be assigned to those node groups, or the platform-specific DB2SPI template groups must be assigned specifically to such individual nodes that are not contained in a DB2SPI node group.

Note that the management server itself does not need to be a DB2SPI managed node, but it should receive the log file policy for the DB2SPI log on the management server.

Policy Groups in OM for Windows

Figure 15: DB2SPI policy groups shows the policy groups that are available after the successful installation of the DB2SPI software.

Figure 15: DB2SPI policy groups



Other Operations Manager Administrator Tasks

Running the Agent in a non-root Account

The Operations Manager agent can be configured to run in a non-root account on a HTTPS agent managed node. This has quite some impact upon the DB2SPI, because this usually disables the direct "su" capability required to switch to the proper DB2 user environment. Non-root DCE agent setups are not supported by the DB2SPI.

However, a tool is available with the DB2SPI that can be executed to enable such functionality even for non-root HTTPS agents.

After the Operations Manager agent has been switched to a non-root account by the `ovswitchuser` command, the following steps need to be performed on the managed node.

Note, that these steps are required if the DB2SPI is freshly deployed to such a managed node before any DB2SPI activities including "Config Setup" are performed or immediately after the agent has been switched to non-root.

Steps:

1. Login on the managed node as user 'root'.
2. Change directory to the instrumentation directory
(`/var/opt/OV/bin/instrumentation`)

3. Run `db2s_start db2s_root.pl`
4. Edit `/etc/db2spi.su` file to add allowed users.

To allow executions for any commands as instance user, please use `!*!`

For example, add your instance user to this file like this:

```
db2inst1:*
```

Now the SPI will operate with the necessary rights.

These steps must be performed every time when agent user was switched.

In the `db2spi.su` file, you have to enter the instance user names of all instances you want to monitor with the DB2SPI. Do not forget to update this file when adding new instances.

Executing the tool "Config Delete" to remove the DB2SPI configuration removes the file `/var/opt/OV/db2spi/db2s_sudo` which is needed for the SPI to work on a non-root Agent system. "Config Delete" does not delete `/etc/db2spi.su`. It has to be removed manually using an account with appropriate rights (root).

Suppressing Unwanted Messages from "su" Monitoring

The DB2SPI sometimes has to switch the user environment in order to be able to execute particular applications properly. Since the root-user on the DB2 server is involved in this action, entries are generated in the `syslog` log file, indicating that a "su" event has taken place.

The standard `Logfile:syslog` template on HP-UX managed nodes or the `Logfile:su` template on AIX managed nodes detect these `su` events and notify the user by sending a message (with an "unknown" or "normal" severity, respectively) to the message browser.

You can prevent these messages appearing in the message browser by adding a condition to the `Logfile:syslog` template on HP or the `Logfile:su` template on AIX. The new condition would suppress these (regular) messages, similar to the condition that Operations Manager uses on the management server itself to drop "su" events in the ORACLE environment.

For more information about suppressing messages generated by the DB2SPI, see "Troubleshooting" on page 133.

DB2SPI Administrator Tasks

This section describes the high-level, day-to-day tasks the DB2SPI Administrator is expected to perform. This section covers the following areas each of which is described in more detail in the sections that follow:

- General Remarks in Advance
- DB2SPI License Tools
- Maintaining DB2 Instances, Databases and the Service Tree
- Affecting the Performance Data Flow

- Other Tasks and Tools

To assist the DB2SPI user in the performance of every-day tasks, the installation process of the DB2SPI creates three application/tool groups specifically for the DB2SPI:

| | | |
|------------------|----------|---|
| DB2 | database | contains applications for operating the DB2 |
| DB2SPI Admin | DB2SPI | contains applications for the administration of the |
| DB2SPI for OS400 | | contains applications for i5/OS400 monitoring |

General Remarks in Advance

GUI Prerequisites and common Steps

- In HP OM for UNIX environments, all tools can be run from the HP OM operator Motif GUI or from the HP OM operator Java GUI.
The Motif GUI interface to the DB2SPI tools is available without any other steps to take. The Java GUI interface must be enabled on the Java GUI station of the operator similar to the HP OM Java GUI itself.
- In HP OM for Windows environments, all tools can be run from any HP OM for Windows Console.
The OM Console on the management server can be used without any other steps to take. On any other console station, the DB2SPI console package has to be installed, before the DB2SPI tools can be executed from these Consoles.

Many DB2SPI tools act upon a single DB2 instance. In case there are more than one currently being monitored on a DB2 server, the DB2SPI tool first asks which DB2 instance shall be taken. If only one DB2 instance is present, the application immediately carries out the task requested.

DB2SPI Admin Tools

The application group DB2SPI Admin contains applications that enable the DB2SPI administrator to manage the DB2 instances and general DB2SPI behavior with Operations Manager HP OM.

The list shown next represents the DB2SPI Admin application group, which by default contains the following applications (tools in OM HP OM for Windows):

- Change AdmUser
- Config Delete
- Config Setup
- Datastore Delete
- Datastore Setup

- DB2SPI Disable
- DB2SPI Enable
- Discovery Filter
- Entity Filter
- License Add
- License Check
- License List
- OPCMON Disable
- OPCMON Enable
- PerfRep Disable
- PerfRep Enable
- Self-Healing Info DB2 Server
- Self Healing Info OVO Server
- ServiceTree Update
- Show DB2SPI Log
- Snapshot Disable
- Snapshot Enable
- Trace Definition

These applications appear in the DB2SPI Admin Tools application-group window as shown in "DB2SPI Admin Tools "on page 67.

DB2SPI License Tools

Before any DB2 monitoring can be performed, you need to have DB2SPI runtime licenses installed. There are three tools available for the licensing context:

- License Add:
Add DB2SPI runtime licenses on the management server
- License List:
Show all runtime licenses currently installed on the management server
- License Check:
Verify that the managed node where executed has a valid runtime license

Adding DB2SPI Licenses

All DB2 servers monitored with the DB2SPI need to have an appropriate runtime license. This is a node-locked license, which is checked by the DB2SPI whenever access to DB2 is requested via the DB2SPI.

There is only one license file per customer, holding all runtime licenses that have been obtained. This file is distributed to the managed nodes together with the "instrumentation" (HP OM for UNIX: "monitors") with standard HP OM means.

In order to add new runtime licenses to this common file, a tool is available in the DB2SPI Admin group, "Add Licenses".

In order to install new runtime licenses, the following steps must be performed:

Start the License Add Tool from the GUI

1. Make sure you have placed the DB2SPI License Update File in a common folder (directory) on the management server.

On HP OM for UNIX systems, this will typically be the `/tmp` directory, on HP OM for Windows probably `C:\TEMP`.

2. In the HP OM for UNIX GUI, execute the "Add Licenses" application from the "DB2SPI Tools" application group with the "Start Customized" option.

On HP OM for Windows, execute the tool and enter the path to the license file in the parameter field.

3. In the window popping up, you need to specify the name of the recently installed DB2SPI License Update File with full path information.

4. Then press "OK" to start the process.

An application output window will appear showing the progress of the license installation, as can be seen in "Install and activate a DB2SPI Runtime License".

License Terms

It is mandatory to accept the license terms of the DB2SPI in order to install runtime licenses. Therefore these terms are provided in conjunction with the license installation and they can be viewed if desired.

When the question appears:

```
Do you want to read the license terms for the DB2SPI [yn]?
```

Answer "y" or "n".

If you selected to read the license terms, they will be shown in this window in a paged manner, with the option to abort reading at any time. The text is identical with the license terms signed with the purchase of the product.

License Term Acceptance

After the terms have been shown in their entirety (or this step has been skipped with an "n" given earlier, or aborted during the read process, the question appears:

```
Do you accept the license terms for the DB2SPI [yn]?
```

- If you say "n" (no), installation of the license(s) is terminated and the product will not be licensed and cannot be used with DB2 server.

- If you say "y" (yes) you indicate the acceptance of the terms and license installation will continue.

List all installed DB2SPI Runtime Licenses

To verify the list of runtime licenses installed on the given HP OM management server the tool "License List" can be executed. When being executed it lists all runtime licenses with the related nodes and expiry dates in an ATOP window.

An example is given here:

```

-----
DB2SPI License Report on w134
=====
DB2SPI License Report on OVO Server w134:
=====
This report lists all licenses found in the license file
on the management server. No validation checks are performed
for this report

Type      Version      Expiry Date  Locked to
-----
Tier 2 == A.03.50  2008-03-31  * (not locked)
Do you want to preserve the output in 'C:\Documents and
Settings\All Users\Application Data\HP\HP BTO
Software\shared\log\db2spi\db2s_licrep.txt'? [y|n]:
-----
  
```

The keys preceding the version mean: "identical" ("==") or "up to" ("<=")

An expiry date of 2999-12-31 means an unlimited time frame.

License Check

Executing the License Check tool can help finding out if there is a valid runtime license for this node. It is advisable to execute it if the DB2SPI cannot be configured at all with messages like "no license found", or if similar messages show up during normal operation.

As you know, the runtime licenses are node locked and / or time-restricted, so installed runtime licenses may become invalid when the "hostname" changes or the evaluation time frame expires.

The typical output of the License Check is shown here:

```

-----
DB2SPI License Report on a48
=====
DB2SPI License Report on managed node a48:
=====
This report lists all licenses found in the license file
on the managed node. Only licenses which were generated for
this node are listed

Type      Version      Expiry Date  Locked to      License
is
-----
---
Tier 2 == A.03.50  2008-03-31  * (not locked)  Valid
  
```

```
Do you want to preserve the output in '/tmp/db2s_licrep.txt'?  
[y|n]: n
```

```
Press any key to close the window ...
```

Maintaining DB2 Instances, Databases and the Service Tree

This section contains information that you require when using the DB2SPI to maintain the DB2 instances you are monitoring with HP OM.

Initial Configuration of DB2 Instances (UNIX and Windows)

A number of different instances of the DB2 database can run on a DB2 server at any one time. All or any combination of these instances might need to be monitored and maintained by HP OM. The initial configuration of the instances is done via the tool "Config Setup", executed on the DB2 server. For more information about configuring instances of DB2, see "Configuring DB2 Instances" on page 40.

Note: If the DB2 "Config Setup" is not executed correctly, errors or warning are displayed and you might be unable to execute any other DB2SPI applications on the DB2 servers.

In addition, the DB2SPI will not be able to monitor the different DB2-related log files and processes on the DB2 server or even collect performance data.

Also, strange message may appear in the log files and / or message browser.

To track any issue during this important phase, lots of information is collected in the log file and a separate trace file.

Also note that the DB2 service tree display in the Service Navigator only shows instances and its underlying components that are configured to be monitored with this "Config Setup" or the "Entity Filter" application.

Changing the list of monitored instances in a DB2 environment that has already been configured with the DB2SPI can be achieved by using the "Discovery Filter" and "Entity Filter" tools,

DB2SPI Tool: "Discovery Filter"

Beginning with DB2SPI version 03.30, DB2 V8 and V9 are fully supported, including simultaneous monitoring on the same server. The DB2SPI tool "Discovery Filter" defines the instance scope in which the DB2 discovery of the DB2SPI should act. Instances, which are switched to invisible, are excluded from the monitoring scope of the DB2SPI.

Furthermore the tool allows adding DB2 setups in non-standard installation paths, which cannot be discovered by the DB2SPI.

The tool must be executed whenever a DB2 instance is created that shall be monitored by the DB2SPI, or a DB2 instance formerly monitored has been dropped from the DB2 environment.

Use Cases for the DB2SPI Tool “Discovery Filter”:

- A new DB2 instance is created:

In case a new DB2 UDB instance is created and monitoring is desired the “Discovery Filter” tool must be executed to add the instance to the DB2SPI scope.

By default, the DB2SPI discovery is executed every 60 minutes. Once it has completed, all database objects (databases, partitions, tablespaces, etc) have been discovered and are available in the DB2SPI tool “Entity Filter”. Appropriate messages are forwarded to the message browser to inform the operators.

Do not forget to enable the new instance for monitoring by actively setting it to “managed” using the “Entity filter”.

- A DB2 instance is dropped:

In case a DB2 UDB instance, which has been monitored by the DB2SPI, is dropped from the DB2 V8 or V9 environment the “Discovery Filter” tool must be executed. Please select “invisible” for the instance that has been dropped.

- Upgrade from V8 to V9

Note that you must disable the DB2SPI before the upgrade starts. After the upgrade from V8 to V9 has been completed follow the procedure described in the first use case. The DB2SPI should then be re-enabled after the “Discovery Filter” tool has been executed to allow the DB2SPI Discovery to detect the database configuration.

Entity Filter

This function can be used to enable or disable monitoring of any entity within the DB2 scope. Entities are DB2 instances, databases and underlying objects (like buffer pools, tablespaces, databases, etc.) and processes. These entities are discovered automatically when configuring the DB2SPI on the DB2 server, or at a later time with the DB2SPI discovery component. The entities and their relations form a "configuration element tree" that is stored and maintained in the DB2SPI instance configuration file.

This interactive tool provides navigation through this tree. It basically comprises of two alternating choices, element selection and operation selection.

At any time the user is informed about the location in the configuration element tree.

Selection of an Element to deal with

Depending on the level in the element hierarchy, an appropriate list is shown:

| Level | Element List |
|----------|-------------------|
| Server | List of instances |
| Instance | List of databases |

| | |
|-------------|--|
| Database | List of partitions |
| Partition | "Tablespace" or "Bufferpools" or "Processes" |
| Tablespaces | List of tablespaces within that partition |
| Bufferpools | List of bufferpools within that partition |
| Processes | List of processes within that partition |

With each element the monitoring status the DB2SPI currently assumes is shown for it:

- + indicates that the element is monitored
- indicates that the element is not monitored

The tool displays all elements prefixed with a sequence number. Enter one of them to select an element for the subsequent operation. If you enter "0", no element is chosen and this level is left. Subsequently, the element list for next-higher level is shown.

Selection of an Operation to be performed

Depending on the type and level of the element chosen, a set of actions is offered to choose from. The following table lists all available actions:

- Cancel
- Open element
- Set element managed
- Set element unmanaged

As always, a number must be entered to select the desired action. Entering "0" leads you back to the latest element list for a new element selection.

Note, that setting an element "unmanaged" will also disable the monitoring of all its contained elements. Setting a previously "unmanaged" element to "managed" will restore the monitoring status the elements had earlier.

Freshly discovered elements are monitored ("managed") by default, unless they are of type "instance". However, enabling the monitoring for such a new instance will also turn on monitoring for all its databases and subsequent elements, as the defaults demand.

As an example, the dialogue that has been executed when disabling monitoring of a certain partition:

```

Current entity:      DB2
Chosen subentity:   DB2:DB2
Select a function (0 to cancel)
  1.   Open element
  2.   Set element managed
  3.   Set element unmanaged

>1
Current entity:      DB2:DB2
Chosen subentity:   DB2:DB2:SAMPLE
Select a function (0 to cancel)

```

1. Open element
2. Set element managed
3. Set element unmanaged

>1

Current entity: DB2:DB2:SAMPLE

Choose a subentity (0 to go up)

1. + W130_0/W130/0
2. + W131_1/W131/1

>2

Chosen subentity: DB2:DB2:SAMPLE:W131_1

Select a function (0 to cancel)

1. Open element
2. Set element managed
3. Set element unmanaged

>3

Current entity: DB2:DB2:SAMPLE

Choose a subentity (0 to go up)

1. + 000(w131.nicelab.de)
2. - 001(w131.nicelab.de)

>0

Current entity: DB2:DB2

Chosen subentity: DB2:DB2:SAMPLE

Select a function (0 to cancel)

1. Open element
2. Set element managed
3. Set element unmanaged

>0

Current entity: DB2

Chosen subentity: DB2:DB2

Select a function (0 to cancel)

1. Open element
2. Set element managed
3. Set element unmanaged

>0

Press any key to close the window ...

Whenever changing the monitoring status of any element, the DB2 service tree will be updated automatically.

Changing the Administrative Account (DB2 on Windows Nodes)

In Windows environments, access to the managed instances and databases is gained via the DB2 administrative account. This account might be changed by the DB2 administrators at any time to follow some security policies and the DB2SPI needs to be re-configured to adapt to changed account information.

Since this account information is stored well encrypted, a separate tool is required to modify these account data. The following shows a typical dialogue for the change of account information this way:

```
Hostname: W158          Change DB2 Administrator user name and
password
```

```
=====
You need both the admin user account and the password
Do you want to continue changing? [y|n]: y
Please enter the name of the DB2 admin user (e.g. db2admin):
db2admin
Please enter the domain of the user account or '.' if it is a
local account: nicelab
Please enter the password of this user (displayed while
typing!): thisisplaintext

Press any key to close the window ...
```

Configuration Deletion

If you want to delete the DB2SPI from a DB2 server, or if you entered data incorrectly during the instance setup, you can execute the Config Delete application to remove **all** instance configuration settings. You can re-enter the new or corrected values by running "Config Setup" again.

When clearing the instance settings this way, the HP OM policies are still deployed, but disabled automatically.

If you want to disable DB2 monitoring permanently, you should also remove the node from the respective DB2SPI node group or de-assign the template groups from it, if it is an individual node. In both cases, make sure to "Install & Update Software & Configuration" after that.

When dropping the instance definition, the DB2 service tree will be updated automatically and delete the respective branches for this node.

A typical dialogue can be seen here (some lines are not shown to keep it shorter):

```
W158
      DB2SPI Configuration Deletion
      =====
Removing DB2SPI configuration files ...
Are you sure? [y|n]: y
Please wait ...
Processing 'DB2SPI_ownlog1' ...
      * Disable all policies for the specified selection on
host
      'localhost'.
INFO:   Disable operation completed successfully.
Processing 'DB2_repliclog_win' ...
      * Disable all policies for the specified selection on
host
      'localhost'.
INFO:   Disable operation completed successfully.
Processing 'DB2SPI_fsize' ...
      * Disable all policies for the specified selection on
host
      'localhost'.
INFO:   Disable operation completed successfully.
Should the performance data stores be preserved? [y|n]: n
Removing performance measurement ...
Removing 'C:\Program Files\HP OpenView\data\db2spi\metrics'
Removing 'C:\Program Files\HP OpenView\data\tmp\db2spi'
```



```
Removing 'C:\Program Files\HP OpenView\data\conf\db2spi'  
  
The instance configuration data have been deleted  
  
Finished  
  
C:\Program Files\HP OpenView\data\log\db2spi\db2s_trace.log  
1 file(s) copied.  
  
Press any key to close the window ...
```

NOTE: If the DB2SPI was setup to work with a non-root Agent, "Config Delete" does not delete /etc/db2spi.su. It has to be removed manually using an account with appropriate rights (root). The file does not exist if no special setup for non-root Agent systems was done.

Enable and Disable the entire DB2SPI

There is a tool pair, which is used to switch operation of the DB2SPI on the given node, "DB2SPI Enable" and "DB2SPI Disable". These tools affect the operation of the policies belonging to the DB2SPI and hence enable / disable all background monitoring activity of the SPI. All DB2SPI tools are kept unaffected and so are automatic and operator actions.

Note that the disabling may take a while to complete as the proper synchronization points in the operation of the HP OM agents processing the policies have to be reached.

Enabling / disabling determines all policies the have "DB2_" or "DB2SPI_" as part of their names and switches them accordingly (except "DB2_nnnn" type, which are passive threshold monitor policies).

When using different policy names for their DB2 monitoring the customer has to make sure that these fragments are still part of the policy names in order to preserve functioning of these tools. Note that these are also applied during "Config Setup" and "Config Delete".

Updating the Service Tree

The DB2 services available in the service tree are determined from the list of instances and their database exclusion lists, and the discovery process also takes into account the DB2 configuration itself. An update of the service tree is triggered internally whenever a "Config Setup" or "Entity Filter" is executed, and the DB2SPI periodically checks the DB2 instances if new databases should have been created or others have been deleted or filtered.

However, the periodic check might be inappropriate sometimes, and the user might want to enforce an update immediately. This can be achieved by using the "ServiceTree Update" tool. When applied to a managed DB2 server node, it immediately performs the discovery and cross-checks with the instance and database exclusion lists.

More details about the service tree data processing can be found in section "Service Management with HP OM

" on page 128.

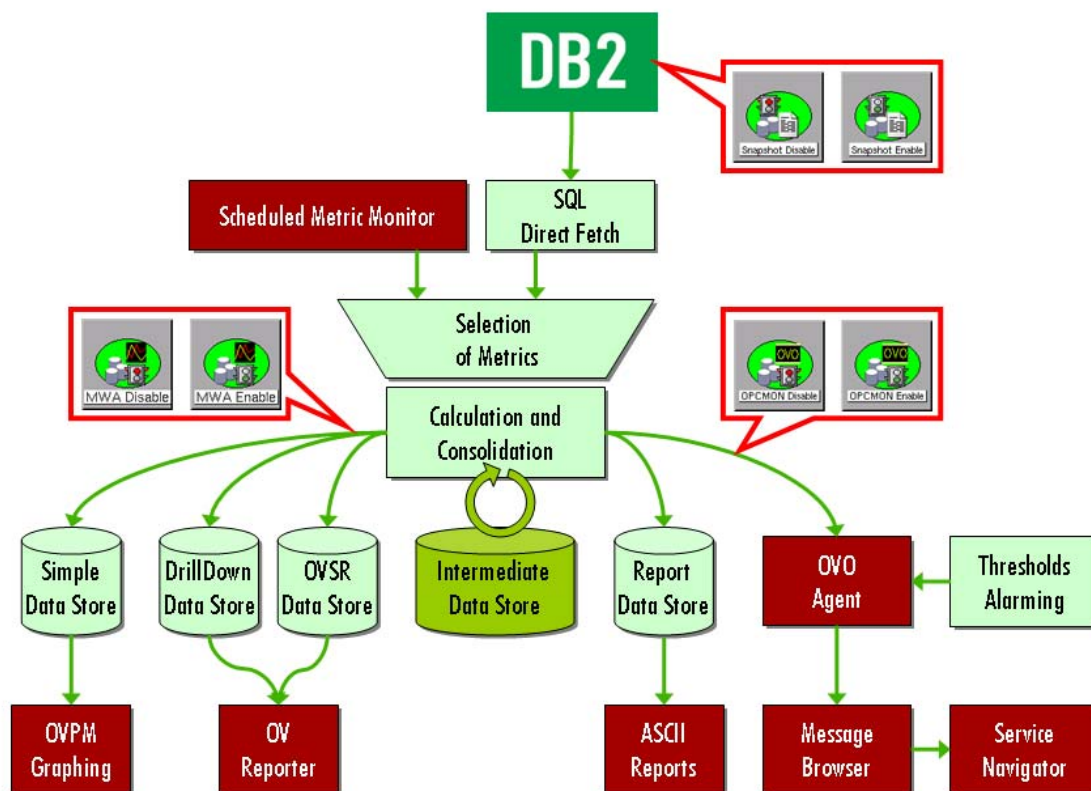
Affecting the Performance Data Flow

This section contains information that you require when maintaining the processing of metric data collected. Please see "Performance Data Collection" on page 118 for details how performance data are collected and processed by the DB2SPI.

The data flow shown in Figure 16: Metric Data Collection and affecting Tools on page 86 can be affected at three points, symbolized there by three pairs of tool labels and implemented as applications in the "DB2SPI Admin" application group.

This section describes the purpose and steps of these applications.

Figure 16: Metric Data Collection and affecting Tools



Performance Data Access Methods

Starting with version A.03.00 the DB2SPI provides a new, efficient method to process performance data via direct SQL access.

SQL direct fetch is a very fast access method without the need to create and interpret snapshot value files. This is available for DB2 8.1 and later only. Older versions of DB2 are hence not supported for metric data collection.

Note that with the sole support of SQL access the former method to provide user defined metrics (UDMs) is not supported any longer. Instead, NiCE offers the creation of customer specific metrics as a service.

Please note that the DB2 internal performance monitors must be enabled (see next section, Enable / Disable DB2 Snapshots) in order to collect and retrieve these data.

Enable / Disable DB2 Snapshots

DB2 must be configured to provide performance snapshot data. By default, there are no such data provided, so there would be no performance data for threshold monitoring, graphing and reporting.

With the tool "Snapshot Enable" the DB2 database is reconfigured to provide such information. Note, that this requires a short shutdown of the database, which may be a critical step in some production systems.

The shutdown is required because the "default switches" for the DB2 internal monitors need to be modified, and they need to cycle the database to take effect.

In Figure 17 you see the dialogue of "Snapshot Enable" execution:

Figure 17: Dialogue during "Snapshot Enable" process

```

Starting snapshot data collection on s40
=====

Please select an instance on s40
 1      db2inst1
 2      db2inst2
Enter one index (\a to abort): 1

      Instance Attachment Information

Instance server      = DB2/SUN64 8.2.3
Authorization ID     = DB2INST1
Local instance alias = DB2INST1

DB20000I The UPDATE DATABASE MANAGER CONFIGURATION command
completed
successfully.

DB20000I The DETACH command completed successfully.

DB20000I The TERMINATE command completed successfully.

Snapshot creation has been enabled for instance 'db2inst1'

Press any key to close the window ...

```

Disabling DB2 snapshot data creation works similar by executing the "Snapshot Disable" tool in the DB2SPI Admin application group,

A proper message is written to the DB2SPI log file and to the HP OM message browser to inform about the change of the switch.

Alternatively, enter the following command in a command shell on the DB2 server:

```
db2 update dbm cfg using DFT_MON_BUFPOOL on
DFT_MON_LOCK on DFT_MON_SORT on DFT_MON_STMT on
DFT_MON_TABLE on DFT_MON_UOW on
```

Note that DB2 may sometimes show misleading messages on the terminal window when performing this switch, consequently making the DB2SPI believe that it failed.

However, sometimes these are just warnings without impact. You should verify correct operation afterwards with the "Show Snapshot" tool if you are in doubt.

Enable / Disable OPCMON Forwarding

The forwarding of metric data to HP OM and hence threshold monitoring and Operations Manager message creation can be enabled or disabled with the "OPCMON Enable" and "OPCMON Disable" applications.

Note that, when disabled, threshold monitoring does not take place and you will not receive any messages in the HP OM message browser if DB2 resources are outside their normal range.

At the same time, metrics may be forwarded to OVPA/CODA for reporting / graphing.

A proper message is written to the DB2SPI log file and to the Operations Manager message browser to inform about the change of the switch.

Enable / Disable Metric Forwarding to OVPA/CODA

DB2 systems that do not have OVPA/CODA installed should disable "performance data forwarding". A pair of switches is available to achieve this change in DB2SPI internal processing, named "PerfRep Enable" and "PerfRep Disable".

A proper message is written to the DB2SPI log file and to the HP OM message browser to inform about the change of the switch.

At the same time, metrics may be forwarded to HP OM for threshold monitoring and alerting.

