Fujitsu Software BS2000 SESAM/SQL-Server

Version 9.1A

June 2026

Release Notes

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1 General

These release Notes describes the main extensions, dependencies and operational instructions for the following products:

SESAM/SQL-Server (BS2000) V9.1
SESAM/SQL-DCN (BS2000) V9.1
SESAM/SQL-LINK (BS2000) V9.1

SESAM/SQL-Server is a relational database system for the operating system BS2000. SESAM/SQL-Server V9.1 is the follow-up version for SESAM/SQL-Server V9.0.

The version SESAM/SQL-Server V9.1 comes in two versions:

1. SESAM/SQL-Server Enterprise Edition (SES/SQL-EE):
   This version contains a multitask Database Handler (DBH), which can operate up to 16 DBH tasks.

2. SESAM/SQL-Server Standard Edition (SES/SQL-SE):
   This delivery version with a 1 task DBH system is offered for those customers who do not need a multitask Database-Handler (DBH).

The following talks of SESAM/SQL-Server if the version used is not of significance.

SESAM/SQL-DCN is an add-on product for the database system SESAM/SQL-Server and enables the distributed database processing.

SESAM/SQL-LINK is a further add-on product for S line servers.It can be used when databases are only to be processed by one program. The Database Handler then runs in the address area of this program.

*4 The release level is that of June 2026.

*4 The current release refers to SESAM/SQL V9.1A80.

*4 Changes to release level June 2024 are marked with *4.

*3 The release level is that of June 2024.

*3 The current release refers to SESAM/SQL V9.1A72.

*3 Changes to release level June 2021 are marked with *3.

*2 Changes to the correction delivery V9.1A50 are marked with '*2' in the margin. The
*2 release level is that of June 2021.

*1 Changes to the correction delivery V9.1A40 are marked with '*1' in the margin. The
*1 release level is that of November 2020.

This and other release notes are online available at
*4 https://bs2manuals.ts.fujitsu.com/.

If one or more versions are skipped as a result of this product version, the information in the release notes for the previous versions must also be taken into account.

1.1 Ordering

*4 SESAM/SQL-Server V9.1, SESAM/SQL-DCN V9.1 and SESAM/SQL-LINK V9.1
*4 (only S line) can be ordered from your local distributors.

1.2 Delivery

The files for SESAM/SQL-Server V9.1, SESAM/SQL-DCN V9.1 and SESAM/SQL-LINK V9.1 are supplied via SOLIS.

The table shows the release units which are supplied with a specific product.

A standardized product line is offered which can be used for all hardware lines.

Products which are only used in one HW line have the corresponding comment in the column "Release Unit".

Product (Delivery unit)	**Release unit**
SESAM/SQL-Server V9.1 Enterprise Edition (SES/SQL-EE) (SESDBA V9.1)[1]	SES-SQL-EE SES-SQL-SE SESAM-SQL
SESAM/SQL-Server V9.1 Standard Edition (SES/SQL-SE) (SESDBA V9.1)[1]	SES-SQL-SE SESAM-SQL
SESAM/SQL-LINK V9.1 Linked-in-version (SES/SQL-LK)	SES-SQL-LK (only used for S line servers)
SESAM/SQL-DCN V9.1 Add-on product for distribution (SES/SQL-DCN)	SES-SQL-DCN

The use of delivery units SES/SQL-LK and SES/SQL-DCN also requires one of the delivery units SES/SQL-SE or SES/SQL-EE.

The delivery comprises - sorted according to release units - the files listed in the table below.

Hardware-dependent files are marked as such. If hardware-specific files are in a delivery unit, the SOLIS/IMON delivery and installation system ensures that only the files for the hardware are transferred to the system.

---

[1] The release unit SESDBA covers the server and client software for the JDBC and ADO.NET interface for SESAM/SQL.
Please see the separate release notes for this release unit.

Name of the release unit and name of the delivery unit match, i.e. the name of the release unit is also the name of the delivery unit.

Release Unit SESAM-SQL:

This release unit contains those delivery components which are supplied with each of the product versions SES/SQL-EE and SES/SQL-SE.

The following delivery components are required irrespective of HSI:

	SYSSII.SESAM-SQL.091	Structure and installation file for the Release Unit SESAM-SQL
*1	(deleted)	
	SIPLIB.SESAM-SQL.091.CLI	Call Level Interface for applications with BLOBs or in dynamic SQL
	SIPLIB.SESAM-SQL.091.MACUTM	UTM macro library for SESAM/SQL servers
	SIPLIB.SESAM-SQL.091.MACUTM.1	UTM macro library for larger event memory (see section 3.4.3)
	SIPLIB.SESAM-SQL.091.SPEZ	Library with special elements. They are:
	i) PRC.LMS.091.<rep>	Procedures for optional reps for SESAM (see section 2.5)
	ii) STATUSxx.ASS	Assembler sources for the Generation of specific language modules for the output of CALL-DML status messages when using SEDI61(L) and SEDI63(L)
	iii) SESFS91.ASS	Conversion table for sort sequence
	iv) SEZTXT.ASS	Assembler sources with texts for the job variables used by SESAM
	SYSFHS.SESAM-SQL.091.MON.E	Mask modules for the SESAM monitor (English; no German version)
	SYSFHS.SESAM-SQL.091.UTI.D	Mask modules for the utility monitor (German)
	SYSFHS.SESAM-SQL.091.UTI.E	Mask modules for the utility monitor (English)
	SYSMAN.SESAM-SQL.091.UTI.D	Help texts for the utility monitor (German)
	SYSMAN.SESAM-SQL.091.UTI.E	Help texts for the utility monitor (English)
	SYSMES.SESAM-SQL.091	Message file
	SYSSDF.SESAM-SQL.091	SDF subsystem syntax file
	SYSSDF.SESAM-SQL.091.USER	SDF user syntax file
	SYSSPR.SESAM-SQL.091.RUN-STA	Procedure implements the SESAM/SQL start commands.
	SYSSPR.SESAM-SQL.091.RUN-CFG	Procedure implements the command CONNECT-SESAM-CONFIGURATION to assign the global configuration file.
	SYSSPR.SESAM-SQL.091.RUN-MON	Procedure starts SESAM monitor for information output for the SNMP subagents for SESAM.
*1	(deleted)	
	SIPANY.SESAM-SQL.091.MAN-DB	Library contains the example database including the manual examples as well as a ready BLOB application

	SIPANY.SESAM-SQL.091.TOOLS	Library of supplied tools (SESDIAG, SEMSTAT, DSQL); documentation; procedures, sources, modules for compressed printouts of CATALOG information (INFO-TAB); example procedures (SESDBB...)
*2	(deleted)	
	SYSDOC.SESAM-SQL.091.OSS	Library containing the readMe files for third party licences

The following delivery units are only required on S line servers (/390):

SYSLNK.SESAM-SQL.091	Module library which contains the modules required for all product versions
SYSSSC.SESAM-SQL.091.DBH	Declaration for subsystem SESDBH
SYSSSC.SESAM-SQL.091.KOM	Declaration for subsystem SESKOM (central component for communication in all tasks)
SYSSSC.SESAM-SQL.091.KOMOD	Declaration for subsystem SESKOMOD for communication without distribution
SYSSSC.SESAM-SQL.091.SQLRT	Declaration for subsystem SESSQLRT for the SQL runtime system

The following delivery units are only required on SQ line server (X86):

SKULNK.SESAM-SQL.091	Module library which contains the modules required for all product versions
SKUSSC.SESAM-SQL.091.DBH	Declaration for subsystem SESDBH
SKUSSC.SESAM-SQL.091.KOM	Declaration for subsystem SESKOM (central component for communication in all tasks)
SKUSSC.SESAM-SQL.091.KOMOD	Declaration for subsystem SESKOMOD for communication without distribution
SKUSSC.SESAM-SQL.091.SQLRT	Declaration for subsystem SESSQLRT for the SQL runtime system

Release Unit SES-SQL-EE (Enterprise Edition):

The following delivery components are required irrespective of HSI:

SYSSII.SES-SQL-EE.091	Structure and installation file for the Release Unit SES-SQL-EE

The following delivery unit is only required on S line servers (/390):

SYSLNK.SES-SQL-EE.091	SESAM module library, which contains the modules which are only required for the independent DBH of the Enterprise edition

The following delivery component is only required on the SQ-line servers (X86):

SKULNK.SES-SQL-EE.091	see SYSLNK.SES-SQL-EE.091

Release Unit SES-SQL-SE (Standard Edition):

The following delivery components are required irrespective of HSI:

SYSSII.SES-SQL-SE.091	Structure and installation file for the Release Unit SES-SQL-SE

The following delivery component is only required on the S line servers (/390):

SYSLNK.SES-SQL-SE.091	SESAM module library, which contains the modules, which are required for the independent DBH of the standard edition

The following delivery component is only required on SQ-line servers (X86):

SKULNK.SES-SQL-SE.091	see SYSLNK.SES-SQL-SE.091

Release Unit SES-SQL-DCN (add-on product for distribution):

The following delivery components are required irrespective of HSI:

SYSSII.SES-SQL-DCN.091	Structure and installation file for the Release Unit SES-SQL-DCN

The following delivery components are only required for S line servers (/390):

SYSLNK.SES-SQL-DCN.091	SESAM module library which contains the modules only required for SESAM/SQL-DCN
SYSSSC.SES-SQL-DCN.091.KOMMD	Declaration for SESAM/SQL-DCN subsystem in storage class 3/4 for communication with distribution

The following delivery component is only required on SQ line servers (X86):

SKULNK.SES-SQL-DCN.091	see SYSLNK.SES-SQL-DCN.091
SKUSSC.SES-SQL-DCN.091.KOMMD	Declaration for SESAM/SQL-DCN subsystem in storage class 3/4 for communication with distribution

Release Unit SES-SQL-LK (linked-in version):

This release unit is only available for S line servers (/390).

The following delivery components are required irrespective of HSI:

SYSSII.SES-SQL-LK.091	Structure and installation file for the Release Unit SES-SQL-LK

The following delivery component is only required on S line servers (/390):

SYSLNK.SES-SQL-LK.091	SESAM module library which contains the modules only required for the linked-in DBH

A CD-ROM is supplied with release unit SESAM-SQL with the following contents:

- Examples: Demo examples for access options to the manual database.
- DBAccess: README and software for the client of the JDBC, ADO.NET and PHP/PDO interface of SESAM-DBAccess.
- Product info: Release Notes for SESAM/SQL and SESAM-DBAccess.

*1 (deleted)

- Tools: Excel charts to calculate the DBH address area requirement, the requirement of resident pages for FASTPAM and the size of the SORT workfile, descriptions for the tools SEMSTAT and SESDIAG.
- WebTA: README files and the archive file with the components for the client and server installation of the SESAM/SQL WebTA interface.

1.3 Documentation

*3 The documentation is available on the internet at
*3 https://bs2manuals.ts.fujitsu.com/.
*3 There you will find both individual manuals and (under the "Softbooks" tab) the ISO
*3 image of a DVD with the entire inventory.

2 Software extensions

The following sections describe the main new features compared to the previous version 9.0. There is an overview in the introductions contained in the new manual versions; there is a list of manuals and sections where the changes are described.

2.1 Utility functions

- Common error handling in parallel service tasks:
  If a CREATE INDEX is processed on a partitioned table in parallel service tasks and in one service tasks an problem occurs (e.g. space bottle neck), as of SESAM/SQL V9.1 it is assured that the sqlstate of the first problem is returned to the caller. