

# Backint for SAP MaxDB



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## Icons in Body Text

Icon	Meaning
	Caution
	Example
	Note
	Recommendation
	Syntax

Additional icons are used in SAP Library documentation to help you identify different types of information at a glance. For more information, see *Help on Help* → *General Information Classes and Information Classes for Business Information Warehouse* on the first page of any version of *SAP Library*.

## Typographic Conventions

Type Style	Description
<i>Example text</i>	Words or characters quoted from the screen. These include field names, screen titles, pushbuttons labels, menu names, menu paths, and menu options.  Cross-references to other documentation.
<b>Example text</b>	Emphasized words or phrases in body text, graphic titles, and table titles.
EXAMPLE TEXT	Technical names of system objects. These include report names, program names, transaction codes, table names, and key concepts of a programming language when they are surrounded by body text, for example, SELECT and INCLUDE.
Example text	Output on the screen. This includes file and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.
<b>Example text</b>	Exact user entry. These are words or characters that you enter in the system exactly as they appear in the documentation.
<Example text>	Variable user entry. Angle brackets indicate that you replace these words and characters with appropriate entries to make entries in the system.
EXAMPLE TEXT	Keys on the keyboard, for example, F2 or ENTER.

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## Backint for SAP MaxDB

This documentation specifies the Backint interface for SAP MaxDB that can be used to connect external backup tools to the SAP MaxDB Database Manager database tool.

The SAP MaxDB software includes a special implementation of the Backint for SAP MaxDB specification. This special implementation allows you to connect external backup tools with a Backint for Oracle interface to Database Manager (see *Connecting Third Party Backup Tools*, “Connecting to a Backint for Oracle Interface”).

For further information about the database system, see the documentation *Concepts of the Database System* and the *Glossary*.

### Features

Each implementation of a Backint for SAP MaxDB interface must include the following functions:

- [Backup Function](#)
- [Restore Function](#)
- [Inquire Function](#)
- [Delete Function](#)

The [Program Definition for Backint for SAP MaxDB](#) describes the formal requirements that must be met in order to implement Backint for SAP MaxDB.

### Constraints

[Supported Operating Systems and Platforms of Database Version 7.4](#)

[Supported Operating Systems and Platforms of Database Version 7.3](#)



## Backing Up and Restoring Data with SAP MaxDB Programs

SAP MaxDB database systems can be backed up and restored using SAP MaxDB programs.

### More Information

*Glossary*, “Backup”



## Functional Description for Backint for SAP MaxDB

Backint for SAP MaxDB backs up and restores data with the appropriate SAP MaxDB database tool and searches for older backups. The program is the connection between the DBM Server and the external backup tool.

If the external backup tool has a client/server architecture, then Backint for SAP MaxDB communicates with the client. Otherwise, it implements the client that is running on the database server. In this way, the SAP MaxDB database tool is able to make standardized use of different external backup tools.

More information: *Installation Manual*, “Block Diagram: Backing Up and Restoring”

Backint for SAP MaxDB supports the following functions:

- [Backup](#)
- [Restore](#)
- [Inquire](#)
- [Delete](#)

For all functions, the User ID (UID) is used as the ID of the SAP MaxDB database. Once a function has been performed, Backint for SAP MaxDB sends a return code that indicates whether it has been successful.

### More Information

[Return Codes](#)

[Variables](#)



## Backing Up and Restoring Data with External Backup Programs

You can implement external backup tools to back up and restore SAP MaxDB database systems. Data is transferred through named pipes, using the Database Manager.

There are two possible implementations:

- The external backup tool is controlled by the DBM Server.

When data is backed up, the DBM Server initiates the data transfer from the database to one or more pipes, and calls the external backup tool to back up the data in the pipes. If the database system or the external backup tool causes an error, the DBM Server ends the data transfer and informs the data transfer partner.

When data is restored, the client queries the available backups from the external backup tool through the DBM Server. It then displays the result of this query to the user, and initiates and controls the transfer of the required backups from the external backup tool to the database through one or more pipes.

See: *Connecting Third Party Backup Tools*, “Block Diagram: Backing Up and Restoring”

- The external backup tool uses the client application Database Manager CLI to control the database.



## Backup Function

The backup function defines a backup request for a list of files or pipes, and sends this request to Backint for SAP MaxDB. Backint for SAP MaxDB backs up these files or pipes, and generates a backup ID for each backup object as a response. Here, the combination of user ID, backup ID and backup object name is guaranteed as being unique for each backup object.

Backint for SAP MaxDB informs the user which files or pipes have been backed up successfully and which have not, which backup ID was assigned to each file and to each pipe, and how many bytes were saved for each pipe.

The order in which the files and/or pipes in the list are backed up is freely determined by the external backup tool.

### Type of Backup Objects

The input list for the backup function indicates whether an object is a file or a pipe. You can combine files and pipes in the input list.

Backint for SAP MaxDB and BACKINT (for Oracle) differ in the objects they allow to be backed up:

BACKINT (for Oracle) allows files, directories, and raw devices.

Backint for SAP MaxDB allows only files and pipes.

### Data Transfer

If the input list contains files, then they are backed up by the external backup tool, however, the backup can be made in a random order and degree of parallelism.

The following rules apply when pipes are restored:

The software (DBM server) or user that called Backint for SAP MaxDB, ensures that every pipe in the list is opened and closed at least once. Backint for SAP MaxDB returns an error for every pipe that has not been opened. To enable a data transfer, both sides of a pipe must be opened; one side by the database software or user, and the other side by Backint for SAP MaxDB. If pipes listed in the input file do not exist, Backint for SAP MaxDB either creates them or checks periodically to see whether they exist.

The pipes are opened for read access only. The data transfer through a pipe ends when one side of the pipe is closed.

If a database version lower than 7.4.03 is used and more than one pipe is specified in the input file, they must all be processed in parallel and in real time to avoid deadlocks. This means that Backint for SAP MaxDB must process all pipes simultaneously, but independently of each other.

When one pipe is opened or read, this action must not block any other pipes listed in the input file from being opened, or any data from being transferred. This is why Backint for SAP MaxDB checks every pipe periodically to make sure that it can be opened or that data can be read from the pipe. This can be achieved by starting one child process or thread for each pipe and by avoiding any synchronization between these processes and/or threads. In this way, the processes or threads can open and read the pipes with normal blocking operations, since the operating system switches periodically to the processes or threads of the other pipes.

If a database version from 7.4.03 is being used, and multiple pipes are specified in the input file, then Backint for SAP MaxDB processes at least some of these pipes in parallel. Otherwise, there would be no advantage in being able to make parallel backups. Interdependencies between the pipes or the processes/threads that process these pipes do not need to be avoided during the backup, since the database itself processes the pipes independently of each other.

SAP MaxDB can support parallel backups with pipes, but this is not mandatory. You can also configure SAP MaxDB for database version 7.4.03 only, or for all database versions covered by this documentation.

## More Information

### [Variables](#)



## Restore Function

The restore function is used to send a request to Backint for SAP MaxDB to restore backups. This request consists of the user ID and a list of files and/or pipes to be restored.

For files, the information consists of the backup ID, its name, and the directory to which the file is to be restored. For pipes, the information consists of the backup ID, its name, and the name of the current pipe to which the content of the backup pipe is to be restored. The name of the directory for the new file and the name of the current pipe are optional pieces of information. If no backup ID is specified, then the last backup of the file or pipe is restored. Information is returned that indicates which files or pipes have been restored successfully and which backups have been used.

The order in which the files in the list are restored is freely determined by Backint for SAP MaxDB.

### Type of Data Carrier

For the restore function, Backint for SAP MaxDB uses its own information or information from the backup tool to decide whether an object is a file or a pipe. Files and pipes can be combined in the input list.



## Data Transfer

If the input list contains files, these are restored in the file system.

The software (DBM server) or user that called Backint for SAP MaxDB ensures that every pipe in the list is opened and closed at least once. Backint for SAP MaxDB returns an error for every pipe that has not been opened. It restores the data in a pipe in the order in which it was read from the original pipe backup. To enable a data transfer, both sides of a pipe must be opened; one side by the database software or user, and the other side by Backint for SAP MaxDB. If pipes listed in the input file do not exist, Backint for SAP MaxDB either creates them or checks periodically to see whether they exist.

The pipes are opened for write access only. The data transfer through a pipe ends when one side of the pipe is closed.

If a database version lower than 7.4.03 is used and more than one pipe is specified in the input file, they must all be processed in parallel and in real time to avoid deadlocks. This means that Backint for SAP MaxDB must process all pipes simultaneously, but independently of each other.

When one pipe is opened or written, this action must not block any other pipes listed in the input file from being opened, or any data from being transferred. This is why Backint for SAP MaxDB checks every pipe periodically to make sure that it can be opened or that data can be written to the pipe. This can be achieved by starting one child process or thread for each pipe and by avoiding any synchronization between these processes and/or threads. In this way, the processes or threads can open and write to the pipes with normal blocking operations, since the operating system switches periodically to the processes or threads of the other pipes.

If a database version from 7.4.03 is being used, and multiple pipes are specified in the input file, then Backint for SAP MaxDB processes a maximum number of these pipes in parallel. This minimizes restore times. Interdependencies between the pipes or the processes/threads that process these pipes do not need to be avoided while data is being restored, since the database itself processes the pipes independently of each other.

SAP MaxDB can support parallel restoring of pipes, although this is not mandatory. It is also possible to design SAP MaxDB for 7.4.03 database versions only or for all the database versions to which this documentation applies. However, the supported type of parallel restore must match the parallel backup type.



## Inquire Function

You can use the inquire function to query information about any backups managed by the external backup tool.

This function is called with the user ID, the backup ID, and the file name or pipe name. The user ID must be specified. The specification of the backup ID and file

name or pipe name is optional. The content of the output file for this function depends on the information specified in the request.

If the input list contains multiple entries, Backint for SAP MaxDB generates the output for the individual entries, and displays it in the order they were entered.

There are four possible cases:

<b>Entries in the Input File</b>	<b>Entries in the Output File</b>
<p>Neither backup ID nor file name or pipe name specified: #NULL</p>	<p>List of backup IDs for a user ID sorted by the date the backup was created (latest backup first)</p> <p>One list entry consists of one backup ID:</p> <pre>#BACKUP &lt;backup_id&gt;</pre> <p>If no backup IDs exist for the specified user ID, Backint for SAP MaxDB does not create any output.</p>
<p>Backup ID specified, file name or pipe name not specified: &lt;backup_id&gt;</p>	<p>List of files or pipes that belong to the backup ID</p> <p>Each list entry consists of the specified backup ID and a file name or pipe name:</p> <pre>#BACKUP &lt;backup_id&gt; &lt;file_name&gt;   #BACKUP &lt;backup_id&gt; &lt;pipe_name&gt;</pre> <p>If no files and/or pipes exist for the specified backup ID, Backint for SAP MaxDB does not create any output.</p>
<p>File name or pipe name specified, backup ID not specified: #NULL &lt;file_name&gt;   #NULL &lt;pipe_name&gt;</p>	<p>List of backup IDs that belong to the specified file or pipe, sorted by the date the backup was created (latest backup first).</p> <p>Each list entry consists of a backup ID and the specified file name or pipe name:</p> <pre>#BACKUP &lt;backup_id&gt; &lt;file_name&gt;   #BACKUP &lt;backup_id&gt; &lt;pipe_name&gt;</pre> <p>If no backup exists for the specified file or pipe, SAP MaxDB generates output that contains the keyword #NOTFOUND.</p> <pre>(#NOTFOUND &lt;file_name&gt;) (#NOTFOUND &lt;pipe_name&gt;)</pre>
<p>Both backup ID and file name or pipe name specified: &lt;backup_id&gt;</p>	<p>The backup specified by the backup ID and the file name or pipe name:</p>

**Entries in the Input File**

```
<file_name> | <backup_id>
<pipe_name>
```

**Entries in the Output File**

```
#BACKUP <backup_id> <file_name> |
#BACKUP <backup_id> <pipe_name>
```

If no backup with the specified backup ID exists for the specified file or pipe, SAP MaxDB generates output that contains the keyword #NOTFOUND.

```
(#NOTFOUND <file_name>)
```

```
(#NOTFOUND <pipe_name>)
```

**Delete Function**

The delete function tells Backint for SAP MaxDB which backed up files or pipes are no longer needed. The files or pipes that are no longer needed are specified by their user ID, backup ID, and name.

Backint for SAP MaxDB is allowed to ignore a delete request.

If, for example, a backup action has been only partially successful, the delete function informs Backint for SAP MaxDB.

**Program Definition for Backint for SAP MaxDB**[Variables](#)[Calling Backint for SAP MaxDB](#)[Options](#)[Content of the Input File](#)[Content of the Output File](#)[Return Codes](#)**Calling Backint for SAP MaxDB**

It must be guaranteed that Backint for SAP MaxDB can be called with the following syntax at the command line level:

```
backint -u <user_id> [-f <function>] [-t <type>] [-c] [-p <par_file>]
[-i <in_file>] [-o <out_file>]
```

For a description of the options, see [Options](#).

For a description of the variables, see [Variables](#).

In addition to the options, the interface also supports several environment variables. These variables are set by the DBM Server before you call Backint for SAP MaxDB.

Environment Variable	Value	Description
BI_CALLER	DBMSRV	Backint for SAP MaxDB is called by the DBM Server
BI_BACKUP	FULL   PARTIAL   ARCHIVE	Complete or incremental data backup or log backup
BI_REQUEST	NEW   OLD	First or subsequent call of Backint for SAP MaxDB within a running backup

Since the DBM Server sets the environment dynamically (putenv), Backint for SAP MaxDB, as a process started by the DBM Server, can inherit these variables (getenv), and use their values to control its further actions.



## Options

It must be guaranteed that the following options can be set for Backint for SAP MaxDB:

Option	Description	Default value
-u <user_id>	User ID (UID) User of the backup tool (for example, the name of the database instance)	None
-f <function>	<function> ::= backup   restore   inquire   delete Type of operation	backup
-t <type>	<type> ::= file Backup type; file is the only possible type for handling files or pipes.	file
-c	Unattended mode (no action by operator possible)	Attended mode

Option	Description	Default value
-p <par_file>	Name of the parameter file, text file for the external backup tool with parameters that specify the backup procedure; specific to the backup tool The SAP MaxDB database tools get the location of this file from their own parameter file. However, they do not analyze its content.	None
-i <in_file>	Name of the input file Text file with the objects of the function (backup, restore, inquire, or delete). See also <a href="#">Content of the Input File</a>	If this option is not set, the data is read from the standard input.
-o <out_file>	Name of the output file Text file where processing messages and the results of functions are saved See also <a href="#">Content of the Output File</a>	If this option is not set, the messages are written to the standard output.



## Variables

In this documentation, all variables have the following meanings and definitions:

Variable	Description	Type (Maximum Length)
<backup_id>	<a href="#">Backup ID (BID)</a>	CHAR(16)
<backup_vol>	Backup volume (for example, tape label)	CHAR(10)
<dest_dir>	Absolute directory and name to which a backed up file is restored	CHAR(255)
<dest_name>	Absolute name of the current pipe to which a backed up pipe is restored	CHAR(255)
<file_name>	Absolute directory and name of the file	CHAR(255)
<in_file>	Name of the input file	CHAR(255)
<out_file>	Name of the output file	CHAR(255)
<par_file>	Name of the parameter file	CHAR(255)
<pipe_name>	Absolute name of the pipe	CHAR(255)

Variable	Description	Type (Maximum Length)
<size>	File size or pipe size	CHAR(16)
<user_id>	User ID (UID)	CHAR(16)



### Backup ID (BID)

The Backint for SAP MaxDB implementation generates a backup ID when a file or pipe is backed up, and writes this ID to the output file. It is then used with the restore, the inquire, and the delete function.

A backup ID is not necessarily unique since it can be assigned both to the backup of a single file or pipe and to the backups of multiple files and/or pipes. However, any backup of a file is identified by a unique combination of user ID, backup ID, and file name or pipe name.



### Content of the Input File

The input file consists of a list of objects that need to be backed up. The entries must comply with the syntax rules indicated below.

The information that needs to be processed by Backint for SAP MaxDB depends on the function that has been used.

Function	Content of the Input File	Syntax
<a href="#">Backup</a>	Names of the files or pipes that you want to back up Pipes are indicated by the keyword #PIPE	<file_name>   <pipe_name> #PIPE
<a href="#">Restore</a>	<a href="#">Backup ID(BID)</a> and/or names of the files or pipes that you want to restore  If you want to restore the newest version of the files or pipes, you can replace some or all of the backup IDs with the keyword #NULL. If you want to restore the file to a directory other than the one where it was backed up, then you can add the absolute name of a target directory to the combination of backup ID and name of a file. If you want to restore the content of the pipe to a pipe other than the one where	<backup_id> <file_name> [<dest_dir>]   #NULL <file_name> [<dest_dir>]   <backup_id> <pipe_name> [<dest_name>]   #NULL <pipe_name> [<dest_name>]

Function	Content of the Input File	Syntax
	it was backed up, then you can add the absolute name of a target pipe to the combination of backup ID and name of a pipe.	
<a href="#">Inquire</a>	Backup ID(s) and/or names of the files or pipes whose information you want to query	#NULL   <backup_id>   #NULL <file_name>   #NULL <pipe_name>   <backup_id> <file_name>   <backup_id> <pipe_name>
<a href="#">Delete</a>	Backup IDs and names of files or pipes that can be deleted	<backup_id> <file_name>   <backup_id> <pipe_name>

## More Information

### [Variables](#)



### Content of the Output File

The output file contains the messages about the processing of the functions, and their results. In addition to the success messages and error messages in their defined formats, the file can also contain other messages.

The content of a message depends on the function that has been executed.

Function	Success Message	Error Message
<a href="#">Backup</a>	#SAVED <backup_id> <file_name> [<backup_vol>]   #SAVED <backup_id> <pipe_name> <size> [<backup_vol>]	#ERROR <file_name>   #ERROR <pipe_name>
<a href="#">Restore</a>	#RESTORED <backup_id> <file_name>   #RESTORED <backup_id> <pipe_name>	#NOTFOUND <file_name>   #NOTFOUND <pipe_name>   #ERROR <file_name>   #ERROR <pipe_name>
<a href="#">Inquire</a>	#BACKUP <backup_id>   #BACKUP <backup_id> <file_name>   #BACKUP <backup_id> <pipe_name>	#NOTFOUND <file_name>   #NOTFOUND <pipe_name>   #ERROR <file_name>   #ERROR <pipe_name>
<a href="#">Delete</a>	#DELETED <backup_id> <file_name>   #DELETED <backup_id> <pipe_name>	#NOTFOUND <file_name>   #NOTFOUND <pipe_name>   #ERROR <file_name>   #ERROR <pipe_name>   #NOTDELETED <file_name>   #NOTDELETED <pipe_name>

## More Information

## [Variables](#)



### **Return Codes**

Backint for SAP MaxDB is called by the software (the DBM Server) or a user. Both the software and the user expect Backint for SAP MaxDB to return one of the codes described below:

<b>Return Code</b>	<b>Description</b>
0	OK - All files and pipes were processed successfully without warnings.
1	WARNING - However, all files and pipes were processed successfully.
2	ERROR - Some or all files or pipes were not processed successfully.



### **Supported Operating Systems and Platforms (Version 7.4)**

Version 7.4 of the database system supports the following operating systems and platforms:

- Compaq Tru64 Unix (Alpha)
- HP-UX (HP-PA)
- IBM AIX (PowerPC)
- Linux (i386, ia64)
- SUN Solaris (SPARC)
- Microsoft Windows 2000 (i386)
- Microsoft Windows XP (i386)
- Microsoft Windows Server 2003 (i386, ia64)



### **Supported Operating Systems and Platforms (Version 7.3)**

Version 7.3 of the database system supports the following operating systems and platforms:

- Compaq True64 Unix / Alpha
- IBM AIX / PowerPC



- SUN Solaris / SPARC
- HP-UX / HP-PA
- Linux / Intel
- Siemens Reliant Unix / MIPS
- Windows NT / Intel