Note, that this applies to both OVPA and CODA data storage types, whatever is apparent on the managed node.

Other Tasks and Tools

Specific Metric Thresholds with Template Name Spaces

By default, the DB2SPI uses fix names for the metric threshold monitor policies in OM for UNIX and OM for Windows. These names are hard coded in the

`db2s_metrics.cfg` configuration and hence apply to all managed systems in a similar way.

The name space extension allows prefixing the names of these policies with a string freely definable, thus making it possible to maintain different sets of threshold monitors while still using the same `db2s_metrics.cfg`.

Call Syntax

Whenever calling `db2s_db2mon.pl`, you may pass a `-t <prefix>` parameter before the list of metrics in the command line like:

```
db2s_db2mon.pl -t MYDEV_ -i <metric_list>
```

or

```
db2s_fsize.pl -<logfile parameter> -t MYDEV_
```

This will forward all values determined for the metrics listed to respective threshold monitors which are named `MYDEV_<original_name>`.

Usage in the DB2SPI

This can be used in the DB2SPI easily by copying the schedule policies `DB2_10m_metrics_*` and `DB2_30m_metrics_*` and `DB2_60m_metrics_*` to new names and adapting the `db2s_db2mon.pl` call in them accordingly.

Make sure that you will deploy only one set of metric schedule policies to the nodes, according to their "threshold set" desired.

Note that all instances and databases on a given system will use the same policies; there is no instance or database specific distinction possible.

Show DB2SPI Log

The "Show DB2SPI Log" tool opens a terminal window and displays the DB2SPI log file for the DB2 server that is being selected.

Screen output is separated into pages. After each page the user may decide to continue viewing the output or jumping to the end.

- In order to continue browsing through the snapshot, simply press **<RETURN>**.
- If you want to cancel, hit **<Q>** and **<RETURN>**
- At the end, the script asks if the output of the report shall be saved to disk. If confirmed, a text file with the respective output is saved to disk and can be viewed at any time

Trace Definition

The DBSPI Admin application group contains a functions to define tracing the DB2SPI itself. Tracing can be helpful in troubleshooting difficulties in the operation of the DB2SPI. See "Tracing" on page 149 about details how to

configure specific processes and sections of the DB2SPI to create trace information.

Manual Replication Monitoring Setup

This section describes how to set up replication monitoring, even if it has not been configured during the initial "Config Setup". The following steps are necessary to enable replication monitoring:

Enable Monitoring

- Edit the file: `db2s_spi.cfg`, which can be found in the configuration directory of the DB2SPI (Different locations on different platforms. For more information see section "Files and Directories").
- Look for the line: `DB2SPI_REPLICATION_MONITOR OFF`
- Change this to "ON"
- Save and close this file

Register paths to replication log files

- Look for the configuration file `db2s_replicpath.cfg` in the same path the `db2s_spi.cfg` is in
- If it does not exist create an empty file `db2s_replicpath.cfg`
- Enter the paths to the directory where your capture and apply log files reside. Do not include the filenames or a trailing line!
- Save and close this file

After this the DB2SPI will automatically scan the directory for log files and add them for monitoring.

Note: Expect the first messages after two log file scan cycles have been completed (typically 40 minutes).

Providing Information for the HP Self-Healing Collector

If a problem is detected and real-time data needs to be collected to determine the cause. The DB2SPI provides an Operations Manager application integrated with the HP Self-Healing Service. This helps solving product problems by collecting the required DB2SPI data.

HP has abandoned the Self-Healing program, which has no effect on the functionality provided here.

The SHS collector may be run in one of the following ways:

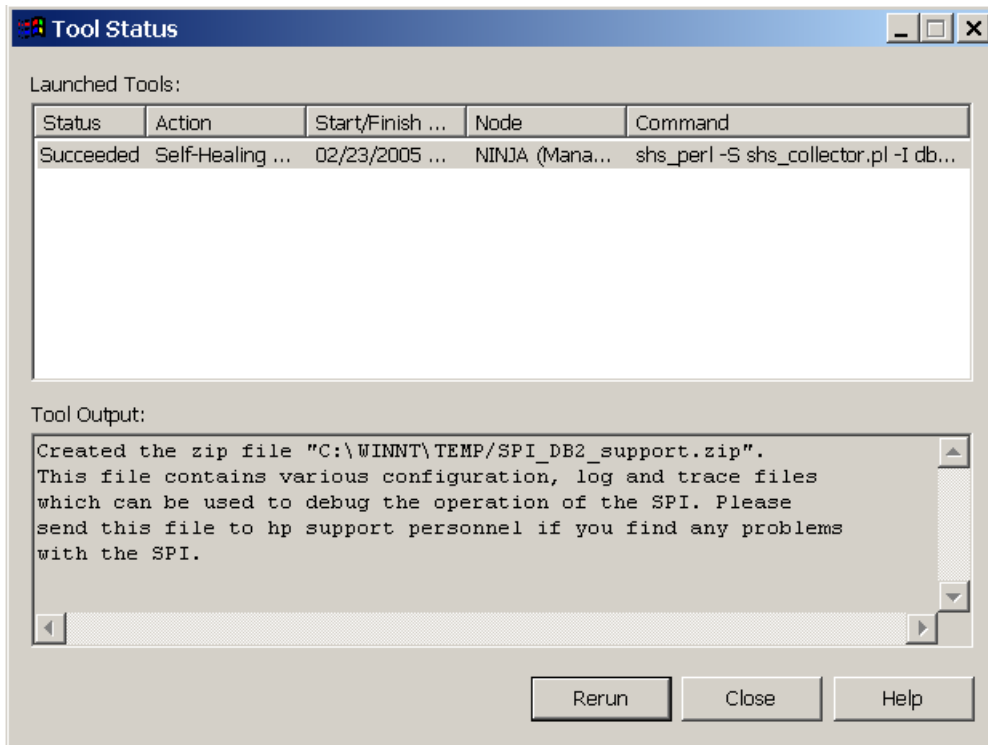
- Self-Healing Info DB2 Server

If the problem concerns a managed node, it is run by launching the new DB2SPI tool "Self-Healing Info DB2 Server" on the managed node in question. A sample tool execution window looks as follows:

- Self-Healing Info OVO Server

If the problem concerning DB2SPI occurs on the Operations Manager server, the tool “Self-Healing Info HP OM Server” should be run to collect data from the Operations Manager management server.

Figure 18: OM for Windows Self-Healing Tool Output



The complete path to the directory, where the collected data was stored is given in the tool output window (see example above). The data is contained in a .zip or .tar file, depending on the operating system on the managed node (Windows/UNIX).

The uncompressed data / files can also be found in the subdirectory SPI_DB2.

DB2 Operator Tasks

This section describes the tasks that the DB2 operator can expect to perform on a regular basis. The section covers the following topics:

- Using DB2SPI Messages
- Tool Execution – some general Remarks
- DB2 Information Tools
- Direct Access to DB2 Command Lines
- Advanced Management Tools
- Graphical Data Presentation Utilities

Using DB2SPI Messages

DB2SPI users use the Message Browser window to view and manage DB2SPI-related messages. Messages sent by the DB2SPI are assigned to one of two DB2SPI message groups:

DB2: for DB2 related messages.

Users who have been assigned either the DB2 Operator or the DB2SPI Admin user profile can see messages in the DB2 message group.

DB2SPI: for SPI related messages.

Messages in the DB2SPI message group can only be seen by users who have been assigned the DB2SPI Admin user profile.

Acting upon these messages is the standard task for Operations Manager operators. DB2SPI attempts to support this DB2 administration task by providing explanatory instruction texts and metric drill down annotations, created automatically by the event interceptor.

Instructions for DB2 and DB2SPI Events

Most events shown up in the message browser provide some additional information how to interpret the event and how to deal with it. Some of these instruction texts are defined with the template, but most of them are provided in a separate instruction text data file.

Please note that retrieval of such texts may take some time on slower systems.

Pressing the "Instructions" button in the operator GUI shows up specific instructions for the respective event, where available.

An example from "Sort Heap Monitoring" might look as follows:

```
The number of sorts that have requested heaps after the sort
heap
threshold has been reached.
Under normal conditions, the database manager will allocate
sort heap
using the value specified by the sortheap configuration
parameter.
If the amount of memory allocated to sort heaps exceeds the
sort heap
threshold (sheapthres configuration parameter), the database
manager
will allocate sort heap using a value less than that specified
by the
sortheap configuration parameter.
Each active sort on the system allocates memory, which may
result in
sorting taking up too much of the system memory available.
Sorts that start after the sort heap threshold has been reached
may
not receive an optimum amount of memory to execute, but, as a
result,
the entire system may benefit. By modifying the sort heap
threshold
```

and sort heap size configuration parameters, the performance of sort operations and/or the overall system can be improved. If this element's value is high, you can:

- (1) Increase the sort heap threshold (sheapthres) or,
- (2) Adjust applications to use fewer or smaller sorts via SQL query changes.

Please note that instruction texts are not available on OOM for Windows.

Automatic Actions for Metric Events

Many metric events have automatic actions assigned that collect additional information about the cause. To provide this drill-down capability, the ASCII reports tool is executed automatically with the appropriate parameters.

The execution and success of such an action can be seen in the "A" column of the message browser.

The result of the additional data collection is available as an annotation.

Please note that the node must be "controlled" in the OM for UNIX node bank to allow execution of the automatic action. "Monitored only" nodes are not able to start any action.

An example for the ASCII report is given with the description of the tool in "ASCII Report" on page 95.

Tool Execution – some general Remarks

Prerequisite: ATOP

In OM for UNIX all applications (tools) can be run from the Operations Manager operator Motif GUI or from the Operations Manager operator Java GUI. The same is true in similar sense for OM for Windows.

Some applications (tools) perform bidirectional I/O (input/output). These are executable only via the generic communication layer, ATOP.

The Motif GUI ATOP interface to the DB2SPI applications is available without any other steps to take. For the Java GUI interface and the OM for Windows management stations it must be enabled on the Java GUI station (management station) of the operator similar to the Operations Manager Java GUI itself.

Common Steps for DB2 Operator Applications

When you run any of the DB2 Operator tools in the DB2 application group, the DB2SPI first determines whether or not multiple instances of the DB2 database are present on the DB2 server where you want the application to run. If only one DB2 instance is present, the application immediately carries out the task requested. If there is more than one DB2 instance present on the managed node you selected, the DB2SPI first prompts you to select a DB2 instance from the list of configured instances.

Enter the number next to the DB2 instance you want to interrogate, for example; **1** for the first DB2 instance listed. Alternatively, enter **0** if you want to exit at this point.

In any case, press <RETURN> after your entry.

The DB2 Operator Applications

Before executing any of the DB2 operator applications make sure to understand the prerequisites and common steps.

The DB2SPI provides the following applications for the DB2 operator:

- ASCII Report
- DB2 Command Line Processor
- Instance List
- Instance Start
- Instance Stop
- Replication Status
- Service Tree Assign (OM for UNIX only)
- Show Manager Config
- Show DB Config
- Show Snapshot
- DB2 Management Tools:
 - Application Management
 - Backup / Restore
 - Data Management
 - Database Management
 - Database Migration
 - Instance Management
 - Miscellaneous
 - Node Management
 - Table Management
 - Tablespace Management

Note: Most of the DB2SPI-operator applications will only work correctly if the DB2SPI administrator (or an Operations Manager user with the DB2SPI administrator user profile) has already defined the DB2 instances, which the DB2SPI is to manage. For more information about setting up DB2 instances in the DB2SPI, see on page 50.

DB2 Information Tools

ASCII Report

This tool allows the creation of detailed reports for a number of functional DB2 areas. We perform a drill-down analysis from the instance level down as far as possible for each area (database, tablespace, application) and process these data in tabular form.

1. When started, it first shows a list of report areas where the user may choose from
The user may enter the number of the area he/she is interested in.
2. Next, the individual reports from that area are shown to allow selection.
The user may enter the number of the report he/she wants to get.
3. Finally, the user has to select the instance and database for which the report shall be created.

The DB2SPI will request the respective data from the latest performance metric snapshot that has been created and displays them in the application window.

At the end, the script asks if the output of the report shall be saved to disk. If confirmed, a text file with the respective output is saved to disk and can be viewed at any time.

A typical dialogue and output looks as follows:

```
-----
          ASCII Report of DB2 Metrics on Node a48
          =====

Please select a report area
 1      Locks and deadlocks
 2      Connections
 3      Agents and applications
 4      Statement activity
 5      Disk I/O
 6      Buffer pool
 7      Transaction logs
 8      Miscellaneous
 9      Fast Communications Manager
10      Sorts
Enter one index (\a to abort): 5

Please select a report
 1      Average direct read times for applications
 2      Average direct write times for applications
 3      Average sectors read per direct read
 4      Average sectors written per direct write
Enter one index (\a to abort): 3

Please select an instance on a48
 1      db2inst1
 2      db2inst2
Enter one index (\a to abort): 2
```



Please select a database for 'db2inst2'

1 SAMPLE

Enter one index (\a to abort): 1

```
*****
*****
Instance: db2inst2
Database: SAMPLE
*****
*****
```

Report 0362 (Average sectors read per direct read)

Date: 20080226.233908

```
*****
*****
```

| AUTH_ID | CLIENTLOGIN_ID | APPL_NAME | APPL_ID | APPL_HDL | DIR_RD_REQ | DIR_RD | AVG_DIR_RD |
|---------|----------------|-----------|---------|----------|------------|--------|------------|
| ----- | | | | | | | |
| ----- | | | | | | | |
| -- | | | | | | | |

There is no data for the report for database 'SAMPLE'

AUTH_ID: The Authorisation ID for the application
CLIENTLOGIN_ID: The Login ID for the client application
APPL_NAME: The name of the application
APPL_ID: The ID of the application
Hit RETURN to continue or 'Q' to save/quit ...q
Do you want to save the report as '/tmp/db2s_ascii_report.txt'?
[y|n]: n

Press any key to close the window ...

Instance List

The "Instance List" tool opens a terminal window that lists all instances of the DB2 database that are visible on the selected managed node. Note that list of DB2 instances displayed by the db2ilist application does not necessarily reflect the list of DB2 instances monitored by the DB2SPI. This is because the DB2SPI Administrator might have decided to omit some DB2 instances during the "Config Setup".

Managed and unmanaged instances can be distinguished by the prefix:

- Monitored instances are listed with a preceding "+"
- Unmonitored instances are listed with a preceding "-"

For each instance, all databases are listed, too, properly indented under each instance to allow easy reading. Managed and excluded databases can be distinguished by the prefix:

- Monitored databases are listed with a preceding "+"
- Excluded databases are listed with a preceding "-"

The following example shows a typical output:

```
Looking for instances on dengue...
=====

Please wait. This may take some time ...

+ db2inst1
  + IN1_DB1
  + IN1_DB2
  + SAMPLE
+ db2inst4
  + IN4_DB1
  + IN4_DB2
+ db2inst7
  + IN7_DB1
  + IN7_DB2
- db2inst2
- db2inst3
- db2inst5
- db2inst6
- db2inst8
- db2inst9
- db2inst10
Search finished.

Press any key to close the window ...
```

Replication Status

The "Replication Status" tool displays the current status of the DB2 replication, if enabled. Please note that information is provided only about those DB2

Capture and Apply processes that had been executing on the instances specified during setup.

The typical output of a "Replication Status" execution looks as follows:

```
-----  
DB2 Replication Monitoring - Status Information  
-----  
  
Settings (DB2SPI Config):  
DB2SPI_REPLICATION          1  
  
-----  
Sun Microsystems Inc.   SunOS 5.10      Generic January 2005  
2005-11-21-10.00.14.105152 ASN0520I  "AsnAcmd" : "DEPTQUAL" :  
"Initial" : The STATUS command response: "HoldLThread" thread  
is in the "is waiting" state.  
2005-11-21-10.00.14.105886 ASN0520I  "AsnAcmd" : "DEPTQUAL" :  
"Initial" : The STATUS command response: "AdminThread" thread  
is in the "is resting" state.  
2005-11-21-10.00.14.106088 ASN0520I  "AsnAcmd" : "DEPTQUAL" :  
"Initial" : The STATUS command response: "WorkerThread" thread  
is in the "is resting" state.  
Sun Microsystems Inc.   SunOS 5.10      Generic January 2005  
2005-11-21-10.00.17.265212 ASN0520I  "AsnCcmd" : "ASN" :  
"Initial" : The STATUS command response: "HoldLThread" thread  
is in the "is waiting" state.  
2005-11-21-10.00.17.265958 ASN0520I  "AsnCcmd" : "ASN" :  
"Initial" : The STATUS command response: "AdminThread" thread  
is in the "is resting" state.  
2005-11-21-10.00.17.266155 ASN0520I  "AsnCcmd" : "ASN" :  
"Initial" : The STATUS command response: "PruneThread" thread  
is in the "is resting" state.  
2005-11-21-10.00.17.266316 ASN0520I  "AsnCcmd" : "ASN" :  
"Initial" : The STATUS command response: "WorkerThread" thread  
is in the "is resting" state.  
  
Please press any key to close the window.  
-----
```

Show Database Configuration

The "Show DB Config" tool opens a terminal window and displays the manager configuration for the DB2 instance that is being selected.

Screen output is split into pages. After each page the user may decide to continue viewing the output or jumping to the end.

- In order to continue browsing through the snapshot, simply press **<RETURN>**.
- If you want to cancel, hit **<Q>** and **<RETURN>**
- At the end, the script asks if the output of the report shall be saved to disk. If confirmed, a text file with the respective output is saved to disk and can be viewed at any time

Show Manager Configuration

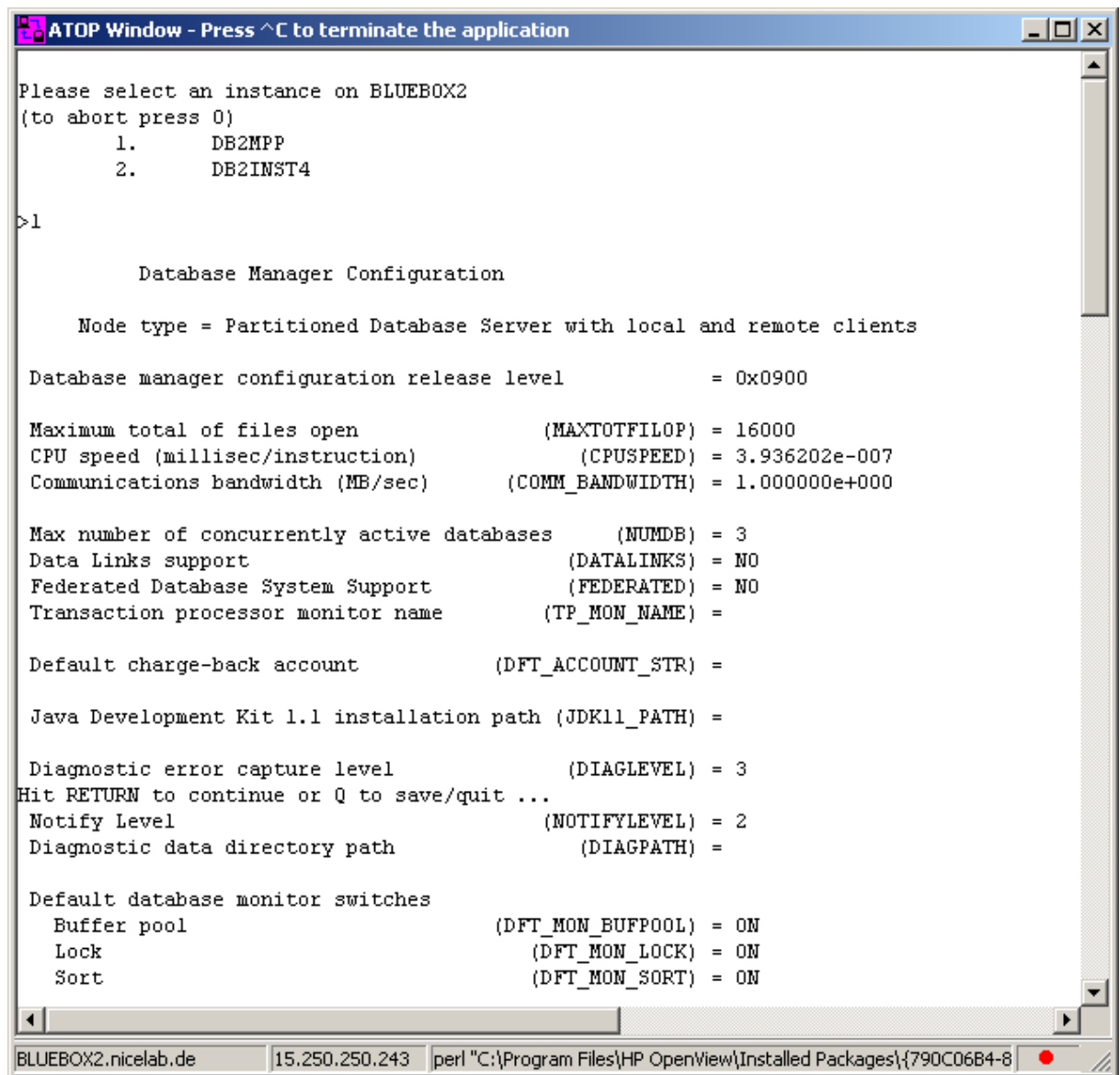
The "Show Mgr Config" tool opens a terminal window and displays the manager configuration for the DB2 instance that is being selected.

Screen output is separated into pages. After each page the user may decide to continue viewing the output or jumping to the end.

- In order to continue browsing through the snapshot, simply press **<RETURN>**.
- If you want to cancel, hit **<Q>**.

This is a sample session showing the ATOP window with the "Show Manager Configuration" output:

Figure 19: Show Manager Configuration session output



```

ATOP Window - Press ^C to terminate the application

Please select an instance on BLUEBOX2
(to abort press 0)
    1.    DB2MPP
    2.    DB2INST4

>1

      Database Manager Configuration

      Node type = Partitioned Database Server with local and remote clients

Database manager configuration release level           = 0x0900

Maximum total of files open                (MAXTOTFILOP) = 16000
CPU speed (millisec/instruction)          (CPUSPEED)   = 3.936202e-007
Communications bandwidth (MB/sec)         (COMM_BANDWIDTH) = 1.000000e+000

Max number of concurrently active databases    (NUMDB) = 3
Data Links support                          (DATALINKS) = NO
Federated Database System Support           (FEDERATED) = NO
Transaction processor monitor name          (TP_MON_NAME) =

Default charge-back account                (DFT_ACCOUNT_STR) =

Java Development Kit 1.1 installation path (JDK11_PATH) =

Diagnostic error capture level              (DIAGLEVEL) = 3
Hit RETURN to continue or Q to save/quit ...
Notify Level                               (NOTIFYLEVEL) = 2
Diagnostic data directory path              (DIAGPATH) =

Default database monitor switches
  Buffer pool                               (DFT_MON_BUFPOOL) = ON
  Lock                                       (DFT_MON_LOCK)   = ON
  Sort                                       (DFT_MON_SORT)   = ON

BLUEBOX2.nicelab.de  15.250.250.243  perl "C:\Program Files\HP OpenView\Installed Packages\{790C06B4-8
  
```

Upon the end, the user is asked to save the output in a file. This question is given regardless if the output has been quit before or not.

Show Snapshot

The "Show Snapshot" tool opens a terminal window and displays the complete snapshot data of a selectable database, as it is used as the basis for performance metric analysis.

When started, it first asks for the DB2 instance and after that, all managed databases belonging to this instance are shown.

Select the database of interest.

If a database has been selected, DB2 is requested by the script and provides the data in the terminal window.

We provide a paged output before requesting user input to continue or stop. Note that the output window also provides a scrollbar to move through the output, but that may be too limited in many cases (the snapshot can consist of several hundred lines).

- In order to continue browsing through the snapshot, simply press **<RETURN>**.
- If you want to cancel, hit **<Q>** and **<RETURN>**.

Regardless if cancelled or finished at the end of the snapshot, the DB2SPI asks if this snapshot should be saved as a text file:

The file name proposed contains the names of instance and database to allow an easy identification in the file system.

Press any key to close the window when done.

This is a sample session running the "Show Snapshot" application:

```
DB2SPI Snapshot Display on a48
=====

Please select an instance on a48
 1      db2inst1
 2      db2inst2
Enter one index (\a to abort): 1^
Index must be numeric

Please select an instance on a48
 1      db2inst1
 2      db2inst2
Enter one index (\a to abort): 1
Please select a database for db2inst1
 1.      TEST
 2.      SAMPLE

>1

Database Manager Configuration

Node type = Enterprise Server Edition with local and
remote clients
```



```
Database manager configuration release level           =
0x0a00

CPU speed (millisec/instruction)                     (CPUSPEED) =
1.086392e-06
Communications bandwidth (MB/sec)                   (COMM_BANDWIDTH) =
1.000000e+02

Max number of concurrently active databases          (NUMDB) = 8
Data Links support                                  (DATA LINKS) = NO
Federated Database System Support                  (FEDERATED) = NO
Transaction processor monitor name                  (TP_MON_NAME) =

Default charge-back account                          (DFT_ACCOUNT_STR) =

Java Development Kit installation path               (JDK_PATH) =
/usr/java14_64

Diagnostic error capture level                       (DIAGLEVEL) = 3
Notify Level                                         (NOTIFYLEVEL) = 3
Hit RETURN to continue or Q to save/quit ...
Diagnostic data directory path                       (DIAGPATH) =
/home/db2inst1/sqllib/db2dump

Default database monitor switches
Buffer pool                                         (DFT_MON_BUFPOOL) = ON
Lock                                                (DFT_MON_LOCK) = ON
Sort                                                (DFT_MON_SORT) = ON
Statement                                           (DFT_MON_STMT) = ON
Table                                               (DFT_MON_TABLE) = ON
Timestamp                                           (DFT_MON_TIMESTAMP) = ON
Unit of work                                        (DFT_MON_UOW) = OFF
Monitor health of instance and databases            (HEALTH_MON) = ON

SYSADM group name                                   (SYSADM_GROUP) =
DB2GRP1
SYSCTRL group name                                  (SYSCTRL_GROUP) =
SYSMAINT group name                                (SYSMAINT_GROUP) =
SYSMON group name                                  (SYSMON_GROUP) =

Client Userid-Password Plugin                       (CLNT_PW_PLUGIN) =
Client Kerberos Plugin                              (CLNT_KRB_PLUGIN) =
Group Plugin                                         (GROUP_PLUGIN) =
GSS Plugin for Local Authorization                 (LOCAL_GSSPLUGIN) =
Hit RETURN to continue or Q to save/quit ...q
Do you want to save snapshot as '/tmp/db2inst1_TEST.txt'?
[y|n]: n

Press any key to close the window ...
```

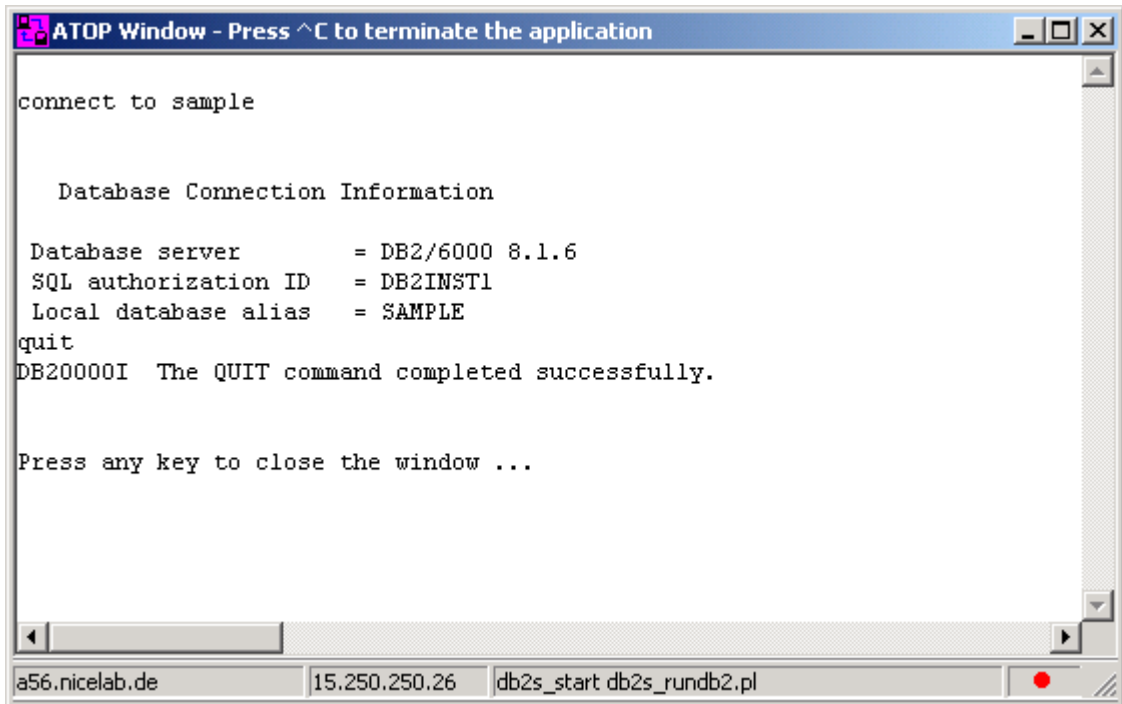
Direct Access to DB2 Command Lines

DB2 CLP

The DB2 program opens a command shell that provides interactive access to the DB2 command line processor. Enter `quit` to leave the program and close the window.

The following picture shows a sample of running DB2 in an OM for Windows environment:

Figure 20: DB2 CLP session an ATOP window



```
ATOP Window - Press ^C to terminate the application
connect to sample

Database Connection Information

Database server      = DB2/6000 8.1.6
SQL authorization ID = DB2INST1
Local database alias = SAMPLE
quit
DB20000I The QUIT command completed successfully.

Press any key to close the window ...

a56.nicelab.de 15.250.250.26 db2s_start db2s_rundb2.pl
```

Instance Start

The "Instance Start" tool attempts to start the selected DB2 instance and displays progress in a terminal window. If the database is already running, the DB2SPI returns an error message. Press any key to close the window.

Note that due to the asynchronous nature of the DB2 startup, the DB2SPI can only recognize problems during the triggering of the startup procedure. Any problems in this phase are logged in the DB2 log files and, as a consequence, detected by the DB2SPI log file monitor.

Instance Stop

The "Instance Stop" tool attempts to stop the selected DB2 instance and displays progress in a terminal window. If the database is already down, the DB2SPI returns an error message. Press any key to close the window.

Note, that due to the asynchronous nature of the DB2 shutdown, only problems during the triggering of the shutdown procedure can be recognized. Any problems in this phase, however, are logged to the DB2 log file and detected by the DB2SPI log file monitor.

Advanced Management Tools

A separate application group contains a set of advanced management tools that allow almost all administrative tasks that could be performed on a DB2 server,

ranging from backup via data management to instance, database, tablespace and table management.

All these commands could also be typed and executed in the DB2 command line processor. The DB2SPI tools, however, make it much easier to achieve results timely as the correctness of the statements is checked and correction may be made before they are executed.

Note that using these tools can affect the integrity of your database, and you should be well trained in DB2 administration when executing such tasks. You can achieve these results also by entering DB2 commands or by using the DB2 command line processor.

NiCE is not liable for adverse results caused by inappropriate use.

Configurable Tools Basics

Each DB2 administration command is created internally in a step-by-step approach. We call these tools "flexible", as almost any command may be defined with the same method of assembling fixed, variable and optional components of a command.

Depending on the command, one of the following user actions are requested:

- Selection of one item from a selection list
- Entry of a value
- Omission of optional parameters

At most places, the user may go back to the previous step in case he had made an error. This is achieved by entering "\b" where offered.

Also, cancellation is possible where "\a" is allowed for entry.

Whenever special keys are available for a certain operation, they are prompted in the dialogue window.

If the command is assembled completely, it is shown on the screen and its execution must be confirmed (or denied) by the user.

Upon the end of the execution, the user may even decide if the output provided shall be saved to disk or not. This file may be helpful when DB2 errors are encountered that need a deeper investigation or when the result is required for other purposes.

DB2 Management Tool Areas

There are ten different areas for the flexible management tools. Table 13 shows the different areas and the tools embedded inside them.

Table 13: Flexible Tools

| Management Area | Available Tools |
|------------------------|--|
| Application Management | List Applications List DCS Applications Force Applications Rebind Rebind All Packages |
| Backup / Restore | Check Backup Backup Database Restore Database Rollforward Database |
| Data Management | Export Import |
| Database Management | Catalog Database Catalog DCS Database Create Database Create Sample Database Activate Database Reset Database Configuration Restart Database Uncatalog Database Uncatalog DCS Database Alter Bufferpool |
| Database Migration | Check Migration Migrate Database |
| Instance Management | List Instances Reset Database Manager Configuration Reset Administrative Server Configuration |
| Miscellaneous | Get Monitor Switches Prune History Prune Logfile |

| Management Area | Available Tools |
|------------------------|--|
| Node Management | Lists Node Directory List Nodegroups List Nodes Verify Node Change Partition Server Configuration Add Node Redistribute Nodegroups |
| Table Management | Reorganize Table Reorg Check Runstats |
| Tablespace Management | List Tablespaces List Tablespace Containers Quiesces Tablespaces Alter Tablespaces |

Sample Flexible Tool Dialogue

A typical dialogue of an application looks as follows:

```
Select one application
(to abort press 0)

    1.      List applications
    2.      List DCS Applications
    3.      Force Applications
    4.      Rebind
    5.      RebindAllPkgs

>1

Do you want to specify the database name?
('0' - abort, 'b' - back)

    1.      Yes
    2.      No

>1

Please select a database for DB2
('0' - abort, 'b' - back)

    1.      DB2_DB1
    2.      DB2_DB2
    3.      DB2_DB3
    4.      DB2_DB4
    5.      DB2_DB5
    6.      DB2_DB6
    7.      DB2_DB7
    8.      DB2_DB8
```

9. DB2_DB9
10. DB2_DB10
11. SAMPLE

>11

Please select the nodes that you want to list the applications for.

('0' - abort, 'b' - back)

1. specific node
2. all nodes

>1

Please enter the node number for which you would like to list applications:

('a' - abort, 'b' - back)

>1

Please select the type of information you would like to view:

('0' - abort, 'b' - back)

1. Basic information
2. Detailed information

>1

COMMAND: LIST APPLICATIONS FOR DATABASE SAMPLE AT NODE 1

The command will be executed on instance 'DB2'

('0' - abort)

1. Run the command
2. Return to the previous step

>1

SQL1610N The Database System Monitor input parameter "data->iNodeNumber" is invalid.

The application: "perl -S db2s_flexapp.pl -s applmgmt" has terminated.

Please press RETURN to close the window.

Graphical Data Presentation Utilities

The DB2SPI supports various ways to present collected performance data in a graphical way:

- Embedded graphing component in OM for Windows (up to version 7.5)
- PM Portable Graphs

The next sections describe the various methods in detail.

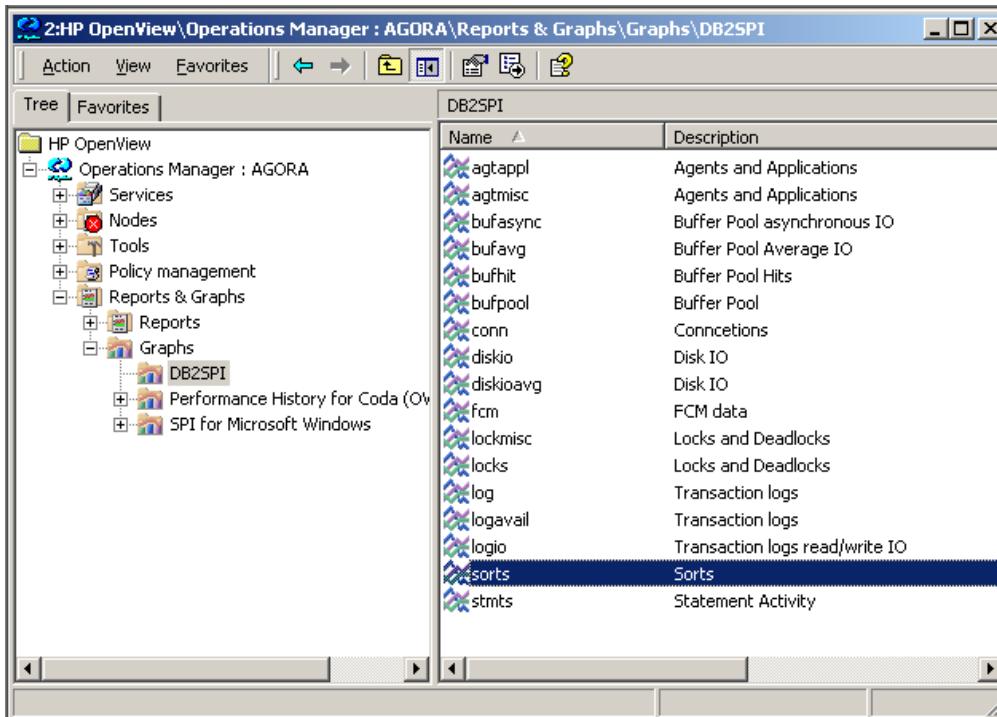
HP Performance Manager (PM) and the OM for Windows embedded graphing tool can be used to view data, depending on the format they are stored (PA format or CODA format) as explained below.

PM is the recommended tool as it supports all data formats.

Predefined Graphs for embedded Graphing

In the Reports and Graphs section of the task tree in OM for Windows a list of predefined graphs is shown:

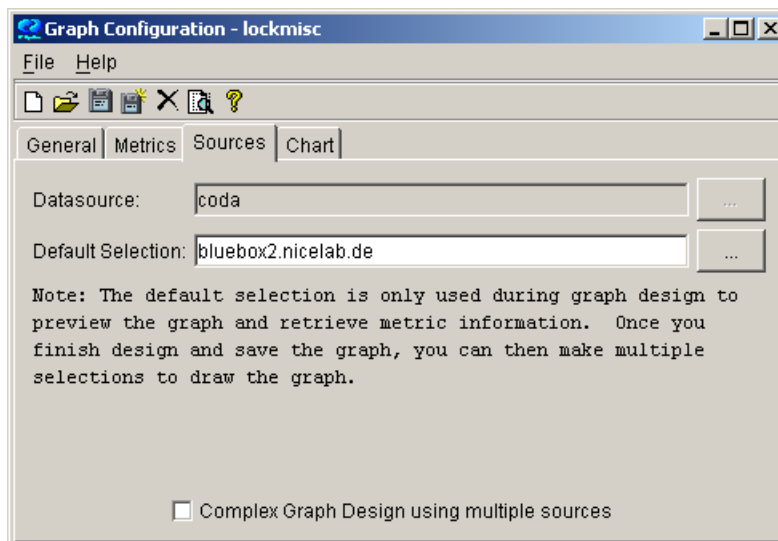
Figure 21: Predefined DB2SPI Graphs



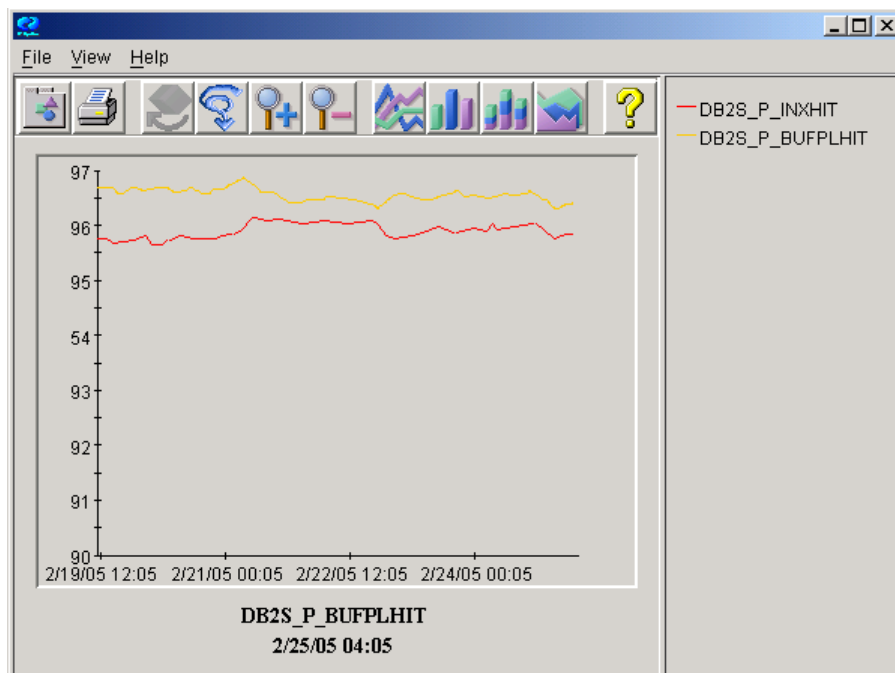
In order to use these graphs, you have to select one of them and open its "Properties" sheet, e.g. via clicking the right mouse button.

In the "Properties" you have to define a system where your data are to be picked up via the "Source" tab, as shown next:

Figure 22: Source determination for the predefined graphs



Since the "Metrics" are predefined, all information to draw the graph is available.



OVPB Portable Graphs

OVPB may be installed on any system in the network, but it must be able to access the DB2 servers and the performance data stored in OVPA / CODA format on these node(s).

In order to view any of these graphs, separate software has to be installed on the OVPB server.

More detailed information may be found in the Appendix B in "OVPB Integration (Portable Graphs).

Concepts and Architecture

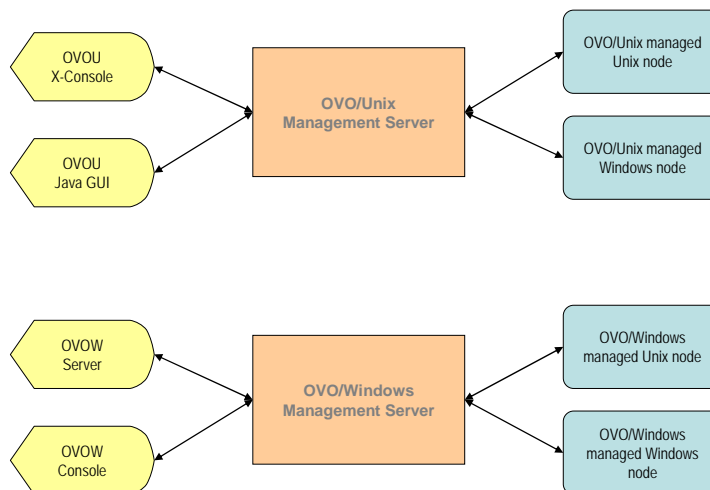
This section describes the general architecture and processing of the DB2SPI.

ATOP Communication Layer

ATOP is a component of the DB2SPI that helps to execute interactive applications on both UNIX and Windows managed nodes and interact with them from OM for UNIX Motif or Java GUI, or from the OM for Windows management console in absolutely the same way.

Internally, a communication channel is created separate from the Operations Manager communication as can be seen in Figure 23.

Figure 23: ATOP Architecture underlying DB2SPI



ATOP Configuration Settings

ATOP uses a separate IP connection between the managed nodes and the management server and from the management server to Java GUI stations / management consoles. This communication must be consistent throughout the management domain.

The configuration values are stored in the configuration files `atop.cfg` on the managed nodes and `atopsrv.cfg` on the management server.

The file `atopsrv.cfg` is found in the directories

OM for UNIX:`/opt/OV/atop/bin`**OM for Windows:**`%OvInstallDir%\bin\DB2SPI`

on the management server.

For deployment to the managed nodes, copies of `atop.cfg` are kept in all supported platform-specific directories for the managed nodes, hence

OM for UNIX:`/var/opt/OV/share/databases/OpC/mgd_node/customer/<...>/cmds`**OM for Windows (7.5):**`%OvSharedDir%\Instrumentation\<platform>\DB2SPI`**HP OM for Windows:**`%OvSharedDir%\Instrumentation\Categories\DB2SPI`

on the management server.

On Microsoft Windows based OM for UNIX Java display stations or OM for Windows management consoles, the file can be found in

`\Program Files\HP OpenView\bin\DB2SPI`

Note: Whenever changes need to be made to the ATOP configuration file, especially regarding the port information, this must be re-distributed to the managed nodes and display stations.

Default Settings and their Modification

The default configuration of ATOP consists of the following settings:

```
# -----  
--  
# Configuration file for ATOP2 server 'atoprv'.  
#  
# -----  
--  
  
ATOP_CFG_LOGLEVEL      = 3  
ATOP_CFG_SERVERPORT    = 55551  
ATOP_CFG_CLIENTPORT    = 0  
ATOP_CFG_LANGUAGE      = us  
ATOP_CFG_QUEUELEN      = 10
```

There is one important field, the `ATOP_SERVERPORT`, which acts as the key for all successful communication between the managed nodes and the display stations. This port must be enabled in the IP network connecting the systems.

If this should not be suitable for your environment, please change the configuration with an editor on the management server and make sure to distribute it to all nodes in the management domain (managed nodes using ATOP, Java GUI display stations, and OM for Windows consoles) as described next.

Distributing changed ATOP Configuration Data

ATOP configuration changes must be distributed within the managed environment to make sure communication can be committed, especially if port numbers should be changed.

Three areas therefore require the updated information.

- Management Server

The ATOP server executing there consumes the "master copy" of the ATOP configuration file and needs no special attention.

- In OM for UNIX, it is a registered OV service it needs to be restarted after the configuration file has been changed:

In a terminal session on the management server, enter

```
ovstop atop_server
```

```
ovstart atop_server
```

to achieve this. Make sure you have been successful by entering

```
ovstatus atop_server
```

- In OM for Windows, re-start the "ATOP2 Server" service set up during installation.

Note: No ATOP application windows should be open at the time of re-starting the ATOP server; depending on the configuration changes that might lead to unpredictable results.

- Managed Nodes

These nodes get updated with the regular distribution mechanism of Operations Manager, i.e., via "Install & Update Software & Configuration" from the Operations Manager administrator GUI, and hence it consumes all data that are in the respective repository. So, in order to get the configuration data to the nodes we must make sure that they are consistent, especially with regards to the port number, in those platform specific repositories. Edit the `atop.cfg` files there and do the "Install & Update Software & Configuration" from the Operations Manager administrator GUI afterwards to get the data distributed to all managed nodes.

- Java Display Stations of OM for UNIX and OM for Windows Consoles

For the Java Display Stations and OM for Windows consoles there is no intrinsic update method today.

So, when changes are done on the management server, the configuration file `/opt/OV/atop/bin/atopsrv.cfg` must be transferred manually to `%OvInstallDir%\bin\DB2SPI`

or these changes must be made locally in a consistent manner.

Do not forget to re-start the "ATOP2 Server" service on Windows systems after a change to the ATOP configuration file.

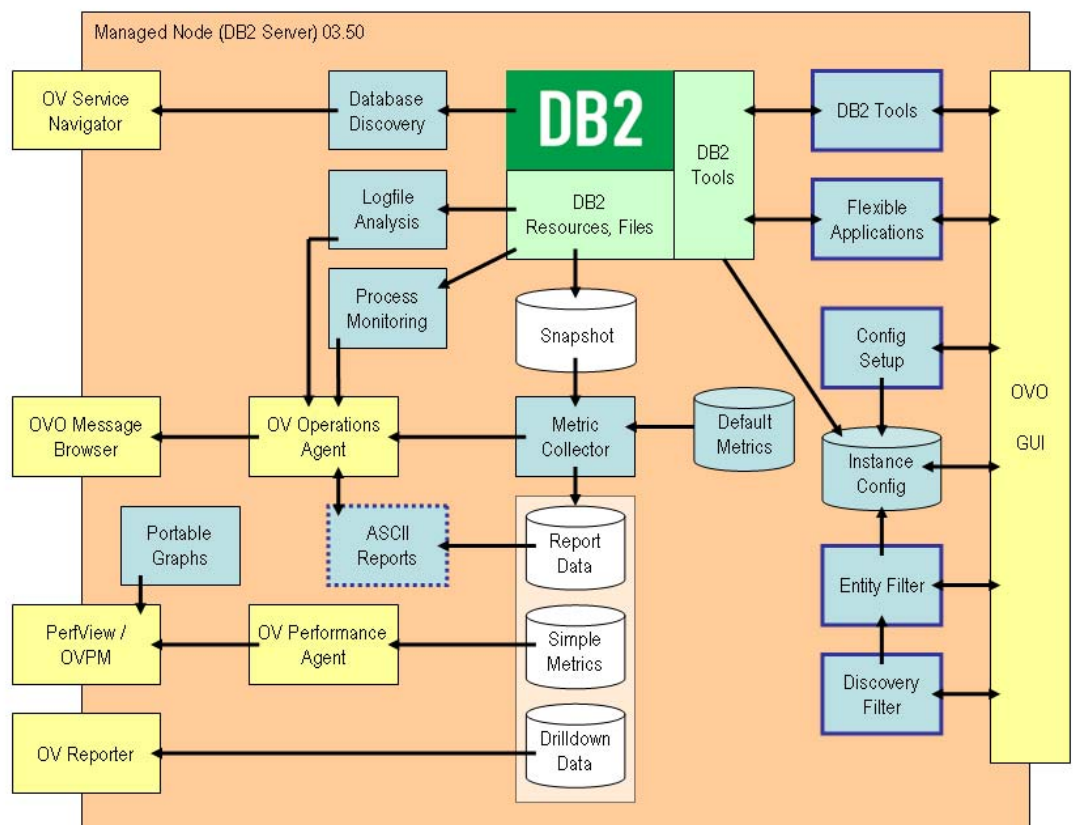
A Note on Strange Characters

Sometimes strange characters may be shown in ATOP windows, especially when executing tools on UNIX systems. This is not a defect, just some terminal test sequences (tset, ttytype etc.) that are launched when sessions are switched and the user profile requests such action.

DB2SPI Internal Architecture

The following picture gives a closer look at the DB2SPI modules and configuration data:

Figure 24: DB2SPI Internal Architecture



The following sections describe in detail how the different monitoring areas work and interact with each other.

Support of non-root Agents (UNIX Managed Nodes)

A special functionality (not shown in the picture) is the internal "su" functionality used for the switch of DB2 environments. Whenever DB2 is accessed it is done by switching to the DB2 instance user context to have the proper environmental

data (DB2 refers to some of these settings when calling, for example, the command line processor).

When non-root operation of the agent is enabled, a special "db2s_sudo" program is required instead of the simple "su" to facilitate this environmental switch without a password. This program is secured against misuse by requiring a predefined list of users that DB2SPI may switch to, stored in /etc/db2spi.su. This file must be edited to contain the correct information. This is not automated and must be performed as 'root' for security reasons. Please see "Running the Agent in a non-root Account" on page 74.

Monitoring Log Files

DB2 Log Files

Various log files are used by DB2 to note status changes, problems or other information. With the help of DB2SPI important entries are identified from the logs and forwarded as events to the Operations Manager message browser.

Administration Log File

With DB2 8.1 IBM introduced a new log file in UNIX environments holding important events, the administration log file. It exists once per instance.

In Windows environments the administration log is provided in the Windows event log.

In these administration log files or administration event logs, more than 120 specific event entries are identified and forwarded to the Operations Manager message browser.

Replication Log Files

Replication log files are written rapidly by DB2, and they are monitored for status hints if replication monitoring has been activated during the "Config Setup".

A dedicated logfile processing script is used for it, as there is no preprocessing necessary as with the diagnostic log files.

Log File Size Monitoring

Alerts are created when log files exceed a predefined size. By default, these are 200 kb. The following log files are monitored in regard to their file size:

- Administrative log file
- Audit log file
- DB2SPi's own log file
- DB2SPI's own trace files

- Diagnostic log file

DB2SPI's own Log File

There is a log file for internal logging of the DB2SPI, `db2s_spi.log`. Important messages are created from this log file by a separate log file template provided with the DB2SPI.

Log File Size Monitoring

Alerts are created when the DB2SPI log file (or a possibly existing trace file, `db2s_trace.log`) exceeds a predefined size. By default, these are 200 kb.

The DB2SPI Process Monitor

All work performed by a running DB2 UDB is done by specialized DB2 processes. If one single process fails to run properly, the system as a whole might be affected. The result may be that users cannot log on to the database, database logs are not written or that massive performance bottlenecks occur, lowering the effectiveness of all involved database applications and database users.

The ability to recognize if specific DB2 UDB processes are running in the proper multiplicity at a certain point in time is implemented in DB2SPI's Process Monitoring Application.

About DB2 Processes

DB2 processes can be classified by numerous characteristics. Some are started within the system startup framework, others show up when an instance is started and others may appear only when a database becomes active. The multiplicity is often dependent to the number of instances and databases on a DB2 server and to several Database and Database Manager Configuration settings. Detailed information on DB2 and its processes can be found in the IBM DB2 UDB Information Center.

Please note that on Windows platforms most DB2 processes are implemented as threads and therefore not visible by their names in common system information tools. Table 19: Default DB2SPI Process Monitor Configuration in Appendix A shows common DB2 processes integrated in the default DB2SPI Process Monitor configuration.

Configuration

The configuration of the monitoring objects for the DB2SPI Process Monitor is done via the DB2SPI Operations Manager application 'Entity Filter'.

From the DB2SPI Process Monitoring application's point of view a DB2 process is represented as a monitored object with several attributes. These attributes influence the way the monitor handles the object to perform its monitoring task. The attributes are:

- Process name

The actual DB2 process name as can be seen in various system tool's output, e.g. the "ps" command on UN*X. Please note that with the current version of DB2SPI a process identified by its name can appear only once in a single instance/database/partition context.

- Management State

A monitoring object can either be managed or unmanaged. Use this flag to control if a configured entity should be processed by the DB2SPI Process Monitor.

- Affiliation

This parameter can be used to associate a process to different scopes on a DB2 server. The available affiliations are:

- no special affiliation

By setting this parameter the DB2SPI Process Monitor checks only for the configured process name without regarding any other constraints that might be present

- affiliated to the idle pool

If this parameter is set the monitor only counts the processes given in Process Name if it is currently assigned to the idle pool

- affiliated to a specific database

Configuring a process to be monitored with the database affiliation setting causes the DB2SPI Process Monitor to only count it if it is assigned to the database the configuration is done for.

- Minimum number of process instances running

If the actual number of running instances of a process is lower than the value specified, the DB2SPI Process Monitor generates an alarm by sending an Operations Manager message. Set this parameter to '-1' if the minimum number is not relevant for the monitoring object.

- Maximum number of process instances running

If the DB2SPI Process Monitor determines there are more process instances of a configured process running than the configured maximum, it will trigger an alarm by sending an Operations Manager message. As with the minimum number, enter '-1' here to tell the monitor to not consider this parameter.

If both maximum and minimum thresholds are configured, an alert will be triggered if the counted number of process instances either drops below the minimum or exceeds the maximum threshold configured.

An initial and automatic configuration is set during the initial setup of DB2SPI on the target managed node. Whenever the scheduled automatic DB2SPI Discovery encounters new databases on the target managed node, this default configuration is also applied. Additional processes are configured by default if Database Partitioning Feature is in use on the target managed node. Table 16 in Appendix A shows this default configuration.

The further configuration of the monitoring objects for the DB2SPI Process Monitor is done via the DB2SPI Operations Manager application 'Entity Filter'.

Additionally, the DB2SPI Message Source Policy can be edited in a standard Operations Manager manner to achieve an even more explicit alarming.

The scheduling of the planned monitor runs is set via the DB2SPI Operations Manager Schedule Policy 'DB2_procmon'.

Note:

A good DB2SPI Process Monitor configuration that produces meaningful results is only achieved by knowing the characteristics of the observed DB2 UDB system.

Capabilities of the DB2SPI Process Monitor

The DB2SPI Process Monitor application is able to check the number of configured DB2 processes for a specific database on a specific database partition in a specific instance's context. It implements three different metrics that result in three different alert types if the rules defined in its configuration are violated:

- Number of running DB2 process instances running is higher than the configured maximum
- Number of running DB2 process instances running is lower than the configured minimum
- Number of running DB2 process instances running is out of configured boundaries

Configuration Examples

In the following section four detailed examples of DB2SPI Process Monitor monitoring object configurations are given. These examples are only applicable on UN*X managed nodes due to the DB2 process architecture on Windows platforms.

- Example 1

The main DB2 system engine 'db2sysc' is intended to run once per active instance. The DB2SPI Process Monitor should check if the process is present and if there is only one instance running. The attributes of the monitoring object would be as follows

| | |
|---------------------|---------|
| Process Name | db2sysc |
| Mgmt. State | managed |
| Affiliation | none |
| Minimum | 1 |

| | |
|----------------|---|
| Maximum | 1 |
|----------------|---|

- Example 2

On all DB2 servers all database requests are handled via designated agent processes 'db2agent'. These are dynamically instantiated by the DB2 system engine and assigned to a specific database the request is made for. To avoid the computational overhead that results in the instantiation itself, the engine keeps some agents in an idle state (idle pool affiliation) for faster processing. The relevant DB2 Database Manager Configuration parameters that influence this behavior are 'MAXAGENTS', 'NUM_POOLAGENTS' and 'NUM_INITAGENTS'. A meaningful configuration for the DB2SPI Process Monitor would be to send an alarm if the number of agents in the idle pool drop below a specified number, e.g. 20. The attributes of the monitoring object would be as follows:

| | |
|---------------------|-----------|
| Process Name | db2agent |
| Mgmt. State | managed |
| Affiliation | Idle pool |
| Minimum | 20 |
| Maximum | -1 |

- Example 3

The DB2 local deadlock detector process 'db2dlock' scans the lock lists of a specific database for deadlock situations (database affiliation). The DB2SPI Process Monitor checks that there is exactly one process instance running for the configuration context's database when this configuration is applied.

| | |
|---------------------|----------|
| Process Name | db2dlock |
| Mgmt. State | managed |
| Affiliation | database |
| Minimum | 1 |
| Maximum | 1 |

- Example 4

The DB2 panic agent 'db2panic' handles urgent requests if agent limits have been reached on any of the database's partitions. It is present in multi-partitioned database environments only. In inactive state it is affiliated to the idle pool, when it becomes active it is assigned to the database where the resource bottleneck occurred. Therefore a meaningful configuration would cause the DB2SPI Process Monitor to generate an alarm if the panic agent is not assigned to the idle pool.

| | |
|---------------------|----------|
| Process Name | db2panic |
|---------------------|----------|

| | |
|--------------------|-----------|
| Mgmt. State | managed |
| Affiliation | Idle pool |
| Minimum | 1 |
| Maximum | 1 |

Service Interaction

With the current release of DB2SPI the messages generated by the DB2SPI Process Monitor affect the service tree at the partition level.

I.e., we do not show all processes monitored in the service tree, but alarms raised for processes cause a status (color) change of the respective database partition.

Performance Data Collection

This chapter tells how performance data are collected and processed by the DB2SPI and how the general information flow can be affected by the DB2SPI Administrator.

Performance data can be collected in either OVPA (MWA) or CODA (embedded performance collection) data stores. By default, OVPA (MWA) is used for UNIX managed nodes and CODA for Windows managed nodes.

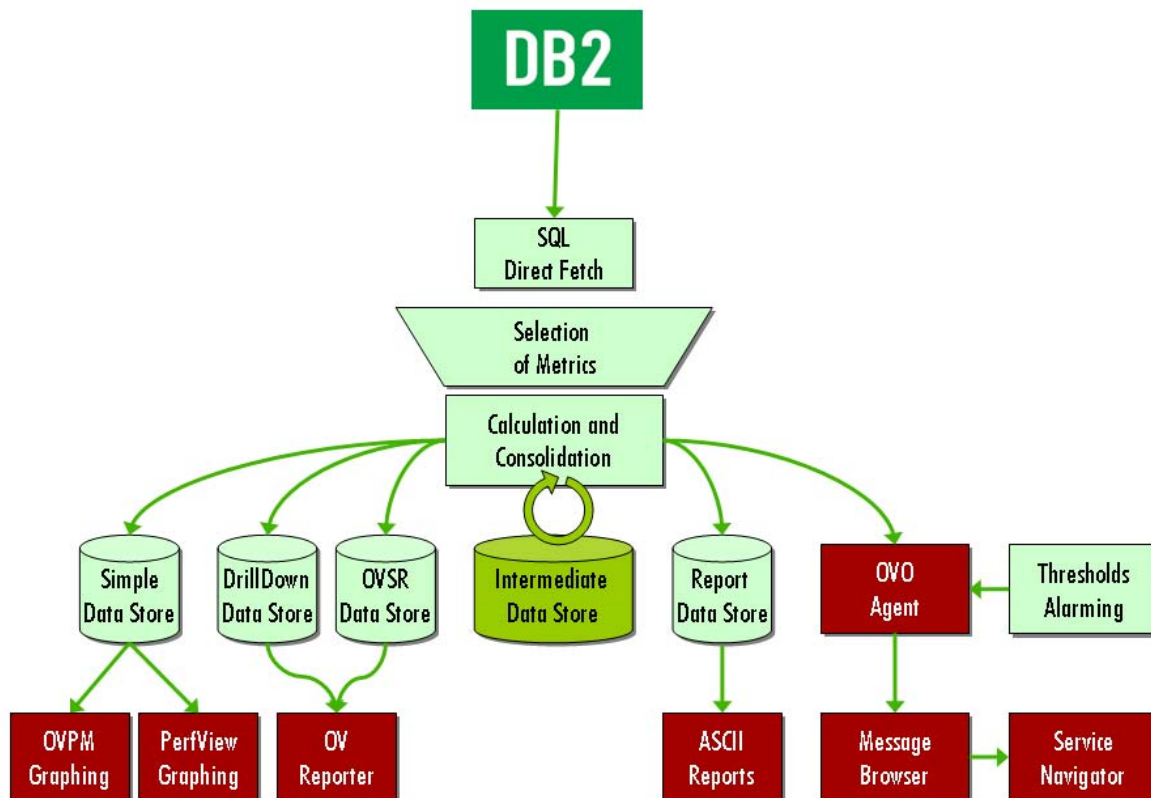
In "Format of the Data Store" on page 122 is described how these defaults can be changed.

In the following, metric storage is described regardless of the format, unless specifics must be considered.

General Data Flow

The DB2SPI is able to collect a big amount of performance data that are supplied by DB2. The collection is done as shown in the following picture:

Figure 25: Data flow for DB2 metric data



The data flow can be described as follows:

Collection of Source Data

DB2 can be configured by their internal "monitor switches" to collect performance information in some internal tables.

The data is obtained by internal requests directly from those tables by submitting proper function calls ("embedded SQL", ESQL). This provides direct access to the data source with maximum throughput.

Data Processing

Despite the way how raw data are obtained, their processing is similar:

- Raw data are taken for the calculation of valuable, derived information, like percentages, ratios etc.
- Snapshot data are requested by the DB2SPI and are stored temporarily for proper analysis.
- Metric values are retrieved from these snapshot files by proper filtering and calculation.

- These metric values can be forwarded to Operations Manager and/or OVPA/CODA.
- The Operations Manager agent is used to perform threshold monitoring and provides an alert if a metric is outside the valid range.
- If available and enabled, the OVPA/CODA agent stores these metrics for later viewing with OVPM or OM for Windows Graphing and for reporting with OV Reporter.

Affecting the Metric Data Processing

There are three switches that affect processing of the performance data:

- First of all, snapshot creation with the "DB2 monitor switches" can be disabled and enabled with the "Snapshot Enable" / "Snapshot Disable" tools. If disabled, the database is not requested not to provide any performance data. This minimizes the system load, but also inhibits any kind of monitoring performance, availability etc.

Switching "snapshot DB2 monitor switches" of DB2 on and off requires a restart of the database, and this functionality is NOT provided within the tool, because it is a pretty invasive step. That is the reason why the default settings are changed rather than the current ones for the given database.

- Second, Operations Manager data forwarding can be prohibited or enacted by another switch application "OPCMON Enable" / "OPCMON Disable". This is useful (or necessary) if the Operations Manager monitor agent shall not be used for threshold monitoring and alarming, but data shall be collected for OV Performance Manager and / or OV Reporter.
- Third, OVPA/CODA data forwarding can be prohibited or enacted by another switch application pair of tools ("PerfRep Enable / Disable"). This is useful (or necessary) if OVPA/CODA is not available or not installed at all on the DB2 server.

When executing only "PerfRep Disable", threshold monitoring still is active and alerting can be achieved via the Operations Manager monitor agent.

Primary performance data are collected by DB2 itself when snapshot collection is enabled. Since this gathering requires resources, this will often be disabled on DB2 servers while they are not managed systems.

The installation of the DB2SPI does not change any settings of the DB2 intrinsic collection. Therefore, before the DB2SPI can monitor any DB2 metrics, you have to ensure that the collection of DB2 intrinsic performance data is started on the DB2 server. You can do this with the "Snapshot Enable" tool in the "DB2SPI Admin" application group.

Note: The collection of performance data works on an instance oriented basis. This means that for every instance the collection of performance data must be switched on / off explicitly by choosing the appropriate instance in the upcoming menu.

Metric Collection and Resource Consumption

The metric collection can be "expensive" in terms of requiring system resources.

Thus, it might be desirable to adjust the metric collection to limit the impact upon the system if possible. The following points should act as a guideline where to look into and what to consider, but there is not "best solution", as it always depends on the needs and desires of each customer.

In order to reduce the workload from the managed node required for metric processing, you might:

- Read Reference Guide carefully and decide about the importance of each metric
- Call less metrics with db2s_dbmon.pl script in the scheduling policies
- Add new scheduling policies to call some metrics less often
- Forward less metrics to opcmn (add NO_OVO in db2s_metrics*.cfg)

Naming Scheme for Metrics

The naming scheme for the metrics and associated Operations Manager monitor policies is consistent and as self-explaining as possible.

Example: DB2_0172p_OpnLocCursBlk_ap

Each metric consists of a prefix (DB2_), a three-digit number (e.g. 017), a one-digit level indicator (e.g. 2), a flag character (e.g. "p") and the meaning in abbreviated form.

The abbreviation of the meaning is required due to MeasureWare/OVPA restrictions – no more than 20 characters are allowed to identify metrics in MeasureWare/OVPA, and some of them are already reserved for the product key. All names also contain a postfix, which indicates the level purpose.

For the flag character the following list applies:

Table 14: Metric name key component

| Key | Meaning |
|-----|-------------|
| a | average |
| c | count |
| g | gauge |
| i | information |
| p | percentage |
| r | ratio |
| w | watermark |

Amount of Data Collected

In DB2SPI 03.51 / 03.61 nearly 150 different values are gathered directly or derived from original DB2 performance monitor data. A comprehensive list can be found in the DB2SPI Reference Guide.

To store the data collected, the following disk space must be available (assuming one year of data):

- Reporter OVPA data: 59 Mb per node
- Graphing OVPA data: 5 Mb per database
- Drilldown data 50 Mb per instance + database + tablespace

Note that these are maximum values of disk space to the storage.

Example:

If you are managing 3 instances with a total of 10 databases and 23 tablespaces, you need

$$59 \text{ Mb} + 10 * 4 \text{ Mb} + 23 * 47 \text{ Mb} = 1180 \text{ Mb disk space.}$$

This gross amount can only be affected by reducing the data collection rate, not by removing certain metrics from being collected.

Configuring Data Collection

Data collection is configured in a three-step approach:

First, we must decide about the data format. This depends on the tools we want to apply for viewing and processing the data and applies to all data collection installed on the respective managed node (i.e., to all SPIs). The tools that might be used are OVPA or CODA.

Next, data are provided by DB2 snapshot monitors at predefined rates between ten and thirty minutes. This is done in the schedule policies which start the metric data collection.

Finally, the metric values created this way are forwarded to OVPA/CODA in a common time slice (every five minutes), regardless of the collection repetition.

Thus, the common granularity of the data is determined by:

- DB2 snapshot creation repetition and analysis
- DB2SPI data forwarding to OVPA/CODA

Format of the Data Store

DB2SPI uses the DSIDDF tools to store data for OVPA/CODA.

These tools are not installed automatically with the DB2SPI, but must be available when the DB2SPI configuration ("Config Setup") is performed.

Right now, there are no tools in the DB2SPI to determine specific configuration of the data storage type. The explanation given here should help the user to define specific setups by themselves if needed. Note that these settings affect all other SPIs as well.

These tools contain a predefined logic about default storage formats, depending on the platform they are just operating:

- On UNIX systems, OVPA format is the default data source
- On Windows systems, CODA format is the default data source.

These defaults can be overridden by providing a special file, `nocoda.opt`, in a specific place in conjunction with the existence (installation) of certain tools.

Case 1: Determine CODA Availability

To determine if CODA is installed, the code looks for the CODA executable in platform dependent locations.

- On AIX, the code looks for `/usr/lpp/OV/bin/coda`.
- On Tru64 UNIX (not supported by the DB2SPI), the code looks for `/usr/opt/OV/bin/coda`.
- On all other UNIX platforms, the code looks for `/opt/OV/bin/coda`.
- On Windows, the code uses the NT Registry key `[HKEY_LOCAL_MACHINE\SOFTWARE\Hewlett-Packard\HP OpenView\AgentInstallDir]`. The code adds the bin directory to the registry key value.

For example:

```
C:\Program Files\HP OpenView\Installed  
Packages\{790C06B4-844E-11D2-972B-  
080009EF8C2A}\bin\coda.exe
```

Case 2: `nocoda.opt` is given

To determine if the datasource is overridden, the code looks at the contents of the `nocoda.opt` file. The location of this file is platform dependent.

- On AIX, the code looks for `/var/lpp/OV/conf/dsi2ddf/nocoda.opt`.
- On all other UNIX platforms, the code looks for `/var/opt/OV/conf/dsi2ddf/nocoda.opt`.
- On Windows, the code uses the NT Registry key `[HKEY_LOCAL_MACHINE\SOFTWARE\Hewlett-Packard\HP OpenView\AgentDataDir]`. The code adds the `conf\dsi2ddf` directory to the registry key value.

For example:

```
C:\Program Files\HP OpenView\Installed  
Packages\{790C06B4-844E-11D2-972B-  
080009EF8C2A}\conf\dsi2ddf\nocoda.opt.
```

With `nocoda.opt` given, its contents could even be used to determine different types for different data sources, as listed below in the decision tree.

Case 3: nocoda.opt is not there

If the `nocoda.opt` file is not on the system, the code determines if `ddfcomp` is running from the OM for Windows location.

- On AIX, the OM for Windows location is `/var/lpp/OV/instrumentation/ddfcomp`.
- On all other UNIX platforms, the OM for Windows location is `/var/opt/OV/bin/instrumentation/ddfcomp`.
- On Windows, the OM for Windows location is any path that includes "instrumentation" or its short form "instru~".

The DB2SPI requires the installation of `ddfcomp` on the managed node. If it should not exist during setup, no metric data will be stored for reporting or graphing.

The code uses platform dependent methods to determine if OVPA is installed.

On UNIX platforms, the code looks for `/var/opt/perf/perflbd.rc`. If the file exists, OVPA is installed.

On Windows, the code uses the NT Registry key [HKEY_LOCAL_MACHINE\SOFTWARE\Hewlett-Packard\MeasureWare Agent\CurrentVersion\CommonDataPath]. If the NT Registry key exists, then OVPA is installed.

DSI2DDF Decision Tree

All together, the DSI2DDF Tools perform the following decision for CODA / OVPA storage:

| | | |
|--|----------|--------------|
| is CODA installed? | | |
| yes: | | no: |
| is data source overridden? (see below) | | |
| yes: | no: | |
| use MWA/OVPA | use CODA | use MWA/OVPA |

To determine if a data source is overridden, the following applies:

| | | | | | |
|-------------------------------------|--------------------------------|----------|----------------------------------|----------|----------|
| does <code>nocoda.opt</code> exist? | | | | | |
| yes | | | no | | |
| does it contain data? | | | does <code>ddfcomp</code> exist? | | |
| yes | | no | | | |
| is it "ALL"? | is it the current data source? | | use CODA | yes | no |
| | yes | no | | | |
| use OVPA | use OVPA | use CODA | use CODA | use CODA | use OVPA |
| | | | | | no |
| | | | | | use CODA |

Data Collection Scheduling

Data collection means starting a snapshot for the desired database and analyzing the response supplied by DB2.

The DB2SPI provides four default policies for appropriate data collection, implemented as schedule policies named

- db2s_metric_5m
- db2s_metric_10m
- db2s_metric_30m
- db2s_metric_60m

The desired metrics for each time resolution are specified in the command line of the script called by these schedule policies by their number. These numbers can constitute a list of comma-separated values or ranges like 23-35.

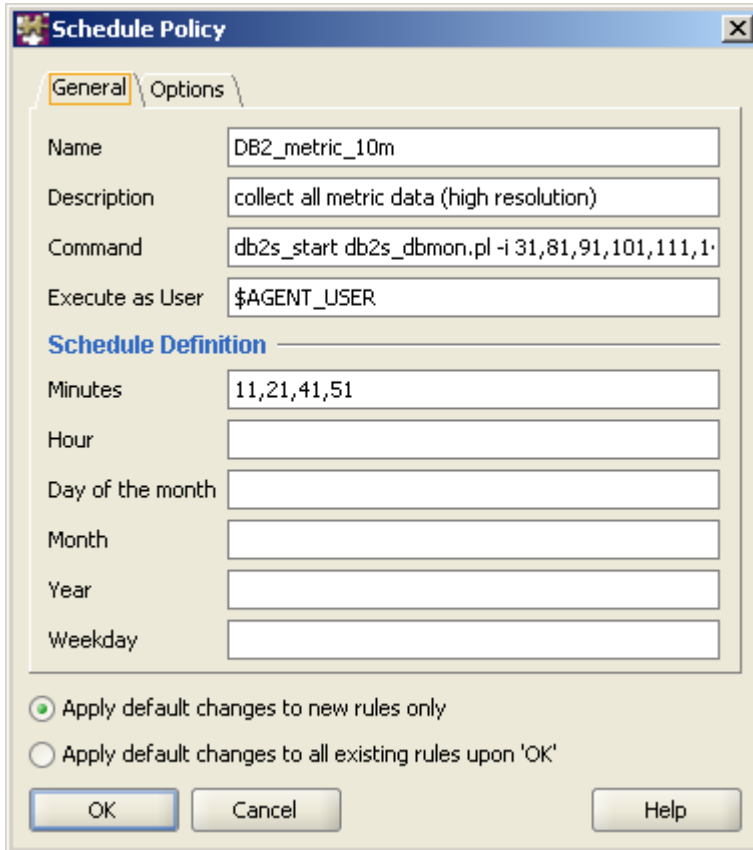
Example: db2s_dbmon.pl -i 11, 21, 31-33, 421, 431

All data is collected every 60 minutes and only a subset every 30, 10 or 5 minutes depending on their importance.

Note that this data collection poses a noticeable load to your system. If you are not interested in the evaluation of some of the metrics you should adapt the schedule policies accordingly.

In the troubleshooting section methods are described how the load can be reduced

Figure 26: Template for performance data collection



Schedule Policy

General \ Options

Name: DB2_metric_10m

Description: collect all metric data (high resolution)

Command: db2s_start db2s_dbmon.pl -i 31,81,91,101,111,1

Execute as User: \$AGENT_USER

Schedule Definition

Minutes: 11,21,41,51

Hour:

Day of the month:

Month:

Year:

Weekday:

Apply default changes to new rules only

Apply default changes to all existing rules upon 'OK'

OK Cancel Help

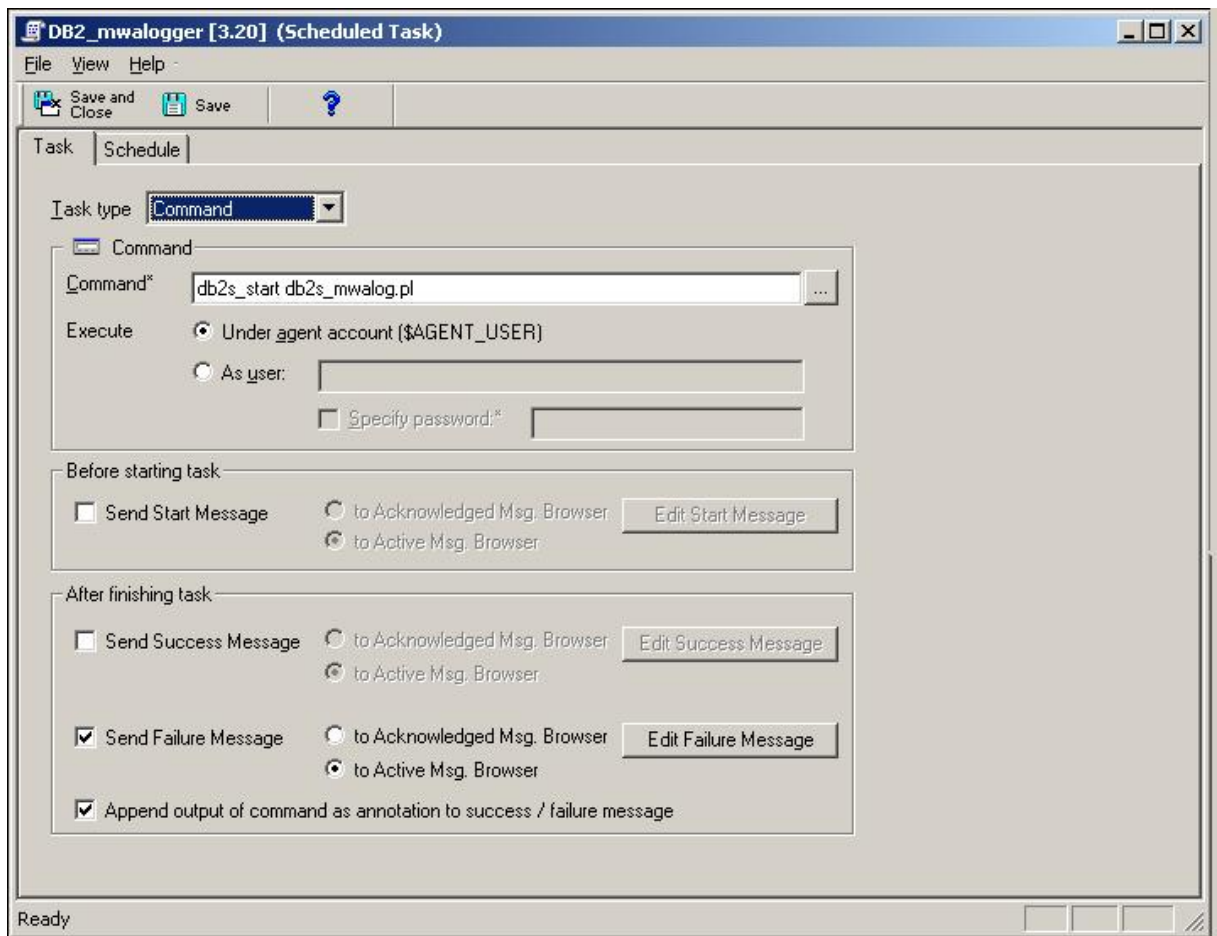
OVPA / CODA Data Forwarding

Data collected from the snapshots or from the DB2 internal tables are stored temporarily in value files of the DB2SPI itself before these are forwarded to the OV Performance Agent (OVPA) or the embedded collection agent (CODA). Normally, this should be the same resolution as the fastest snapshot collection rate. Per default, data is forwarded every five minutes.

Data that are collected at lower rates than five minutes are transferred with the latest value available from last collection cycle.

This is achieved by another HP OM schedule template policy to track correct operation.

Figure 27: Template to schedule OVPA data forwarding



Configuring Alert Thresholds

If snapshot taking and metric calculation is enabled, almost all metrics are sent to the Operations Manager monitoring to check for threshold violations. See the DB2SPI Reference Guide for the complete list of metrics and their threshold values.

In order to change the thresholds, the respective Operations Manager monitor policy need to be modified and re-distributed to the managed node(s).

A multiplicity of thresholds is supported with the help of "template name spaces", where copies of the policies can be applied with different threshold values, just by adding a prefix. This is described in "Specific Metric Thresholds with Template Name Spaces" on page 88.

Note, that the Operations Manager platform is NOT able to provide local thresholds that would allow different thresholds to be compared to on different nodes or even instances or databases. If there should be a need for specific thresholds, please request assistance from support.

Service Management with HP OM

Both OM for UNIX and OM for Windows provide service management capabilities by tracking status changes of services due to messages collected from the managed nodes.

The presentation of the services differs significantly between the two platforms.

Service management capabilities of OM for UNIX are offered via the OV ServiceNavigator. This is an extension to the Operations Manager Java GUI and hence not visible in the Motif GUI. The Service Navigator provides a static, flat view to the service tree.

In OM for Windows, service display is provided as an integral part. The graphical presentation is a dynamic picture where you can zoom into any area you like.

Both systems, however, act identical on incoming data and can apply the same hierarchic model.

DB2 Service Hierarchy

In this context DB2 services are defined as the databases monitored by the DB2SPI, and these databases are organized in a four-tier hierarchical manner.

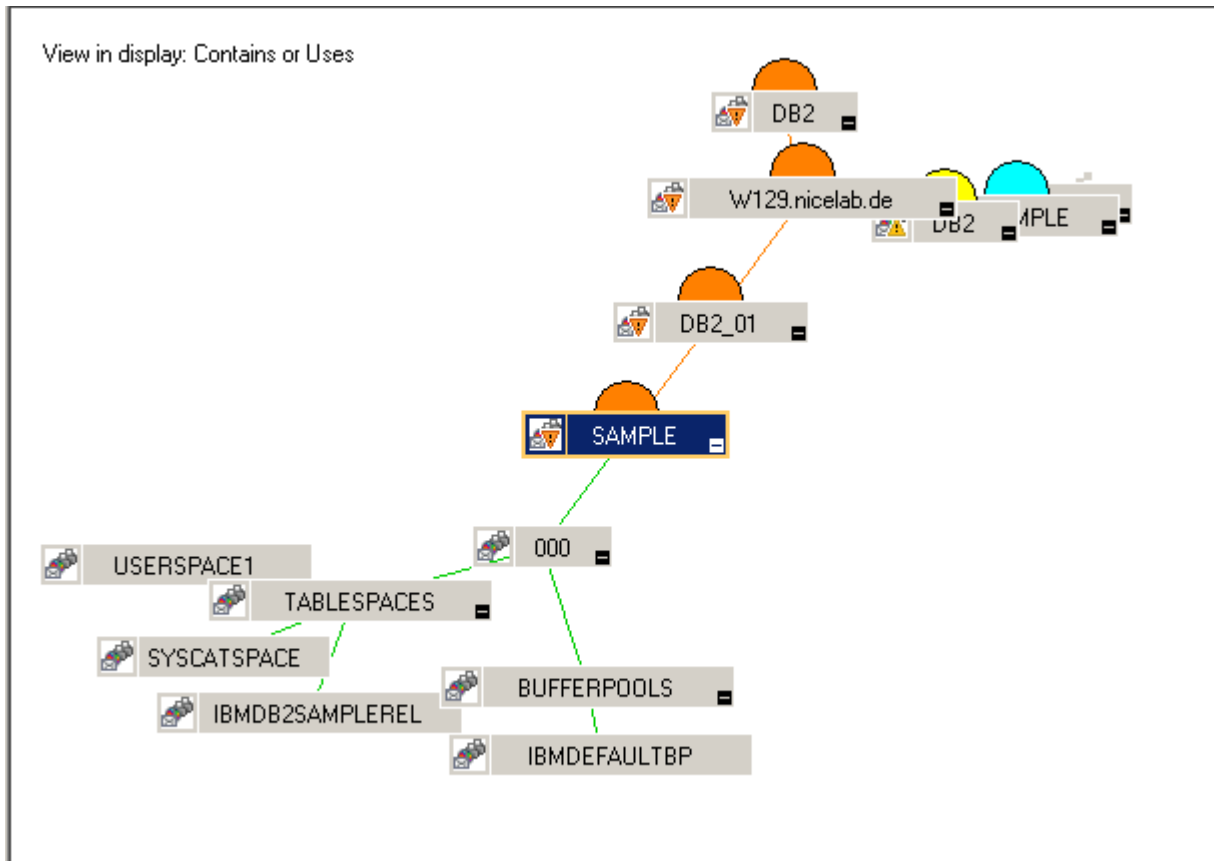
Table 15: Service Tree Levels

| Level | Meaning | Description |
|-----------|------------------------|--|
| Top Level | DB2 | This is the top level hook to access any DB2 service. The icon shown in the service tree is the DB2SPI base icon with the DB2 logo attached. |
| Level 2 | Instance | This level is linked to the DB2 top level service. It consists of all instances on all managed DB2 servers. The icon shown in the service tree is the DB2SPI base icon with a frame containing some database sets in a grey background. |
| Level 3 | Database | This level is linked to the instance level. For each instance, all managed databases are linked to it. The names of these services are just the database names. The icon is the DB2SPI base icon with some symbolic tables on white ground. |
| Level 4 | Partition (Node) | This level is linked to the database level. In DPF environments each database may consist of a set of partitions, spread across many servers. |
| Level 5 | Area | This level shows two areas of interest, bufferpools and tablespaces. It has been introduced into the service tree to keep the display manageable by unfolding only of them. |
| Level 6 | Tablespace, Bufferpool | All tablespaces or bufferpools monitored in this branch of the service tree are displayed here. Please note that in some cases (e.g. PeopleSoft DB2 |

| | | |
|--|--|--|
| | | databases) this can consist of hundreds of individual icons! |
|--|--|--|

Figure 28 shows the screenshot of the hierarchy for a simple setup.

Figure 28: Typical DB2 service tree



Note, that operators can see the DB2 service tree only if they are entitled to. This can be achieved by executing the application "Assign ServiceTree" from the operator's application desktop, and this needs to be done only once.

DB2 Service Functionality of the DB2SPI

The DB2SPI provides the following functionality to achieve DB2 service management: service discovery, automatic update after configuration changes, enforced update via user application.

Service Discovery

The DB2SPI automatically determines the service tree on a managed node by analyzing the general configuration file `db2s_instances.cfg` for instances, databases and its subordinate elements. This is done automatically every hour on the managed node, but change reports are sent to the management server only if changes have occurred (typically these are new or missing databases etc.).

Initial discovery takes place when the `Config Setup` application has been executed and the DB2SPI policies have been distributed to the managed node and are being started.

Enforced Service Tree Update

A tool, "ServiceTree Update", is available in the application desktop of the DB2SPI Administrator to allow the user an enforced synchronization between the configuration of the DB2 server and the service tree visualization.

Status Propagation from Messages to Services

Most events detected by the DB2SPI may affect the service tree, i.e., colorize the icons shown there. Two different levels may be affected by events:

- Instance Level: Events causing the entire instances to be affected directly map into the instance level of the DB2 service tree.
- Database Level: Events which are specific for one database map to its respective symbol in the DB2 service tree.
- Tablespace Level: Events which are specific for one tablespace map to its respective symbol in the DB2 service tree.
- Bufferpool Level: Events which are specific for one bufferpool map to its respective symbol in the DB2 service tree.

The Operations Manager message severity for the event directly determines the status of the service.

Also, within the DB2 service tree "most-critical" propagation model is followed; i.e., the most severe status found in the subordinate level determines the color of a service symbol.

Note that any event other than from DB2 or the DB2SPI does not affect the status (and color) of the node level in the DB2 service tree. Its color is solely determined by the underlying DB2 instances and statuses of them.

OV Reporter Integration

OV Reporter is a powerful tool to create reports about metrics collected on a daily, weekly and monthly basis.

Data acting as the source for reports are found in the OVPA data stores, written when DB2 metrics are calculated.

The location of the reports is `HP_OV_Reports/db2spi/` on the OV Reporter system.

Some sample reports can be found in the Appendix B on page 169

De-installing the DB2SPI

The instructions in this section describe how to remove the DB2SPI software quickly and cleanly from the Operations Manager management server and the managed node. This section covers the following topics:

- Clean-up the Managed Nodes
- Removing the DB2SPI Package
- Removing DB2SPI Components from the Operations Manager GUI

Clean-up the Managed Nodes

Before cleaning up the central instance you should have removed the DB2SPI components from the managed nodes:

- De-assign the Policies (OM for Windows)

This may be done by de-assigning the nodes from the DB2SPI node groups and re-distributing the policies after that. Remember to do this for the Management Server Node as well, if the DB2SPI_ownlog0 policy was deployed to it. Removing this policy should be done after Removing the DB2SPI Package

- Delete the DB2SPI Configuration

Execute "Config Delete" on all managed nodes to clean-up DB2SPI related files and directories.

De-Assignment of Policies (OM for Windows)

To remove the policies from the managed nodes, following these steps:

1. Open the Node Configuration Editor on the management server
2. Drag all nodes from the DB2 node groups to the root node group "Nodes"
3. Close the Node Configuration Editor
4. Mark each node and select the function "All Tasks → Redeploy policies and Instrumentation"

Another possible way to remove the policies from the managed nodes is as follows:

1. On the management console, right-click the DB2 policy group to be removed (e.g. "DB2SPI Windows").
2. Select the function "All Tasks → Uninstall from ..." and choose the node group or node desired (e.g. "DB2 Windows")
3. Repeat these steps for all policy groups and DB2 node groups.

Also remove the DB2SPI_ownlog0 policy from the Management Server node.

This removes all policies from the nodes that belong to those node groups.

4. Remove the managed nodes from the DB2 node groups

Either way you need to execute "Config Delete" for each managed node afterwards.

A quick Alternative

If you intend to re-install the DB2SPI (same version or an update), you may simply execute the "Config Delete" application without de-assigning the policies. In this case, all DB2SPI policies get disabled automatically without being deleted from the managed node.

After (re-)configuration of the DB2SPI and (re-)deployment of the (possibly refreshed) policies the tool "DB2SPI Enable" may be started to put them back into action.

Removing the DB2SPI Package from the Operations Manager Server

To remove the DB2SPI and ATOP components from the OM for Windows management server and complete the general clean-up process:

1. On the OM for Windows management server, enter the Control Panel and select the function "Add/Remove Programs"
2. Select the components for removal:
 - DB2SPI

This will remove all installed binaries.

Unfortunately there is no way to eliminate the DB2 elements from the service tree, if they still exist after all these actions, so this must be done manually, as well as other configuration components.

Removing DB2SPI Components from the Operations Manager GUI

Unfortunately there is no way to remove configuration elements of the DB2SPI from the OM for Windows database automatically.

You have to remove the DB2SPI integration with the Operations Manager GUI manually. You will have to remove the following DB2SPI components from the Operations Manager GUI:

- DB2 managed nodes and DB2SPI node groups (Node Configuration Editor)
- DB2SPI tools and tool groups (Tool Configuration Editor)
- DB2SPI policies, policy groups and policies grouped by types
- DB2SPI user profiles (User Roles Configuration Editor)
- DB2 service tree elements (Service Configuration Editor and Service Type Configuration Editor)

Troubleshooting

This section describes how to troubleshoot the DB2SPI. The information provided is designed to help you find, analyze, and fix problems with the DB2SPI quickly and efficiently. In this section, you will find information about:

- Troubleshooting Checklist
- Area: DB2SPI Installation and Components
- Files and Directories
- Area: DB2SPI Usage
- Tracing
- Tracing other Scripts
- Processes, Services and Scripts

Problems can occur in different areas, and you should first look at the standard scenarios explained in this section before deciding whether or not you need to investigate in more detail.

Troubleshooting Checklist

This checklist shall assist you in isolating and identifying the problem. Most often it will help to solve the problem yourself, and if not, gives hints what to collect and prepare when calling support for the product.

What describes your problem best?

Problem with installation / de-installation

→ see "Area: DB2SPI Installation and Components"

Problem with the initial configuration

Operations Manager shows an error when running "Config Setup"

→ see "DB2SPI Configuration Issues"

The ATOP window does not open

→ see "Problems with the ATOP Communication Layer"

Problem with the DB2SPI licensing

→ see "License Issues"

No license found (error 33)

License file corrupt (error 34)

Problems in general Operations Manager areas

Problem with unidentified "su" events in the message browser

→ see "Unknown Messages for Switch-User Events"

Deployment problem of instrumentation

→ see "Re-Deployment of "Monitors" cannot be done sometimes"

Problem regarding logfile monitoring

→ see "No Messages from DB2 Log Files"

Problem regarding process monitoring

Missing processes are complained
→ see "DB2SPI Process Monitoring Issues"

Problem regarding metric collection

No messages from metric monitoring at all
→ see "No Messages from Metric Monitoring"

Messages show up about "incomplete snapshot"
→ see "'Incomplete Snapshot' Messages appear in the Browser"

A missing "ddflog" is complained
→ see "Error Reported when Forwarding Data to DDFLOG"

A "missing keyword" is complained
→ see "'Missing Keyword' Messages appear in the Browser"

OVPA is not installed
→ see "Message about Missing MeasureWare"

Problem regarding service tree updates
→ see "Service Tree Update does not happen"

Problem regarding the execution of tools
→ see Symptom 2: "Config Setup" aborts with an "Error 34 (license corrupt)".

Some data sources

As a first step, make sure that the base installation of Operations Manager is operating correctly. For more information about basic troubleshooting in HP OM, see the *HP OpenView Operations Administrator's Reference* (Volumes 1 & 2)

The DB2SPI provides the following tools, which may be used to find and analyze problems:

| | |
|---------|--|
| Browser | Messages indicating start / stop problems encountered |
| Logging | All important steps / events regarding the operation of the DB2SPI itself (configuration, errors encountered etc.) are logged in a log file on the managed node. |
| Tracing | Useful information can be collected about each individual step performed during the operation of the DB2SPI. However, tracing must be switched on explicitly. |

Area: DB2SPI Installation and Components

Installation on OM for Windows

To verify that the installation of the DB2SPI completed successfully on the Operations Manager management server, carry out the steps described in the following list:

1. Open the Windows administrative tool "Add / Remove Programs":
Look for the following entry: "DB2SPI"

2. Check that the elements listed in Table 16 have been added to the Operations Manager GUI.

Table 16: DB2SPI GUI Components

| Component Type | Component Name | |
|----------------------------|----------------------|--------------------|
| Node Groups | DB2-AIX | |
| | DB2-HPUX | |
| | DB2-LINUX | |
| | DB2-OS400 | |
| | DB2-SOLARIS | |
| | DB2-WINDOWS | |
| Application / Tool Groups | DB2 Tools | |
| | DB2SPI AdminTools | |
| | DB2SPI for OS400 | |
| User Profiles / User Roles | DB2 Operator Profile | |
| | DB2SPI Admin Profile | |
| Template / Policy Groups | DB2SPI AIX | DB2SPI Base |
| | | DB2SPI Base (UNIX) |
| | DB2SPI HP-UX | DB2SPI Base |
| | | DB2SPI Base (UNIX) |
| | DB2SPI Linux | DB2SPI Base |
| | | DB2SPI Base (UNIX) |
| | DB2SPI MgmtSvr | |
| | DB2SPI OS400 | |
| | DB2SPI Solaris | DB2SPI Base |
| | | DB2SPI Base (UNIX) |
| | DB2SPI Windows | DB2SPI Base |

Files and Directories

Installed File Locations on the Operations Manager Management Server

The installation of the DB2SPI software copies the required files to the Operations Manager management server. In addition to the standard locations already available on an Operations Manager management server, the following directories are created.

Note, that the management server must be a managed node itself.

On HP-UX and Solaris (OM for UNIX):

| | |
|-------------------------------|---|
| /var/opt/OV/atop/log | log and trace files for the communication layer |
| /opt/OV/atop/bin/ | configuration files for the communication layer |
| /var/opt/OV/share/log/db2spi | log and trace files |
| /var/opt/OV/share/conf/db2spi | configuration files |
| /opt/OV/db2spi/bin | script files |
| /opt/OV/doc/C/db2spi | documentation files |

On Windows (OM for Windows):

| | |
|--------------------------------|---|
| %OvInstallDir%\atop | log and trace files for the communication layer |
| %OvShareDir%\tmp\db2spi | temporary storage |
| %OvShareDir%\log\db2spi | log and trace files |
| %OvInstallDir%\db2spi\messages | message files for internationalization (currently unused) |

Installed File Locations on the DB2 Servers

Installing and activating the DB2SPI components on the DB2 server (the Operations Manager managed node) establishes the following directories on the Operations Manager managed node.

Note that besides them some files are also kept in the standard "instrumentation" resp. "cmds" and "monitor" directories.

On HP-UX:

| | |
|---------------------------------|---|
| /var/opt/OV/atop | log and trace files for the communication layer |
| Instrumentation/cmds Directory | configuration files for the communication layer |
| /var/opt/OV/tmp/db2spi | temporary storage |
| /var/opt/OV/log/db2spi | log and trace files |
| /var/opt/OV/db2spi/messages | message files for internationalization (currently unused) |
| /var/opt/OV/db2spi/metrics | metric definition files |
| /var/opt/OV/conf/db2spi | configuration files |
| /var/opt/OV/bin/OpC/monitor | templates for configuration files and monitor scripts (if managed by OM for UNIX) (DCE nodes) |
| /var/opt/OV/bin/instrumentation | templates for configuration files and monitor scripts (if managed by OM for UNIX) (HTTPS nodes) |
| /var/opt/OV/bin/instrumenta | templates for configuration files and monitor scripts |

| | |
|------|--------------------------------|
| tion | (if managed by OM for Windows) |
|------|--------------------------------|

On Solaris:

| | |
|---------------------------------|---|
| /var/opt/OV/atop | log and trace files for the communication layer |
| Instrumentation/cmds Directory | configuration files for the communication layer |
| /var/opt/OV/tmp/db2spi | temporary storage |
| /var/opt/OV/log/db2spi | log and trace files |
| /var/opt/OV/db2spi/messages | message files for internationalization (currently unused) |
| /var/opt/OV/db2spi/metrics | metric definition files |
| /var/opt/OV/conf/db2spi | configuration files |
| /var/opt/OV/bin/OpC/monitor | templates for configuration files and monitor scripts (if managed by OVOOM) (DCE nodes) |
| /var/opt/OV/bin/instrumentation | templates for configuration files and monitor scripts (if managed by OVOOM) (HTTPS nodes) |
| /var/opt/OV/bin/instrumentation | templates for configuration files and monitor scripts (if managed by OVOOM) |

On AIX:

| | |
|----------------------------------|--|
| /var/lpp/OV db2spi/messages/atop | log and trace files for the communication layer |
| Instrumentation/cmds Directory | configuration files for the communication layer |
| /var/opt/OV/tmp/db2spi | temporary storage |
| /var/opt/OV/log/db2spi | log and trace files |
| /var/opt/OV/db2spi/messages | message files for internationalization (currently unused) |
| /var/opt/OV/db2spi/metrics | metric definition files |
| /var/opt/OV/conf/db2spi | configuration files |
| /var/opt/OV/bin/OpC/monitor | templates for configuration files and monitor scripts (if managed by OM for UNIX) |
| /var/opt/OV/bin/instrumentation | templates for configuration files and monitor scripts (if managed by OM for Windows) |

On Linux:

| | |
|-----------------------------------|---|
| /var/opt/OV/atop | log and trace files for the communication layer |
| Instrumentation/cmds Directory | configuration files for the communication layer |
| /var/opt/OV/tmp/db2spi | temporary storage |
| /var/opt/OV/log/db2spi | log and trace files |
| /var/opt/OV/db2spi/messages | message files for internationalization (currently unused) |
| /var/opt/OV/db2spi/metrics | metric definition files |
| /var/opt/OV/conf/db2spi | configuration files |
| /var/opt/OV/bin/OpC/monitor | templates for configuration files and monitor scripts (if managed by DCE agent) |
| /var/opt/OV/bin/instrumentation | templates for configuration files and monitor scripts (if managed by HTTPS agent) |

On Windows (managed by OM for UNIX):
DCE agents:

| | |
|------------------------------|---|
| \\usr\\OV\\atop | log and trace files for the communication layer |
| \\usr\\OV\\bin\\OpC\\cmds | configuration files for the communication layer |
| \\usr\\OV\\tmp\\db2spi | temporary storage |
| \\usr\\OV\\log\\db2spi | log and trace files |
| \\usr\\OV\\db2spi\\messages | message files for internationalization (currently unused) |
| \\usr\\OV\\db2spi\\metrics | metric definition files |
| \\usr\\OV\\conf\\db2spi\\ | node specific configuration files |
| \\usr\\OV\\bin\\OpC\\monitor | templates for configuration files and monitor scripts |

HTTPS agents (using the common prefix \\Program Files\\HP OpenView\\):

| | |
|---------------------------------|---|
| ...\\data\\atop | log and trace files for the communication layer |
| ...\\data\\bin\\instrumentation | configuration files for the communication layer |
| ...\\data\\tmp\\db2spi | temporary storage |
| ...\\data\\log\\db2spi | log and trace files |
| ...\\data\\db2spi\\messages | message files for internationalization (currently unused) |
| ...\\data\\db2spi\\metrics | metric definition files |
| ...\\data\\conf\\db2spi | node specific configuration files |
| ...\\data\\bin\\instrumentation | templates for configuration files and monitor scripts |

On Windows (managed by OM for Windows):

| | |
|----------------------------------|---|
| %OvAgentDir%\atop | log and trace files for the communication layer |
| %OvAgentDir%\bin\Instrumentation | configuration files for the communication layer |
| %OvAgentDir%\tmp\db2spi | temporary storage |
| %OvAgentDir%\log\db2spi | log and trace files |
| %OvAgentDir%\db2spi\metrics | metric definition files |
| %OvAgentDir%\conf\db2spi | configuration files |
| %OvAgentDir%\db2spi\messages | message files for internationalization (currently unused) |
| %OvAgentDir%\bin\Instrumentation | templates for configuration files and monitor scripts |

Configuration Files

ATOP Communication Layer

On the management server the central configuration file is `atop.srv.cfg`

Please see "Files and Directories" in the Troubleshooting section of this document to locate the directory containing it on your management server.

This should act as the primary source for all modifications.

For distribution to the managed nodes, equivalent files `atop.cfg` are kept in all supported platform-specific directories for the managed nodes, hence

```
/var/opt/OV/share/databases/OpC/mgd_node/customer/<...>/cmds
```

on the management server. After distributing the actions / commands / monitors a copy is kept in the `cmds` directory on the managed node.

On Microsoft Windows based Operations Manager Java display stations, the file can be found in

```
\Program Files\Hewlett-Packard\NiCE\ATOP
```

Note: Whenever changes need to be made to the ATOP configuration file, especially regarding the port information, this must be re-distributed to the managed nodes and to the Java GUI stations or OM for Windows management consoles.

General DB2SPI Configuration Files

There is one general DB2SPI configuration file which is installed and used on the management server as well as on the managed nodes.

Distributing the DB2SPI instrumentation to the managed node copies this configuration file to the monitor directory resp. instrumentation directory.

The file contains the default settings of the DB2SPI configuration:

| | |
|--|---|
| <code>db2s_spi.cfg</code> | Default configuration file for DB2SPI operation |
| After executing "Config Setup", the following files are created in the configuration directory <code>.../conf/db2spi</code> on the managed node: | |
| <code>db2s_spi.cfg</code> | Active image of the default configuration file <code>db2s_spi.cfg</code> ; this copy may be modified to change the default behavior of the DB2SPI on the managed node, like enabling / disabling performance monitoring or switching trace options. |
| <code>db2s_instances.cfg</code> | This file contains information about the DB2 version and edition present on the managed node and the instances that have been configured during "Config Setup". This file is encrypted. |
| <code>db2s_replicpaths.cfg</code> | When SQL replication log file monitoring is set up this file is created in the configuration file directory. It contains the paths of the SQL replication log files. The capture log file paths are extracted from the <code>CAPTURE_PATHS</code> column in the <code><your_schema>.IBMSNAP_CAPPARMS</code> table. The apply logfile paths for each apply qualifier are obtained from the <code>APPLY_PATHS</code> column in the <code>ASN.IBMSNAP_APPPARMS</code> . If these values are not set, please ask you DBA to specify the paths with the help of the Replication Center in the corresponding tables and edit the file <code>db2s_replicpath.cfg</code> accordingly. |
| <code>db2s_illist.cfg</code> | This file contains information about the visibility of existing DB2 instances on this machine. It is modified by the "Discovery Filter" tool by the user if necessary. |

DB2SPI Runtime License File

In the monitor (or instrumentation) directory the DB2SPI runtime license file, `db2s_license.dat`, is kept. This file contains all runtime licenses in encrypted form the user has obtained. It is read by the DB2SPI and must not be modified at any time to preserve DB2SPI operation.

If this file should be deleted or get corrupted, simply re-deploy "monitors" (OM for UNIX) or "instrumentation" (OM for Windows) for a reset.

Note: With the "License Check" tool you can verify the validity of the runtime licenses on each managed node.

Self-Healing Services Configuration Files

Installation Description File

The installation description file `db2s_install.xml` contains all data about the (deployed) version of the DB2SPI on the managed node.

This file is used by the HP OpenView Self-Healing Client to find out the products installed on a managed node.

It is located in the monitor resp. instrumentation directory on the managed node.

SHS Collector Information File

The SHS collector information file `db2s_shscollin.xml` is an XML file which specifies the data to be collected. The data is grouped into "contexts". The context is a label that is used to specify what data is to be collected.

It is located in the monitor resp. instrumentation directory on the managed node.

Registration Files

There are two registration files, one for Windows nodes and one for UNIX nodes. In the registration file, the "source-name" attribute is the "source name" component of the SPI's application identifier (see section "Implementation details") and the "name" attribute is the "source description" component of the application identifier.

These files are named `db2s_shsreg_unix.xml` and `db2s_shsreg_win.xml` and can be found in the monitor resp. instrumentation directory on the managed node.

Other Configuration Files

Many functions of the DB2SPI are written in a very generic way, and their effective action is determined via configuration files. All these files are also kept in the monitor (or instrumentation) directory of the managed nodes. Their common identifiers are:

- a prefix "db2s_"
- a postfix ".cfg"

These files must not be modified by the user to assure proper operation of the DB2SPI.

If any file should be deleted or get corrupted, simply re-deploy "monitors" (OM for UNIX) or "instrumentation" (OM for Windows) for a reset.

Log Files

ATOP Log Files

The ATOP log file lists extraordinary states and problems that are encountered when the ATOP communication layer executes. ATOP log files can be found on all systems that run components of the ATOP subsystem, i.e., the management server, the managed nodes and the Java GUI display stations. Please see "Files and Directories" in the Troubleshooting section to locate the directory containing the following logs.

- On the management server (running the ATOP server as an OV service):
`atopsrv.log`
- On the managed node (running the ATOP client to connect to applications):
`atop.log`
- On Windows based Java GUI display stations (running the ATOP server as a service):
`\Program Files\Hewlett-Packard\NiCE\ATOP\Logs\atop_server.log`

DB2SPI Log File

All important internal states and messages are written to a log file on the managed node, `.../log/db2spi/db2s_spi.log`. All configuration events as well as important events during operation are logged to this file.

Many of the entries are monitored by the DB2SPI itself, using a proper policy, but this does not filter all events from it nor does it provide accurate timing and sequencing in the Operations Manager message browser.

For details and the complete history you should therefore check this log file directly.

Details about errors and problems logged in this log files can be found later in this manual

Metric Storage on Managed Nodes

Metric data are stored in series of files in the metrics directory as listed above.

Please make sure that these files are not modified or deleted in order to guarantee proper operation of the DB2SPI.

DB2SPI Service Tree Configuration

There is one configuration file that keeps the former state of the monitored DB2 services, `.../conf/db2spi/db2s_svctree.cfg`. This file is used to determine the need of updating the service tree on the management server, which is otherwise skipped if no changes have occurred in the managed objects.

This file is referenced and possibly updated whenever the DB2SPI service discovery runs, instance configuration or database filtering is executed or when the user requests an update of the service tree.

Area: DB2SPI Usage

This section describes the troubleshooting scenarios that you are likely to encounter when using the DB2SPI. Each problem is described in terms of possible symptoms and a likely cause, which is designed to help you pinpoint the problem and solve it as quickly and efficiently as possible.

Common Areas and Symptoms

Installation on OM for UNIX

To verify that the installation of the DB2SPI completed successfully on the management server, carry out the steps described in the following list:

On the command line, enter: **swlist** and look for the following entry:

```
DB2SPI    03.61.000    DB2 SMART Plug-In for HP OVO /  
Operations Manager
```

Check the following log files for more specific information relating to installation problems:

- /var/adm/sw/swagent.log
- /var/adm/sw/swinstall.log

Check that the Operations Manager configuration elements are all available in the Operations Manager Administrator GUI. If not, you can check the file `opcfcgupld.log` or `opcfcgupld.old` for possible problems during upload. Note, that these files are overwritten by subsequent configuration uploads.

DB2SPI Configuration Issues

Please also see the sections "License Issues" and "Problems with the ATOP Communication Layer" for possible scenarios

Symptom 1: In the window of the `Config Setup` application an error message (`OpC30-913`) is shown for `opcmsg`, adjacent with the text:

```
"This is a warning only since there is no  
opcmsg policy yet.
```

```
Completion of DB2SPI installation will  
provide one."
```

Possible Cause: There is no `opcmsg` policy on the managed node that could intercept the message generated by the `Config Instance` application. This problem is not critical: when installing

the DB2SPI later, the appropriate `opcmsg` policy will be installed automatically.

Action: None required.

License Issues

Symptom 1: "Config Setup" aborts with an "Error 33 (no valid license)".
Applications cannot be started.
Messages in the message browser contain the string "Error 33 (no valid license)".

Possible Cause: The DB2SPI license might have expired (common at the end of the evaluation period) or not installed at all.

Action: The DB2SPI Administrator may check the globally available valid licenses with the "License List" tool. He should rerun the "License Add" tool to provide a valid license and distribute the "monitors" ("DB2SPI instrumentation" on OM for Windows) to the managed nodes again.

Symptom 2: "Config Setup" aborts with an "Error 34 (license corrupt)".
Applications cannot be started.
Messages in the message browser contain the string "Error 34 (license corrupt)".

Possible Cause: Either the file `db2s_license.dat` got damaged on the managed node (case a), or, with the "License Add" tool, an invalid license string has been added (case b), for example an "HP SPI Installation License Key" rather than a "NiCE DB2SPI Runtime License Key".

Action: Case a: Re-deploy the instrumentation from the management server.
Case b: Delete all occurrences of the `db2s_license.dat` file on the management server (from all platform directories!) and re-run "License Add". Be sure to add only the license key file(s) supplied by NiCE. See "Appendix D: DB2SPI Licensing" on page 177 for details.

DB2SPI Application Execution Issues

Symptom 1: You cannot start DB2SPI application for a given instance even though the DB2 instance is displayed in the instance-selection menu

Possible Cause: If you misspell the name of the DB2SPI Administrator during "Config Setup" or enter the name of an instance user that does not exist, the configuration file generated by the `Config Setup` application is unusable for one or all instances and, as a consequence, no operation is executed.

Action: A DB2SPI Administrator should drop this faulty configuration with "Config Delete" and then rerun the "Config Setup" application and enter the correct values for the DB2 Administration Server and instance users.

DB2SPI Process Monitoring Issues

Symptom 2: Applications cannot be started.
Messages in the message browser show "Error 33 (no valid license)".

Possible Cause: The DB2SPI license might have expired (common at the end of the evaluation period)

Action: The DB2 Administrator should rerun the `Add Licenses` to provide a valid license and distribute the "monitors" ("DB2SPI instrumentation" on OM for Windows) to the managed nodes again.

Symptom 3: Many messages appear from process monitoring that are obviously wrong.

Possible Cause: DB2SPI relies on the DB2 edition specification given by the user. Maybe this was not given correctly or the database has been upgraded / reconfigured later on.

Action: Reconfigure the DB2SPI with "Config Setup".

Symptom 4: In the window of the `Config Setup` application an error message (`OpC30-913`) is shown for `opcmsg`, adjacent with the text:

"This is a warning only since there is no `opcmsg` policy yet.
Completion of DB2SPI installation will provide one."

Possible Cause: There is no `opcmsg` policy on the managed node that could intercept the message generated by the `Config Instance` application. This problem is not critical: when installing the DB2SPI later, the appropriate `opcmsg` policy will be installed automatically.

Action: None required.

No Messages from DB2 Log Files

Symptom: New entries in the DB2 notification log do not generate messages and, as a consequence, no messages appear in the `Message Browser` window.

Possible Cause: The DB2 database instance specific log file may have been moved after the DB2SPI has been configured

Action: Either provide a link at the old place or adapt the log file configuration file in the DB2SPI configuration directory manually.

Unknown Messages for Switch-User Events

Symptom: Many messages with "unknown" severity appear in the Message Browser window

Possible Cause: If you have configured the standard `syslog` policy for HP-UX, or `su_log` (AIX) on the managed node, each time a DB2SPI process monitoring is to be executed an "su" is performed and logged to the `syslog` log file. The "su" event is trapped but does not have a severity assigned in the standard policy.

Action: Improve the `syslog` policy to suppress these messages as explained here:

For HP-UX, add one or more suppress conditions to the `syslog` (HP-UX) policy with text patterns like:

```
su : + <*> root-<InstanceUserName>
```

For AIX, add a suppress condition to the `su_log` (AIX) policy with a text pattern like:

```
SU <*> + <*> root-<InstanceUserName>
```

Note that you need a match for each name an instance user has been set up with on the DB2 servers and their instances to be managed. We recommend you use generic names such as `db2inst<n>` in order to simplify management.

Message about Missing MeasureWare

Symptom 1: The following message appears from time to time in the Message Browser window:

```
"OVPA not installed on <Hostname>. Disabling metric recording"
```

Possible Cause: The MeasureWare agent (PA) is not running on the managed node, but you have configured (standard) performance monitoring with the DB2SPI, which cannot find the PA agent.

Action: Either install PA on the managed node or disable forwarding of performance data by running the appropriate "PerfRep Disable" application from the DB2SPI Admin application group.

Re-Deployment of "Monitors" cannot be done sometimes

Symptom 1: The Operations Manager Administrator receives an error during "forced" policy deployment like

Errors occurred during distribution of the monitors. Solve the problem and distribute the monitors again (OpC30-1030)
Can't delete file
/var/opt/OV/bin/OpC/monitor.old/db2s_dallilib.sl
OpC30-1003)

Possible Cause: The internal DB2SPI library is currently in use (probably by db2s_dbmon.pl), which prevents the replacement by HP OM.

Action: Either re-try after a while or temporarily disable the DB2SPI by running the application "DB2SPI Disable" on the Operations Manager managed node in question; don't forget to re-enable it later on...

No Messages from Metric Monitoring

Symptom 1: Performance messages do not appear in the Message Browser window

Possible Cause: If you successfully distributed the DB2SPI policies, the performance monitoring scripts are operating, but may be suffering from a lack of data. DB2 provides performance data only if the collection of performance data is enabled.

Action: Run the application "Snapshot Enable" on the Operations Manager managed node in question to make sure that the database server has enabled data collection.

"Incomplete Snapshot" Messages appear in the Browser

Symptom 1: Messages like Incomplete snapshot for <database> appear in the message browser window

Possible Cause: This indicates that the DB2 instance is not configured to collect all performance metrics that were requested.

Action: Run the application "Snapshot Enable" for the instance in question to make sure that the database server has enabled data collection. For more information, see "Enable / Disable DB2 Snapshots" on page 87.

"Missing Keyword" Messages appear in the Browser

Symptom 1: Messages complaining about missing keywords in the DB2 snapshots appear in the message browser window

Possible Cause: This may happen if DB2 does not provide values for all metrics that were requested. A typical case is the FCM area: If this is not available, but the metrics 0890, 0900, 0910, 0920 are requested from the metric schedule policy db2s_metrics_10m, such messages will appear.

Action: Create a snapshot with the "Show Snapshot" application and check for the areas covered by DB2. Disable (remove) the respective metrics from the schedule policy.

Error Reported when Forwarding Data to DDFLOG

- Symptom 1: During data collection an error is reported with "ddflog" keyword.
- Possible Cause: The DDFLOG tool may not be installed on the managed node. While this is hardly possible in OM for UNIX environments, it may easily be forgotten from the OM for Windows console.
- Action; Just deploy the "DSI2DDF" area in the instrumentation deployment on the OM for Windows console for the managed node(s) affected.
- Possible cause: PA data files may have been deleted or corrupted.
- Action: Unfortunately PA cannot recover from lost or corrupted data. The only option is to re-configure the DB2SPI (run "Config Delete" and "Config Setup" in sequence).

Service Tree Update does not happen

- Symptom 1: There is no update in the service tree although DB2 or DB2SPI configuration has been changed
- Possible Cause: The schedule policy for service discovery, `db2s_discover_svctree`, is not enabled / active or the log files policies `db2s_svctree_auto` and `db2s_svctree` do not work.
- Action: Run the application "ServiceTree Update" on the Operations Manager managed node in question to make sure that all configuration files and DB2 itself are checked.
- Symptom 2: Messages with "svctree" in the application attribute and names of databases in the message text are appearing in the Message Browser window and do not disappear automatically.
- Possible Cause: Normally, an automatic action is performed on the management server to process the service tree configuration changes transmitted from the managed nodes. If they do not get processed, the automatic action (script `db2s_make_svctree.pl`) cannot be executed on the management server or the service engine might not respond.
- Action: Make sure that the management server is a managed node. Check that the service engine is running.

Problems with the ATOP Communication Layer

Application Windows do not pop up

- Symptom 1: When running a DB2SPI application, no window appears at all although Operations Manager does not report a problem.

Possible Cause: This can be caused by multiple reasons. Please see the "Action" part below for possible checks.

- Action:**
- 1) Make sure that the ATOP server is installed and running on your management server and, if working with the Java GUI, on that display station.
On the OM for UNIX management server, run "ovstatus atop_server" and on OM for Windows check the "ATOP server service" in the "Services" window of the control panel. The latter must also be available on the Java GUI station.
 - 2) There could be problems with the network connection (ports are blocked at firewalls, ATOP port could be used by any other program). Check the respective configuration(s)
 - 3) Problems when starting the application interface could arise due to resource problems on the managed node. Check system load.

The same holds for the ATOP server node – on UNIX there is little risk, but on Windows JRE is needed as well. Check system load.

- 4) Verify that the same ports are defined on both the managed node and the management server (resp. Java GUI stations) for the communication; check the ATOP configuration files for this.

Tracing

This section describes how you can use the tracing feature incorporated in the DB2SPI to help you in your troubleshooting. The information written to the trace files is designed to help you pinpoint and solve problems as quickly and efficiently as possible. This section covers the following troubleshooting areas:

- Trace Configuration
- Configuring the Trace Area
- DB2SPI Trace Files

Note: Tracing can produce large amounts of data in the trace file, and there is no file-size limitation for this logging. You should therefore use tracing only when necessary and, in addition, make sure that tracing is switched off after you have successfully solved the problems you are using tracing to investigate.

Trace Configuration File

The DB2SPI can be traced independently from Operations Manager by using its separate, DB2SPI-specific, configuration file, which contains the appropriate settings for DB2SPI specific tracing. This file is kind of a XML files that describes the different areas and processes that comprise the DB2SPI.

The default trace configuration file, `db2s_tracedef.cfg`, is transferred during the initial distribution of DB2SPI monitors from the management server to the

managed nodes (DB2 servers). During instance configuration with the "Config Setup" tool the configuration file is placed in the DB2SPI configuration directory .../conf/db2spi on the managed node (given for all UNIX systems here).

Configuring the Trace Area

There is a tool in the DB2SPI Admin application group to define the trace area you are interested on a generic or rather detailed level. The tool is called "Trace Define", and it provides an interactive session to change the trace definition for different levels.

The highest level is the "Area", and if you turn on tracing at this level, all functions, tools and scripts belonging to the selected area will produce trace output.

With an "Area" selected, different "Functions" are available, and often there is another level below, the "Process" or "Script" level.

This allows a very granular definition of the desired trace profile.

The following table lists all the areas, functions, and scripts/binaries that can be traced:

Table 17: Tracing Areas

| Area | Function | Scripts |
|-----------------------------|-------------------------------|-----------------------------------|
| DB2 Metrics | Metric Collection | db2s_dbmon.pl db2s_metcoll |
| | Metric Reporting and Graphing | db2s_mwalog.pl |
| DB2 Service Discovery | Discovery | db2s_discover.pl db2s_discover |
| | Service Tree | db2s_svctree_dif.pl |
| DB2 Logfile Monitoring | Administrative Log Entries | db2s_diag.pl |
| | Replication Log Entries | db2s_repliclog.pl |
| | File Size Monitoring | db2s_fsize.pl |
| | DB2SPI Logfile Compression | db2s_ziplog.pl |
| DB2 Process Monitoring | Processes | db2s_ruleprocmon.pl |
| DB2 Administration Tools | Flexible Management | db2s_flexapp.pl |
| | Common Management | db2s_rundb2.pl |
| | Snapshot Data Collection | db2s_snap_switch.pl |
| DB2 Information and Reports | Instance List | db2s_ilst.pl |
| | DB2 Configuration | db2s_showdbcfg.pl |
| | DB2 Manager Configuration | db2s_showmgrcfg.pl |
| | Show Snapshot | db2s_showsnap.pl |
| | Show Replication Status | db2s_replic_status.pl |

| | | |
|---------------------------------|-----------------------------------|--------------------|
| | Show Metric Report | db2s_asciirep.pl |
| DB2SPI Administration | Entity Filter | db2s_entyfilter.pl |
| | Global Metric Collection from DB2 | db2s_metrmon.pl |
| | Metric Forwarding to OVPA/CODA | db2s_mwafwd.pl |
| | Metric Forwarding to OVO | db2s_opcfwd.pl |
| Other DB2SPI Tools and Services | License Report | db2s_licrep.pl |
| | Instance Start/Stop | db2s_istart.pl |

A sample trace definition session is shown in the following listing. Tracing is switched on for the whole area "DB2 Administration Tools".

The "+" or "-" in front of any object gives the current tracing state: "-" means that tracing is switched off and "+" means that tracing is switched on.

```

Current entity:    ALL

Choose a subentity
0      Exit program
1      - DB2 Metrics
2      - DB2 Service Discovery
3      - DB2 Logfile Monitoring
4      - DB2 Process Monitoring
5      - DB2 Administration Tools
6      - DB2 Information and Reports
7      - DB2SPI Administration
8      - Other DB2SPI Tools and Services
Enter one index: 5
Chosen subentity: ALL:DB2 Administration Tools

Select a function
0      Cancel
1      Open DB2 Administration Tools
2      Get trace for DB2 Administration Tools
3      Disable tracing DB2 Administration Tools
Enter one index: 2
Current entity:    ALL

Choose a subentity
0      Exit program
1      - DB2 Metrics
2      - DB2 Service Discovery
3      - DB2 Logfile Monitoring
4      - DB2 Process Monitoring
5      + DB2 Administration Tools
6      - DB2 Information and Reports
7      - DB2SPI Administration
8      - Other DB2SPI Tools and Services
Enter one index: 0

Press any key to close the window ...

```

DB2SPI Trace Files

Regular Trace Files

DB2SPI trace data are written to the following file in the DB2SPI log directory:

```
.../log/db2spi/db2s_trace.log
```

Note, that no file-size limitations exist for the `db2s_trace.log` file while tracing is enabled.

Traces are generated in a two-step approach:

For each process / script that is given in a `DB2SPI_TRACE_AREA` command in the configuration file, a separate trace file is created where the traces are stored. When the process / script ends regularly, this file is appended to the general trace file `db2s_trace.log`. These interim trace files are kept in the same directory as the comprehensive one and can easily be identified by their name, which contains "db2s_trace" and a PID. If the process / script should abort before regular termination and merge, the separate trace file is preserved there.

It is good practice to check the temporary directory from time to time for remainders of such trace operations.

Special Trace Files

There are some special trace files that are always created, namely in the area of basic configuration and upgrade.

These files are also kept in the regular place, but with a different name:

- `db2s_setup_trace.log`
- `db2s_upgrade_trace.log`
- `db2s_shs_trace.log`

These traces are enforced programmatically just as an additional precaution in case any of these critical steps should behave unexpectedly.

The files may be compressed, and then have a date code and a ".Z" suffix added to their names.

Tracing other Scripts

To trace any other scripts not listed in Table 17: Tracing Areas or any OS/400 related script, an alternative tracing mechanism should be used.

The default configuration file, `db2s_spi.cfg`, is transferred during the initial distribution of DB2SPI monitors from the Operations Manager management server to the Operations Manager managed nodes (DB2 servers).

Besides some other flags and settings that are usually affected and modified by proper tools in the DB2SPI Admin application group, there are four entries that determine the trace behavior:



- DB2SPI_TRACE_CONFIG_FILE
- DB2SPI_TRACE_STATUS
- DB2SPI_TRACE_PROCESS
- DB2SPI_TRACE_PLUS

The following listing shows the default contents of the configuration file, db2s_spi.cfg.

Example 1: Default DB2SPI -Configuration File (trace section only)

```
#####
#####
#
# File:          db2s_spi.cfg
# Description:   The general configuration file of the DB2SPI
# Package:      HP OpenView Operations SMART Plug-In for IBM
DB2
#
# Copyright NiCE GmbH, 2000-2008
#
#####
#####

#          DB2SPI_VERSION:
#          -----
#          Code version of the SPI installed.
#          Note:  DO NOT REMOVE OR CHANGE THIS LINE.
#                  IT IS MAINTAINED AUTOMATICALLY DURING
UPGRADES.
DB2SPI_VERSION 03.50.000
#-----
-----

#          DB2SPI_TRACE_CONFIG_FILE:
#          -----
#          Define the name of the tracing configuration
file
#          for advanced DB2SPI tracing.
#          Values: <name> Fully qualified file name
#                  OFF    Advanced tracing disabled
(default)
DB2SPI_TRACE_CONFIG_FILE OFF
#-----
-----

#          DB2SPI_TRACE_STATUS:
#          -----
#          Status of DB2SPI tracing on managed node.
#          Values:  ON    Tracing enabled
#                  OFF   Tracing disabled (default)
#          Note:    This flag is evaluated only if the
advanced
#                  tracing is not defined
DB2SPI_TRACE_STATUS OFF
#-----
-----

#          DB2SPI_TRACE_PROCESS:
```


DB2SPI_TRACE_STATUS ON

Tracing starts automatically after the DB2SPI writes the "ON" flag back to disk; there is no need to restart any processes. In order to de-activate tracing, reset the DB2SPI_TRACE_STATUS parameter to "OFF". Tracing stops automatically after the DB2SPI writes the "OFF" flag back to disk. You do not need to restart any processes.

Configuring Script to be traced: DB2SPI_TRACE_PROCESS

You can specify which programs you want to trace by setting the DB2SPI_TRACE_PROCESS variable in the `db2s_spi.cfg` file and using the appropriate program name as the value. For example:

```
DB2SPI_TRACE_PROCESS db2s_os400_coll.jar
```

Extending Trace Information: DB2SPI_TRACE_PLUS

Sometimes it may be helpful to extend the amount of trace information in order to see environmental data, previous metric values, original logfile entries etc. in context of the DB2SPI processing. This is the purpose of the DB2SPI_TRACE_PLUS switch.

Depending on the area given there, a lot of additional data can be collected and put into the DB2SPI trace file.

This function should only be used if requested by the DB2SPI support.

If activated once, it should be disabled as soon as possible because it produces very large trace logs.

Self-Management of the DB2SPI

DB2SPI Log Files

The DB2SPI is configured to monitor its own status and notifies the user of any changes in status, problems, and errors etc. as follows:

- The DB2SPI self-management feature generates messages for all internal state changes and any problems and sends the messages to the DB2SPI administrator.
- Most of the messages generated by the DB2SPI contain instruction text, which offers a potential explanation as to why the message was generated.

This self-management is primarily achieved via the DB2SPI log file described earlier and an HP OM log file policy, `DB2SPI_ownlog1`, which is contained in the `DB2SPI Base` policy group and hence get distributed to all managed nodes, which are hosting a DB2 management. The policy `DB2SPI_ownlog0`, which is deployed to the Management Server node, does the same like the `DB2SPI_ownlog1`, but specifically for the events that might show up in the `db2s_spi.log` file on the management server (service tree, licensing, help related).

DB2SPI File Size Monitoring

All files written to the DB2SPI log directory on the managed node are checked by an HP OM monitor policy to get alerts if their size is getting larger than expected.

DB2SPI Trace Control

The trace configuration on the managed node is checked by an HP OM monitor policy if any tracing is active or not. An alert is sent to the OM message browser if so, indicating the area, function or process found to be traced.

This is to help avoiding a permanent tracing in background, which could be pretty resource consumptive.

Processes, Services and Scripts

A number of scripts and processes are installed and run on the managed nodes during the installation and deployment of the DB2SPI. The following lists give a brief explanation of the various files:

Note: The operator never needs to start any of the scripts in the following list directly: these scripts are activated by DB2SPI applications or monitors.

Table 18: Scripts on the managed nodes

| Script Name | Description |
|-----------------------|--|
| atop (atop.exe) | ATOP client to process DB2SPI applications |
| db2s_appevent.pl | Application Event log monitoring on Windows DB2 Servers |
| db2s_appevent.vbs | helper script for Application Event log monitoring on Windows |
| db2s_asciirep.pl | creates ASCII reports (interactively or as automatic actions) |
| db2s_Balanced.pm | component for XML parsing and processing |
| db2s_bind2db2.pl | Binds the DB2SPI libraries to the monitored DB2 databases |
| db2s_chgadmin.pl | changes the db2 admin login data (Windows nodes only) |
| db2s_cmdinstswitch.pl | switches monitoring of DB2 instances on the command line |
| db2s_dallilib.pm | module to utilize DalliLib application extensions |
| db2s_db2spi.pl | enable / disable the DB2SPI |
| db2s_dbdiscover.pl | discovers the DB2 configuration (databases, partitions, tablespaces and bufferpools) |
| db2s_dbmon.pl | executes the entire performance data collection |
| db2s_df.bat | used for disk size estimation on windows |
| db2s_df.vbs | used for disk size estimation on windows |
| db2s_diag.pl | pre-process the administration log files |
| db2s_ds_migrate.pl | migrates datasources of some DB2SPI versions |
| db2s_entyfilter.pl | defines the monitoring status of all DB2 components |

| | |
|-----------------------|---|
| db2s_export_icfg.pl | exports instance configuration in a XML format for easy editing |
| db2s_flexapp.pl | runs the flexible tools |
| db2s_fsize.pl | process file size monitoring of various log files |
| db2s_genlib.pm | library holding general functions of the DB2SPI. Required by all other scripts |
| db2s_globdef.pm | library file for global DB2SPI variables |
| db2s_illist.pl | list all instances and databases defined / managed on the DB2 server |
| db2s_import_icfg.pl | imports instance configuration in a XML format |
| db2s_instlib.pm | library holding functions for DB2 instance management. Required by all scripts accessing DB2 |
| db2s_langtext.pm | library for dynamic export of lanuguage text |
| db2s_istart.pl | start / stop a selected DB2 instance |
| db2s_licrep.pl | license reporting |
| db2s_list_conf.pl | configuration listing (OM for Windows only) |
| db2s_metcoll | binary program for metric collection |
| db2s_mg_illist.pl | defines the visibility of DB2 instances |
| db2s_mwafwd.pl | tool to enable / disable forwarding of performance data to the MeasureWare or CODA agent |
| db2s_mwalog.pl | forward the intermediate performance data collected to PA |
| db2s_opcfwd.pl | tool to enable / disable forwarding of performance data to the Operations Manager monitor agent |
| db2s_perflib.pm | library holding functions for metric data processing |
| db2s_perfstore.pl | creates and removes the performance data stores. |
| db2s_platfpath.pl | determine path of files depending on the platform |
| db2s_psspi.pl | integrates DB2SPI with PeopleSoft SPI |
| db2s_qreg.vbs | Used for simple Windows registry queries |
| db2s_replic_status.pl | show status of DB2 replication |
| db2s_replicdiag.pl | analyze the replication log files |
| db2s_root.pl | one-time utility for setup in non-root environments |
| db2s_ruleprocmon.pl | performs process monitoring |
| db2s_rundb2.pl | start the DB2 command line processor |
| db2s_setcp.bat | set the path to DB2 CLP |
| db2s_setupinst.pl | define the instances to be managed on the DB2 server |
| db2s_showdbcfg.pl | displays the DB2 database configuration |
| db2s_showlog.pl | show the db2spi.log file on the selected node |
| db2s_showmgrcfg.pl | tool to display the database manager configuration |
| db2s_showsnap.pl | tool to display a performance snapshot in a window |

| | |
|-----------------------------|---|
| db2s_showstmt.pl | shows the top used sql statements |
| db2s_shs_collect.pl | collects environment information for the SHS support tools |
| db2s_snap_switch.pl | enable / disable DB2 performance data collection |
| db2s_start | starts all our scripts in well-defined environment |
| db2s_startcoll | prepares the environment for metric collection (UnixUNIX only) |
| db2s_stmt_switch.pl | switches the sql statement analyzer |
| db2s_stmtcoll.pl | collects sql statement for analysis |
| db2s_sudo | switches between users in non-root environments |
| db2s_svctree_diff.pl | determines changes for the service tree |
| db2s_tracedef.pl | define the objects to be traced |
| db2s_tracemon.pl | Shows if any tracing is active |
| db2s_updateparm.pl | updates the integration with OVPA to collect performance data about DB2 |
| db2s_upgrade.pl | performs DB2SPI upgrade to activate new code |
| db2s_xmllib.pm | library holding generic functions of the XML parser |
| db2s_ziplog.pl | compresses the DB2SPI log file |
| spi_db2.cmd | Self-Healing services collection file |
| spi_db2_runSHSCollector.cmd | Self-Healing services collection file |
| | |

On the Management Server, the following scripts are installed:

| Script Name | Description |
|------------------|--|
| atop.exe | executable for the graphical infrastructure ATOP |
| atopservice.exe | starts windows service for ATOP |
| atopsvr.exe | server part of ATOP client-server communication |
| atopwin.exe | client part of ATOP client-server communication |
| db2s_Balanced.pm | component for XML parsing and processing |
| db2s_dallilib.pm | Perl interface to C library |
| db2s_genlib.pm | library holding general functions of the DB2SPI. Required by all other scripts |
| db2s_globdef.pm | library file for global DB2SPI variables |
| db2s_helptext.pl | searches and returns the instruction text from the instructions reference file |
| db2s_langtext.pm | library for dynamic export of language text |
| db2s_licrep.pl | license reporting |
| db2s_nicelice.pl | install or add new DB2SPI licenses |
| db2s_start | starts all our scripts in well-defined environment |

| | |
|-----------------------------|---|
| db2s_svctree_mdfy.pl | tool to prepare the XML file for the HP Service Navigator resp. OM for Windows helper tool to delete DB2 related service tree entries |
| db2s_xmllib.pm | library holding generic functions of the XML parser |
| db2s_upgrade.pl | performs DB2SPI upgrade to activate new code |
| spi_db2.cmd | Self-Healing services collection file |
| spi_db2_runSHSCollector.cmd | Self-Healing services collection file |

ATOP Services

On Java display stations, the "ATOP2 server" service is installed automatically when downloading the ATOP Java GUI from the management server.

It can be checked with normal Windows means in the "Services" window.

On the Operations Manager management server, the "atop_server" is set up during installation of the package.

It can be checked with the ovstatus command.

Appendix A: Monitored DB2 Processes

Table 19: Default DB2SPI Process Monitor Configuration

| Process Name | State | min | max | Affiliation | Platform |
|--------------|-----------|-----|-----|-------------|----------|
| db2sysc | managed | 1 | 1 | none | all UN*X |
| db2disp | unmanaged | 1 | 1 | none | |
| db2syslog | unmanaged | 1 | 1 | none | |
| db2chkau | unmanaged | 1 | 1 | none | |
| db2hmon | unmanaged | 1 | 1 | none | |
| db2ipccm | managed | 1 | 1 | none | |
| db2tcpcm | managed | 1 | 1 | none | |
| db2tcpdm | unmanaged | 1 | 1 | none | |
| db2snacm | unmanaged | 1 | 1 | none | |
| db2loggr | managed | 1 | 1 | database | |
| db2loggw | managed | 1 | 1 | database | |
| db2lfr | managed | 1 | 1 | database | |
| db2pfchr | managed | 1 | 1 | none | |
| db2pclnr | managed | 1 | 1 | none | |
| db2resync | unmanaged | 1 | 1 | none | |
| db2estor | unmanaged | 1 | 1 | none | |
| db2reorg | unmanaged | 1 | 1 | none | |
| db2srvlst | unmanaged | 1 | 1 | none | |
| db2fmp | managed | 1 | 1 | none | |
| db2fmcd | managed | 1 | 1 | none | |
| db2fmd | unmanaged | 1 | 1 | none | |
| db2dlock | managed | 1 | 1 | none | |
| db2ckpwd | managed | 1 | 1 | none | |
| db2gds | managed | 1 | 1 | none | |
| db2wdog | managed | 1 | 1 | none | |
| db2dasrrm | unmanaged | 1 | 1 | none | |
| db2agent | managed | 1 | -1 | idle pool | |
| db2fcmdm | managed | 1 | 1 | none | |
| db2glock | managed | 1 | 1 | database | |
| db2lpart | unmanaged | 1 | 1 | none | |

| | | | | | |
|---------------|-----------|---|---|-----------|---------|
| db2lload | unmanaged | 1 | 1 | none | |
| db2lrdf1 | unmanaged | 1 | 1 | none | |
| db2llqcl | unmanaged | 1 | 1 | none | |
| db2lmctk | unmanaged | 1 | 1 | none | |
| db2panic | managed | 1 | 1 | idle pool | |
| db2pdbc | managed | 1 | 1 | none | |
| db2syscs.exe | managed | 1 | 1 | none | Windows |
| db2fmp.exe | managed | 1 | 1 | none | |
| db2licd.exe | managed | 1 | 1 | none | |
| db2sec.exe | managed | 1 | 1 | none | |
| db2jds.exe | managed | 1 | 1 | none | |
| db2dasrrm.exe | unmanaged | 1 | 1 | none | |
| db2dasstm.exe | unmanaged | 1 | 1 | none | |
| db2rcmd.exe | unmanaged | 1 | 1 | none | |

Appendix B: HP PM Integration (Portable Graphs)

This section explains how to make use of the HP PM integration supplied with the DB2SPI. In order to view the DB2SPI Portable Graphs, the metrics need to be collected with the help of either HP PA or CODA. This must be switched on with the DB2SPI tools "Snapshot Enable" on the DB2 side and "PerfRep Enable" on the Operations Manager side.

Prerequisites

The DB2SPI Portable Graphs are supported for HP Performance Manager 5.0, 6.0 and 8.0 on Windows and HP-UX.

HP PM may be installed on any system in the local network on any kind of system (UNIX or Windows), which has access to the collected performance data on the DB2 servers.

Installation of the HP PM Predefined Graphs Package

The HP PM Portable Graphs Package resides on the OM for Windows server at `%OvInstallDir%\install\db2spi\DB2SPI_addon`

Either copy the file `VPI_GraphsDB2SPI.txt` to the HP PM directory or simply install the msi package `DB2SPI_OVPM_3.50.msi`.

HP PM System running on UNIX

For HP PM systems running on UNIX, you need to transfer the HP PM integration file `VPI_GraphsDB2SPI.txt` and save it to `"/var/opt/OV/conf/perf/"` on your HP PM system.

Once the HP PA/ CODA started collecting, the metrics can be displayed with the HP Performance Manager.

HP PM System running on Windows

For HP PM systems running on Windows, the HP PM Portable Graphs must be installed with the package `DB2SPI_OVPM_03.50.msi`. IT may be downloaded from the Operations Manager web server mentioned above. After executing this file, InstallShield will guide you through the installation process.

To verify that the DB2SPI Portable HP PM Graphs have been successfully installed, open the directory `"<install_dir>\newconfig\OVPM"` and look for the configuration file called `"VPI_GraphsDB2SPI.txt"`.

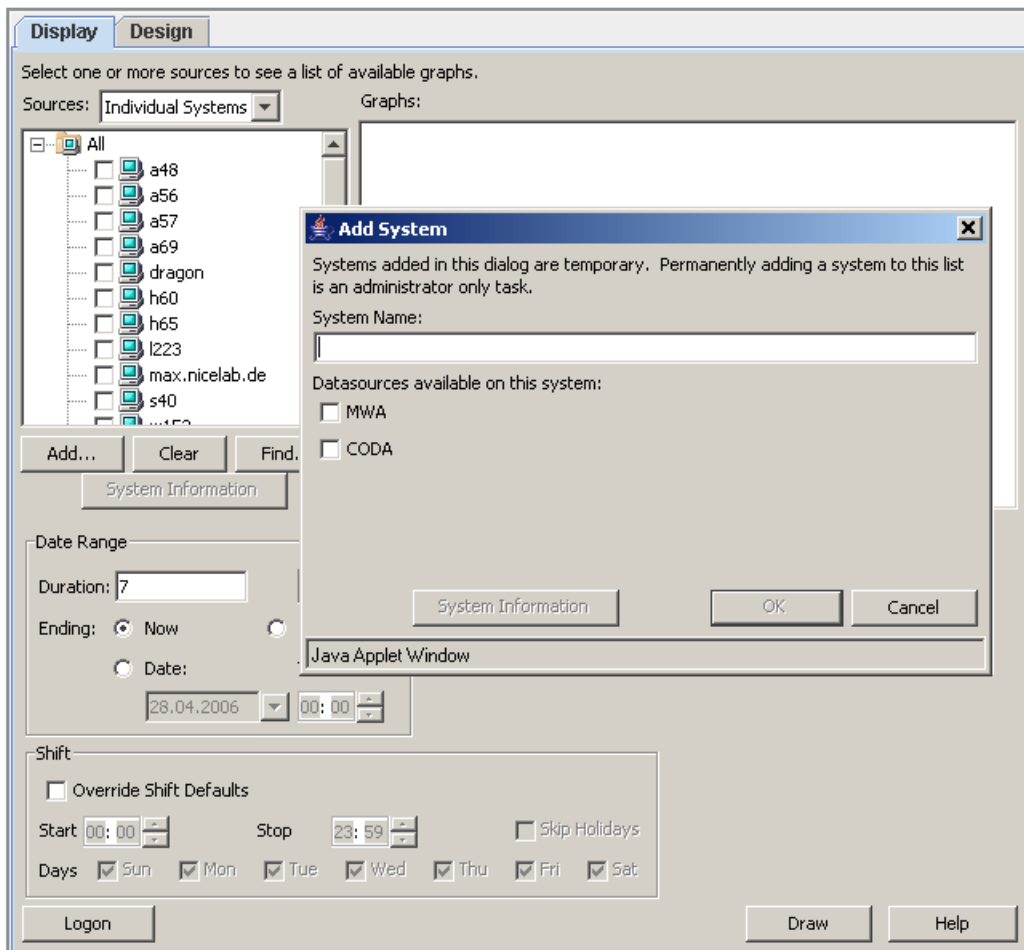
Using the portable Graphs in HP PM

HP PM can be installed on either Windows or UNIX.

Step 1: Selecting the DB2 Server

In order to view performance data with HP PM, the DB2 server needs to be added to HP PM's list of known systems.

Figure 29 DB2 server selection in HP PM

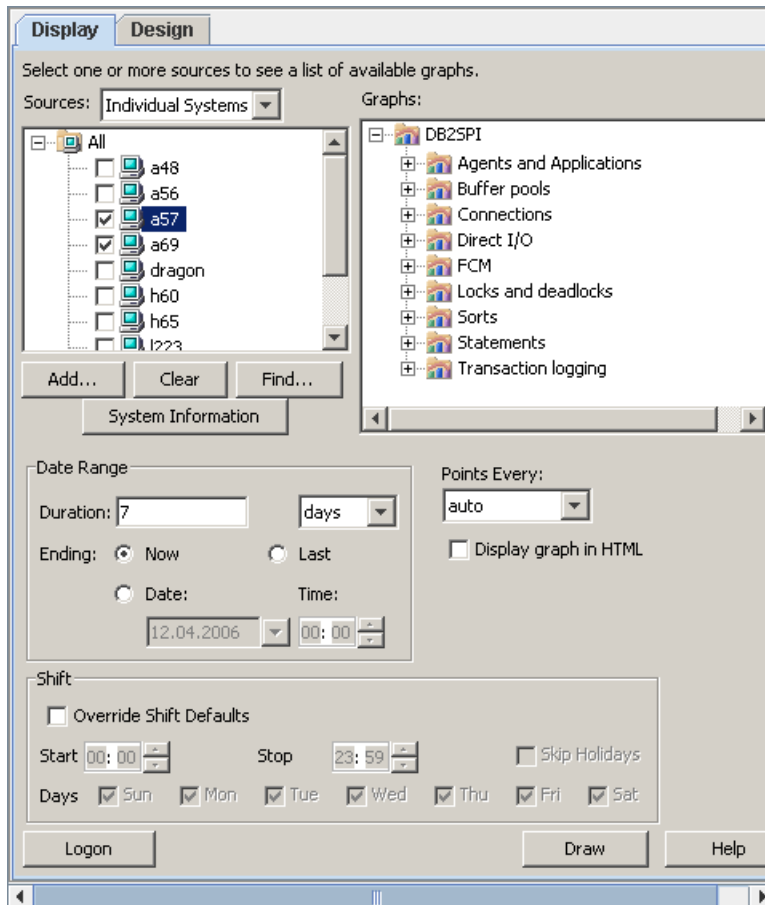


If not sure, what kind of data source is available on the DB2 server, it is possible to find this out from the system information page. This button might be pressed as soon as a system name is entered in the field above.

Step 2: Graph Type Selection

Selecting the DB2 Server from the list, the graph pane shows the available graph templates. There should be a family named DB2SPI with the following categories:

Figure 30: Selection of the graph category

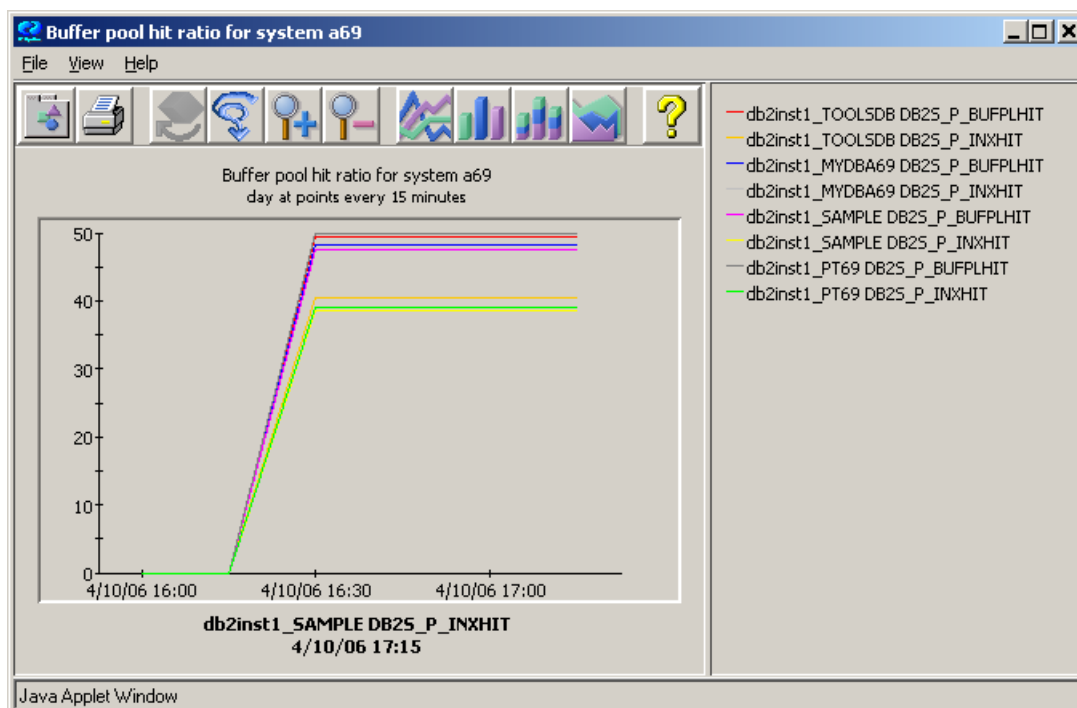


The categories contain the predefined and portable graph templates. For a complete list see the reference section of this document.

Selecting a graph template and pressing the “Draw” button should create the graph from the metric data collected on the DB2 server.

The following picture shows an example of the resulting graph "Buffer pool hit ratio":

Figure 31: Example "Buffer Pool Hit Ratio" graph for multiple databases



Note:

Every metric is drawn for all databases in all instances of the selected system (all databases which are monitored by DB2SPI). This may result in a full graph. However, with the help of the design tab, subsets may be defined.

It is possible to change the data range, shift and number of point in the display tab. In order to change other characteristics, open the design tab, make the required changes and save the resulting graph definition to a new graph family.

Troubleshooting the HP PM Integration

There are several things that may influence the correct execution of the DB2SPI Portable HP PM Graphs:

- Check that the configuration file `VPI_GraphsDB2SPI.txt` is copied to the `<install_dir>/newconfig/OVPM` directory.
- Ensure that the data collection is switched on for the DB2 server concerned. (On the Operations Manager management server switch on snapshot creation with "Snapshot Enable", switch on data forwarding with "PerfRep Enable" for the DB2 server concerned)

- Request the “System Information” for the DB2 server concerned in the HP PM User Interface. In the resulting page check the data Class “DB2_SPI:DB2SPI_GRAPH” if there is data collected for the time range that you want to graph.
- Check the Version of HP PM. DB2SPI Portable HP PM Graphs are supported with HP PM 5.0 and later.
- Consult the Troubleshooting Section of the HP Performance Manger Administration Guide as well as the Troubleshooting Section of the HP Performance Manger User Guide.

List of Portable Graphs

| Agents and applications | |
|--------------------------------|----------------------------|
| HP Application | DB2_G_APPLCONNCUR (0071) |
| | DB2_AGTASSOAPPL(0771) |
| Current Applications | DB2_G_APPLEXECDBMGR (0631) |
| Agents | DB2_G_AGTREG (0490) |
| | DB2_W_MAXCOORDAGT (0250) |
| | DB2_G_AGTIDLE (0500) |
| Conspicuous Agents | DB2_C_AGTSTOLEN (0240) |
| | DB2_G_AGTWAITTO (0550) |
| Buffer pools | |
| Buffer pool hit ratio | DB2_P_BUFPLHIT (0031) |
| | DB2_P_INXHIT (0081) |
| Asynchronous times | DB2_A_ASYNCRDTIME (0281) |
| | DB2_A_ASYNCWRRTIME (0291) |
| Ratio of data read / write | DB2_R_ASYNCIDATARD (0301) |
| | DB2_R_ASYNCIDATAWRT (0311) |
| Ratio of Index Read / Write | DB2_R_ASYNCPLIDXR (0321) |
| | DB2_R_ASYNCPLIDXWRT (0331) |
| Data Logical / Physical Reads | DB2_C_PLDATLOGRD (0341) |
| | DB2_C_PLDATAPHYRDS (0661) |
| Index Logical / Physical Reads | DB2_C_PLIDXLOGRD (0351) |
| | DB2_C_PLIDXPHYRDS (0681) |
| Data / Index Physical Writes | DB2_C_PLDATAWRTS (0671) |
| | DB2_C_PLIDXWRTS (0691) |
| Average Read / Write Times | DB2_A_PLRDTIME (0781) |
| | DB2_A_PLWRRTIME (0791) |

| Connections | |
|---|----------------------------|
| Connections to the database manager | DB2_W_MAXCONNS (0800) |
| | DB2_G_LOCCONNS (0380) |
| | DB2G_REMCONNS (0750) |
| Connections executing in the database manager | DB2_G_LOCCONNSEXEC (0650) |
| | DB2_G_REMCONNSEXEC (0640) |
| Database | |
| Database State | DB2_I_DBSTATUS (0261) |
| Direct I/O | |
| Average direct read / write time for an application | DB2_A_DIRRDTIME (0091) |
| | DB2_A_DIRWRRTIME (0101) |
| Average sector read / writes in the database | DB2_A_DIRRDPREQ (0361) |
| | DB2_A_DIRWRTPREQ (0371) |
| Direct read / writes in the database | DB2_C_DRCTRDS (0701) |
| | DB2_C_DRCTWRTS (0711) |
| Locks and deadlocks | |
| Lock list | DB2_P_LCKLSTMUSED (0461) |
| | DB2_P_LCKHELD (0471) |
| Escalation | DB2_C_LCKESCAL (0191) |
| | DB2_C_EXCLLCKESCAL (0201) |
| Number of locks / deadlocks | DB2_C_LCKTO (0011) |
| | DB2_C_DLCK (0211) |
| Wait time | DB2_A_LCKWAITTIME (0221) |
| Agents waiting | DB2_C_LCKWAITING (0021) |
| Available Locks | DB2_C_LCKAVAIL (0481) |
| Sorts | |
| Sort heap | DB2_G_SORTHEAPALLOC (0181) |
| Sort time | DB2_A_SORTTIME (0431) |
| Conspicuous sorts | DB2_P_SORTOVFL (0061) |
| | DB2_P_PIPESORTACCEP (0120) |
| | DB2_C_POSTTHRSORT (0130) |
| Statements | |
| Internal Statements | DB2_C_INTCOMMITTS (0741) |

| | |
|--------------------------------|----------------------------|
| | DB2_C_INTROLLBACKS (0731) |
| | DB2_C_INTDLCKROLLB (0161) |
| Commit attempts | DB2_C_COMMATTMPT (0511) |
| Other statements | DB2_C_SELSTMTDONE (0541) |
| | DB2_C_DDLSTMTDONE (0521) |
| | DB2_C_MODSTMTDONE (0531) |
| Transaction logging | |
| Maximum total space used | DB2_W_MAXTOTLOGSPCU (0401) |
| | DB2_W_MAXSECLOGSPCU (0391) |
| Maximum Primary log space used | DB2_W_MAXPRILOGSPCU (0381) |
| Logs Allocated | DB2_G_PRILOGALLOC (0841) |
| | DB2_G_SECLOGALLOC (0411) |
| Log space in the database | DB2_P_LOGSPCAVAIL (0861) |
| | DB2_P_LOGSPCUSED (0851) |
| Secondary logs remaining | DB2_P_SECLOGREMAIN (0421) |

Appendix C: HP Reporter Templates Integration

Installing DB2SPI Reports for HP Reporter

The DB2SPI software contains predefined HP Reporter templates to prepare reports about some performance data collected via HP PA / CODA.

Note: This applies only to the integration into the HP Reporter. The embedded reporting component of OM for Windows is not able to connect to the PA data store filled by the DB2SPI and therefore cannot be used for DB2SPI reporting-

Prerequisites

The installation of DB2SPI Reports expects the following installations and settings have been done on the HP Reporter hosting system before starting the setup:

- HP Reporter Version 3.6 or later is installed

When integrating with OM for UNIX, the following also applies:

- Oracle client and Oracle driver are installed for communication with the OM for UNIX database (used partly in DB2SPI reports when looking for DB2 related messages in the Operations Manager database)
- An ODBC interface (ov_net) is established to the OM for UNIX management server
- The "OV /Operations 7&8 Reports" are loaded (check within HP Reporter in the "File → Configure → Report Packages" window)

Reports Installation

The installation is simply execution of an InstallShield package on the system hosting the HP Reporter. The package is contained separately on the DB2SPI CD-ROM.

The individual steps are as follows:

1. On the Windows system with the HP Reporter installed insert the DB2SPI CD-ROM.
2. From the CD-ROM, install it using InstallShield with the package DB2SPI-Reporter.msi.

When starting the installation, a window pops up:

Figure 32: DB2SPI Service reports installation start



Click "Install" to continue. The package automatically plugs into the HP Reporter.

Manual Step for Cluster Installation

If the DB2SPI Reporter Integration is installed on a clustered OM for Windows management server, the following manual copy must be made:

Copy all files

From: ...\\HP OpenView\Data\Reports\db2spi

To: ...\\HP OpenView\Data\shared\reports\db2spi

Verification of correct Installation

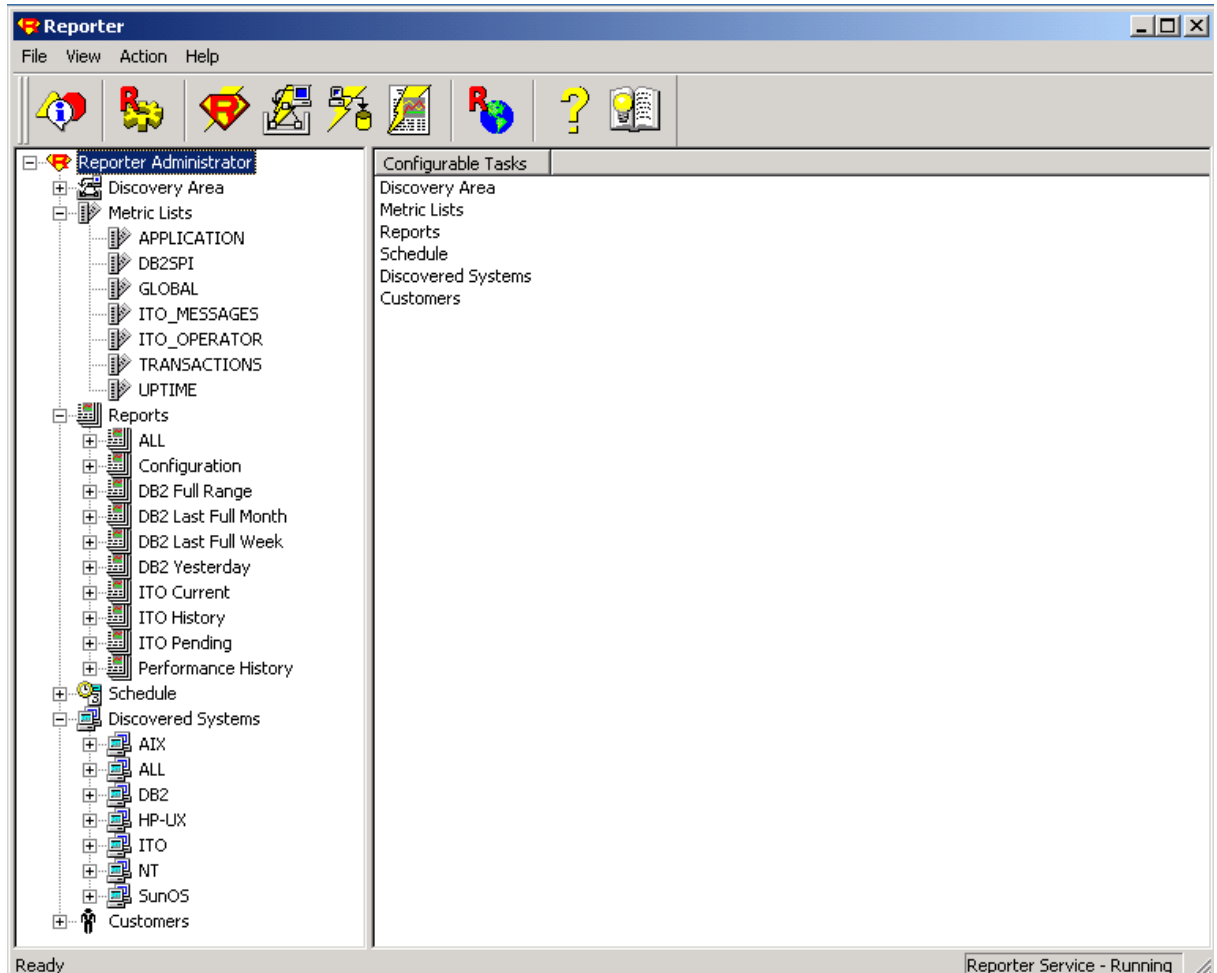
After installation has finished, start HP Reporter and look for the following elements:

- New element "DB2" in the branch "Metric Lists", which contains a lot of individual metrics
- New elements in the "Reports" branch:
 - DB2 Full Range
 - DB2 Full Month
 - DB2 Full Week

- DB2 Yesterday

In the HP Reporter GUI, this appears as follows:

Figure 33: HP Reporter GUI with DB2SPI reports installed



No special steps need to be taken to enable or activate the DB2SPI reports. They are prepared just like other reports.

Creating Reports with the HP Reporter

DB2 information is collected with the HP Reporter just like other performance data.

With the integration of DB2SPI Reports into HP Reporter you are able to discover DB2 systems. HP Reporter automatically gathers data from them and puts it into nice looking reports.

Note that the version of the DB2SPI Report package should correspond with the DB2SPI version that you are using.

The reports created are stored in the Internet Information Server (IIS) of the HP Reporter system and can be accessed with a standard web browser.

Looking at DB2 Reports

The URL of the reports is
http://<reportersystemname>/HPOV_Reports/reports.htm

The DB2SPI comes with a set of ten different reports from four areas, all of which are evaluated and computed on a daily, weekly and monthly basis.

Report groupings and formats have been kept as close to HP's DBSPI as possible. This is to ensure homogeneity across different database SPIs projecting the same data (e.g. availability).

DB2SPI Report Groups

Availability Report Group

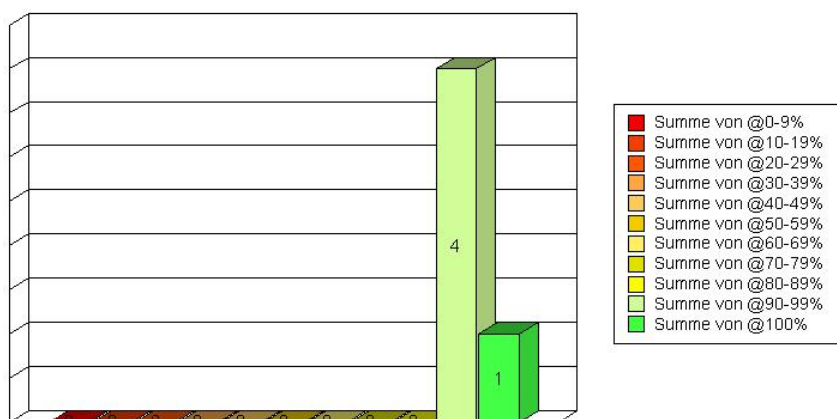
DB2 Database Availability

This report contains daily histograms showing the number (count) of databases in each range based on percent uptime. Ranges for uptime are 0-9%, 10-19%, 20-29%, 30-39%... 90-99% and 100%. The number of databases for a given range may be 0 to **xx**.

Tabular reports below each histogram show the minutes and percentage of uptime, downtime (quiescent pending, quiesced, rollforward and down) and unknown time for each database.

An example graph looks as follows:

Availability Histogram



DB2 Availability Details

This report contains spectrum reports showing minutes of uptime by day and hour for each database. There may be 1 to **xx** databases. The DB2SPI

measures uptime and downtime in five-minute increments. Reports are based on uptime only (i.e. status greater or equal 5).

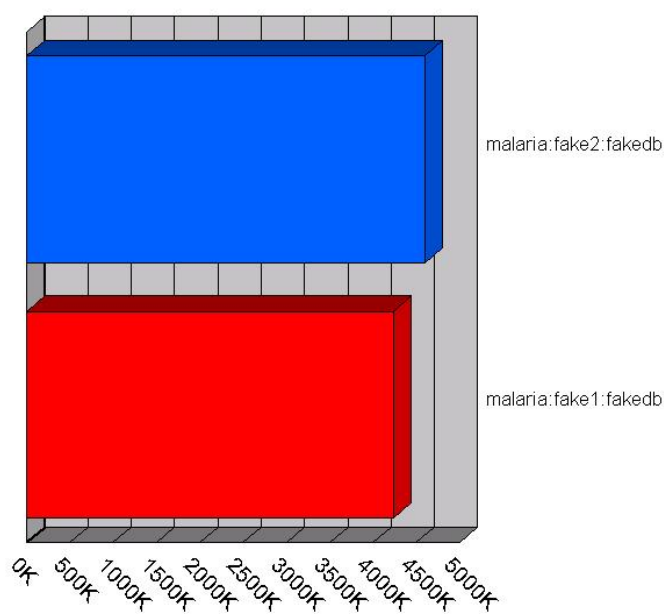
The spectrum graphs use color to indicate how many minutes of uptime (i.e. up to 10 minutes, up to 20 minutes etc) were recorded during each hour of each day. One spectrum chart is produced for each database. The graphs are sorted by database name.

I/O Report Group

DB2 Top Physical I/O

This report shows DB2 physical I/O i.e. the sum of buffer pool (index and data) reads and writes and direct reads and writes by database by day for the 20 databases with the most physical I/O during the reporting interval. The report is sorted by total physical I/O. The graph shows the top 20 databases in a horizontal stacked bar format for each day.

An example graph looks as follows:



DB2 Physical I/O Details

This report shows DB2 physical I/O by database by day. Physical I/O is represented by summing up "buffer pool (both index and data) reads and writes" and "direct reads and writes". The report is sorted by system name, instance name and database name.

Workload Report Group

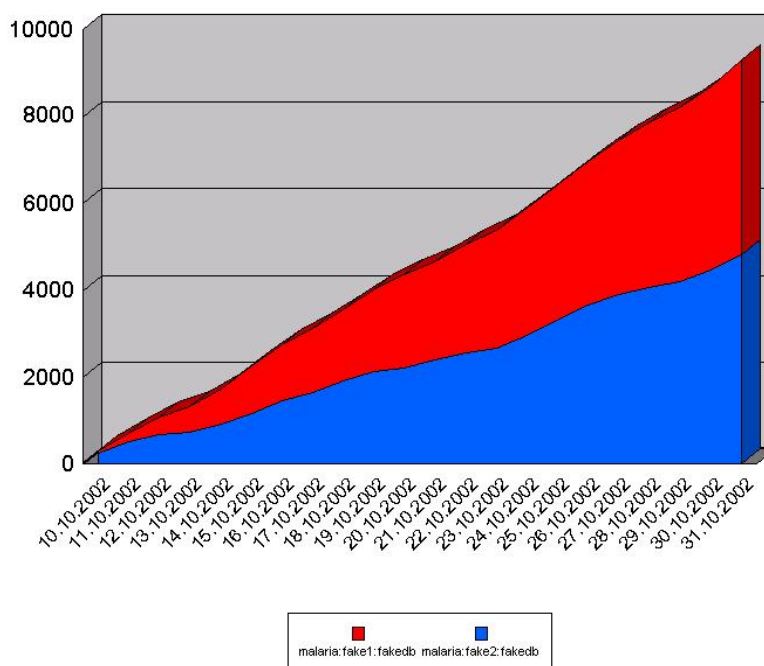
DB2 Transactions

This report shows the transaction rate for DB2 databases. Transactions can be calculated as follows:

- commit statements attempted
- + internal commits
- + rollback statements attempted
- + internal rollbacks

The stacked area graph and table show the average transactions per minute by database by day for the top 20 databases. The top instances are selected based on average transactions per minute over the entire reporting interval. The last tabular report should show the average, minimum and maximum transactions per minute for all databases. This table is sorted by instance name, database name and date.

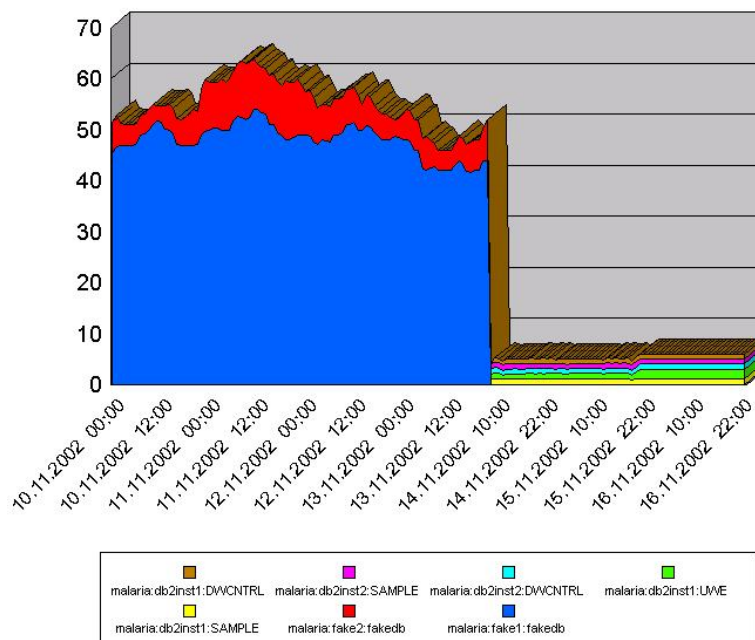
An example graph looks as follows:



DB2 current Connections / executing Connections

This report shows the total number of connections per database. Current connections are the sum of local connections and remote connections. The stacked area graph and table show the average number of current connections by database by day for the top instances. The top instances are to be selected based on average number of current connections over the entire reporting interval. The last table shows the average, minimum and maximum number of current user logons for all instances. This table is sorted by instance name, database name and date.

An example graph looks as follows:



Operations Manager Report Group

To get the following reports/data for these reports, the user has to setup an integration between the reporter system and the corresponding HP OM management server managing the DB2 server systems. How this is done depends on the versions of the Reporter and Management Server used and is not explained in this document.

Please refer to the HP OM and HP Reporter documentation for this.

DB2 Active Messages

This report shows the top error messages, which were sent to HP OM and have not been acknowledged at the time this report was prepared. These "miscellaneous" errors are usually a result of configuration problems. Messages generated by successful processing of metrics or log files are not shown here. They are shown under the database reports. The graph shows the top messages by the DB2SPI error number or the first part of the text message. "Count" is used to show the number of duplicate messages for each object. In this report "Object" is based on the managed node name and the object field used in the HP OM message. For DB2 error messages, the object usually describes either the database instance or the executable and module where the error occurred.

DB2 Active Message Severity

This report should show the severity of DB2 error messages which were sent to the Operations Manager and were not acknowledged at the time the report was

prepared. This report describes error message severity the following three ways:

1. A pie chart showing the message count by severity
2. Message counts for the top five databases broken down by severity
3. Message counts for all databases broken down by severity

DB2 History Messages

This report shows the top error messages, which were sent to the Operations Manager, were acknowledged at the time this report was prepared. These "miscellaneous" errors are usually a result of configuration problems. Messages generated by successful processing of metrics or log files are not shown here. They are shown under the database reports. The graph shows the top messages by the DB2 error number or the first part of the text message. "Count" is used to show the number of duplicate messages for each object. In this report "Object" is based on the managed node name and the object field used in the OM message. For DB2 error messages, the object usually describes either the database instance or the executable and module where the error occurred.

DB2 History Message Severity

This report should show the severity of DB2 error messages, which had been sent to the Operations Manager and have been acknowledged at the time the report was prepared. This report describes error message severity the following three ways:

1. A pie chart showing the message count by severity
2. Message counts for the top five databases broken down by severity
3. Message counts for all databases broken down by severity

Appendix D: DB2SPI Licensing

Licensing Policy

The DB2SPI requires a runtime license for each node where it is operated. Although some functions and policies may work also without a runtime license, all the critical functions and DB2 access is restricted by the license enforcement process.

The following elements are required for valid runtime license:

- Version of the DB2SPI
- Tier of the managed node (according to the HP Tiering Matrix)
- Name or IP address of the managed node or i5/OS systems

Three different kinds of runtime licenses are available:

- Evaluation licenses are not restricted in their name or IP space, hence can be operated on any node, but will expire at some time.
- A regular runtime license is restricted to the node name or IP address specified when requesting the license, but has no time limit.
- Instant-on licenses are enabled with the initial configuration of the DB2SPI on a managed in case there is no evaluation or regular license. This license lasts for 60 days. This allows every user to start with the DB2SPI right away. This license type is not available for i5/OS managed databases.

Note that instant-on licenses are created on managed nodes at runtime. There is no explicit question to accept the license terms as with regular licenses. However, the same rules apply. In addition instant-on licenses are meant for test and evaluation systems only and should not be used in production environments.

How to obtain Runtime Licenses

Note that SPI licenses obtained from HP only serve as "installation licenses" on the management server, but not as "runtime licenses" on managed nodes.

Such HP installation licenses should not be entered into the "License Add" tool.

Runtime Licenses can be obtained very easily via the secure NiCE Customer Portal <https://portal.nice.de/login.php>

Please make sure that you create your account there as soon as you have acquired your DB2SPI.

In the "Licenses" area of your personalized view you can request evaluation and production runtime licenses, which are created automatically and then can be downloaded directly via your web browser.

When changing your system (moving the DB2SPI to another node), simply flag the former system and enter the new data to create an update.

Install and activate a DB2SPI Runtime License

License management consists of two simple steps on the HP OM Management Server.

- Whenever you have received a new runtime license file, run the "License Add" tool and specify the name of the new file. This adds the new runtime license strings to the runtime license files for all supported platforms.
- Deploy the "instrumentation" resp. "monitors" to all DB2SPI managed nodes.

The scripts and binaries on the managed nodes will scan the local license file `db2s_licenses.dat` for a matching, valid runtime license on the respective node.

Tools for License Management

There are three tools in the DB2SPI that help to maintain the runtime licenses:

- License Add:
This tool allows the addition of new runtime licenses on the management server.
- License List:
Thus tool lists all runtime licenses currently available on the management server. However, they must be deployed to the managed nodes in order to be active.
- License Check: (DB2 for LUW only)
This tool verifies on a managed node if there are one or more valid runtime licenses for this node. Licenses may become invalid if time expires (only evaluation and test licenses) or if the node name has changed.

Details can be found in the "Using DB2SPI" section earlier in this User's Guide, chapter "DB2SPI License Tools" on page 77.

Appendix E: DB2SPI for i5/OS

Welcome to the NiCE DB2SPI for i5/OS! With this release of the DB2SPI the support for IBMs Midrange system i has been introduced. In this Appendix you will learn about how to monitor your i5/OS DB2 database with HP Operations Manager.

This appendix is subdivided into the following sections:

- What is DB2 for i5/OS?
- What is the DB2SPI for i5/OS?
- DB2SPI for i5/OS Architecture
- Before you start
- Getting Started with DB2SPI for i5/OS
- Enable Performance Data Collection on i5/OS
- Query Performance
- Enable QSYSOPR
- Enable Monitoring
- Verify correct
- Further metric information

What is DB2 for i5/OS?

DB2 for i5/OS is an advanced, 64-bit Relational Database Management System (RDBMS). It is integrated into the i5/OS and requires no separate installation and very little maintenance. Although IBM DB2 i5/OS (also known as DB2 for OS400) belongs to the IBM DB2 UDB product family it is pretty different. Many of the DB2 objects known from DB2 for LUW are named differently.

Since DB2 for i5/OS is an integral part of the operating system, managing and monitoring DB2 is as important as monitoring the system itself. In many cases, managing DB2 performance is congruent with managing system performance.

What is the DB2SPI for i5/OS?

The **DB2SPI for i5/OS** is designed to simplify the management of DB2 databases by monitoring specific DB2 metrics and states with HP Software Operations Manager for Windows and UNIX. The integration of the two products allows you to use the powerful remote problem-management features of the HP OM to manage and monitor the DB2 environment from one central location even for systems that are often seen as self-contained or even "a world of its own". The DB2SPI for i5/OS provides the following high-level features:

- Remote monitoring of the i5/OS system operator message queue (QSYSOPR) and filter for events specific to DB2.

- Remote collection of a detailed performance data
- Threshold monitoring of selected performance data
- Definition and management of multiple DB2 i5/OS systems
- Integration of i5/OS systems, databases, disks, etc into the HP Software Service Navigator (HP OM for UNIX) resp. the integrated service view (HP OM for Windows), thus treating them as services

DB2SPI for i5/OS Architecture

Most of the components of the DB2SPI for i5/OS are similar to the DB2SPI for LUW. Still there are some specific modules that provide the data from the i5/OS system.

- Proxy System:

The proxy system hosts the DB2 for i5/OS monitoring components for remote monitoring of DB2 on i5/OS. It can be an existing or separate DB2 system or can even reside on the HP Operations Management Server. Please note that a DB2 Server or Client must be installed on the proxy system. The following components are part of the proxy system:

- DB2SPI for i5/OS Java Collector:

The DB2SPI for i5/OS includes several binaries, which utilize IBM libraries for remote performance and monitoring data collection. This also provides the possibility to run commands on the i5/OS system. The queue monitor and the collector component will run continuously on a proxy system to monitor the i5/OS without interruption.

- Perl scripts, database access libraries and binary programs on the management server and the proxy nodes

- HP Software Integrations

HP Operations Manager intrinsic components, for example policies

Note, that the i5/OS system does not need to be entered into the OM node bank, unless you also run the corresponding OM agent on it. For DB2 monitoring with the SPI there is no such need.

- IBM System i Hosts

No scripts or binaries are installed on the i5/OS. Only a database schema is created in DB2 which holds the performance information about the database.

- Service Navigator

DB2 and system components like the disk, IOPs, storage pools etc. are visualized as service in the Service Navigator.

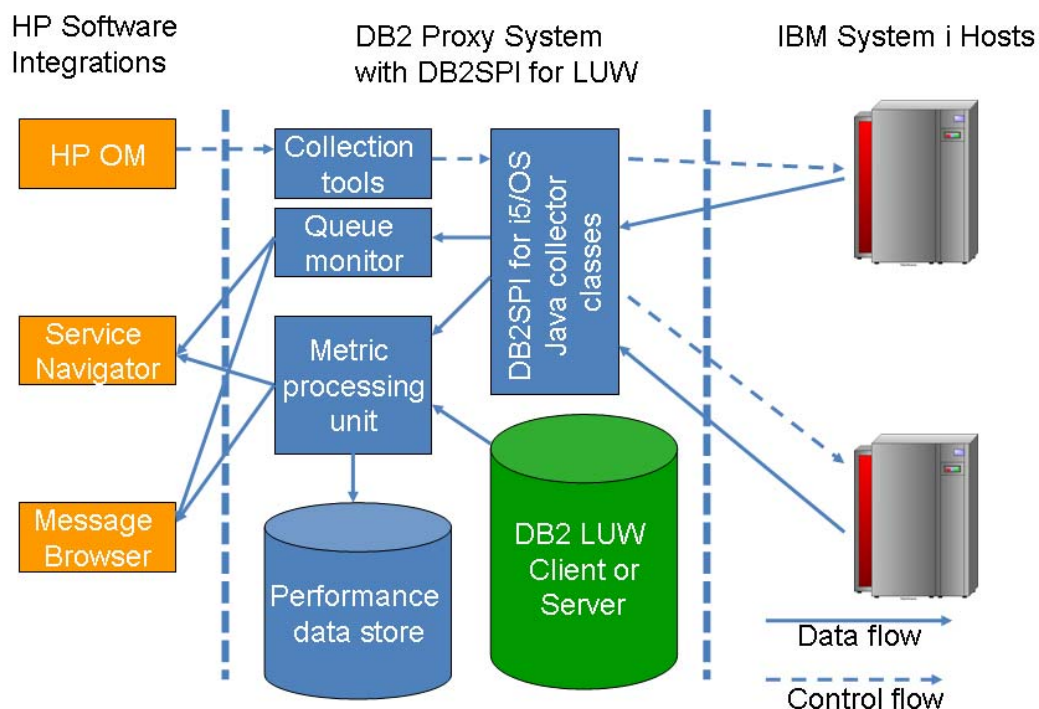


Figure 34:DB2SPI for i5/OS architecture

Before you start

Installation Prerequisites

This section describes prerequisites in addition to the Installation Prerequisites in the DB2SPI for LUW section.

This will include the following aspects:

- i5/OS Versions supported
- Disk Space and Memory Requirements on the i5/OS
- Prerequisites Proxy System
- Software Prerequisites on Proxy System

i5/OS Versions supported

With the current release the following version of DB2 i5/OS are certified. Please note that the DB2 SPI for i5/OS might also be able work with earlier version of i5/OS (OS/400). For detailed and up-to-date information, please contact the NiCE Sales department.

Supported version: IBM i5/OS V5R3, V5R4

Disk Space and Memory Requirements on the i5/OS System

Since the DB2SPI for i5/OS stores performance data for a limited time period (24 hours by default) it will occupy some space on the i5/OS system. The amount of data depends on the system since information collected about process, disk, IOPs, etc. varies with the amount of the objects.

In the most common medium size deployments 100 MB should be enough if the collection default time of five minutes and retention time of 24 hours is not adjusted. For details, please refer to the IBM documentation of the i5/OS Collection Services.

Prerequisites Proxy System

For the proxy system prerequisites refer to the standard prerequisites for the DB2SPI for LUW. Please note that HPUX is not supported as a platform for a proxy system. On the proxy system a DB2 version no older than DB2 8.2 Fix Pack 1 must be installed.

Software Prerequisites on Proxy System

On the proxy system the Java Runtime Environment (JRE) must be installed and available to the HP Software Agent environment.

Please ensure that a JRE 1.5.x or later is used. We recommend to use Sun JRE 1.6.x

Installation of the DB2SPI for i5/OS

Please follow the installation instructions on page 29 of the main section of this User's Guide since all required configuration and binary data is contained in the standard DB2SPI package.

Getting Started with DB2SPI for i5/OS

In this section only the additions to the "Getting Started" in the general section will be mentioned.

Installing DB2SPI for i5/OS Licenses

As the first step the license for the DB2SPI for i5/OS has to be obtained. Please follow the instruction in Appendix D: DB2SPI Licensing.

In case only i5/OS systems need to be monitored, but no DB2 for LUW on the proxy system, please get in touch with the product support at NiCE how this can be done.

HP OM Administrative Tasks for DB2SPI for i5/OS

Adding Nodes to Node Groups

Please follow the instruction in the general section and assign the proxy server to the appropriate node group. In addition to assigning the proxy server to the node group the proxy server has also to be added to the DB2-OS400 node groups.

Assigning it just to the DB2-OS400 node group is not sufficient, as this would result in a incomplete instrumentation deployment.

Configuration for i5/OS

In addition to "Configuring DB2 Instances" the followings steps are required.

During the execution of the DB2SPI Tool "Config Setup" you are asked if you want to monitor DB2 on i5/OS.

```
Do you want to monitor DB2 on i5/OS (OS/400) systems as well?  
[y|n]
```

Once you have selected the monitoring of i5/OS systems you are asked to which local instance on the proxy system the DB2 on the i5/OS should be attached to:

```
Select a local instance where to connect i5/OS (OS/400) systems  
to  
a.    DB2  
Enter one index:
```

After the i5/OS has been attached please enter the user credential for the i5/OS connection. Please note that the user provided must have sufficient privileges to start/stop the i5/OS Collection Services, create a schema and query the schema. You can also create the schema and start the Collection Services manually. In this case only read privileges for the defined schema need to be granted. In the end you can add an additional system.

```
Enter the name of the i5/OS (OS/400) system to be connected:  
192.168.1.93  
Enter the name of the i5/OS (OS/400) user to access it:  
moonshine  
Enter the password of the i5/OS (OS/400) user (visible!):  
m00nshine  
Do you want to add more DB2 on i5/OS (OS/400)? [y|n]
```

After these steps the "Config Setup" will proceed as described on page 183.

Enable Performance Data Collection on i5/OS

After the DB2SPI for i5/OS has been configured you need to start the snapshot data collection on the i5/OS system. Please open the “DB2SPI for OS 400” Tool group and drag and drop the i5/OS proxy node on the “Snapshot Enable” application. This application will start Collection Services on the i5/OS system.

Figure 35: DB2SPI for OS400 Application Group

| Name | Description |
|----------------------|--|
| AdmUser Config | Change the user credentials for the OS400 connection |
| Collection Start | Start the performance data collection on the OS400 Host |
| Collection Stop | Stop the performance data collection on the OS400 Host |
| Queue Transfer Start | Start the transfer of message queue data from the OS400 host |
| Queue Transfer Stop | Stop the transfer of message queue data from the OS400 host |
| Snapshot Disable | Stop the performance snapshot on the OS400 host |
| Snapshot Enable | Start the performance snapshot on the OS400 host |

Query Performance Data

After the Collection Services have been enabled, it takes about five minutes before the first performance data is written to the new created schema. Then you can start the “Collection Start” application in the “DB2SPI for i5/OS” application group.

Again, drag and drop the proxy node upon the application button which will start the java collection and query process of performance data. The performance data is written to the temporary directory of the DB2SPI where it will be processed once the DB2SPI for i5/OS policies are distributed and enabled.

Enable QSYSOPR Monitoring

Now you can also run the “Queue Transfer Start” tool from the DB2SPI for i5/OS application group. This tool will start the transfer of the QSYSOPR queue to the proxy node where it will be processed by the DB2SPI for i5/OS logfile encapsulator policies once distributed and enabled.

Enable Monitoring Operations

The DB2SPI for i5/OS is started by distributing the DB2SPI for i5/OS policies. Please refer to the Distributing the DB2SPI Policies section for details. Since the proxy node is already assigned to the “DB2SPI for OS400” node group all i5/OS relevant policies will be distributed.

Please also verify all log files starting with db2s_os400_log_*.log in the log directory of the DB2SPI on the proxy system. The location is the .../log/db2spi subdirectory of the HP Operations Agent data directory.



Windows: C:\Program Files\HP OpenView\data\log\db2spi

Linux: /var/opt/OV/log/db2spi/

Verify correct Operation

To verify the correct operation of the DB2SPI for i5/OS, please look for messages in the Message Browser. Since in most cases no thresholds will be hit it is also advisable to verify if performance data is logged to the generic data store of the DB2SPI. This can be archived by the following commands on the proxy node.

Please note that the <HOSTNAME> has to be replaced by the host name of the local system. In all cases no FQDNs but the short host names of the local system must be used.

```
ovcodutil -dumpds DB2SPI_DRILLDOWN_<HOSTNAME>
```

Another option is to open the HP Software Performance Manger and to build a graph displaying a selected metric.

Further metric information

Please refer to the DB2SPI for i5/OS Metric Reference Guide for all details regarding the supported metrics for the DB2SPI for i5/OS.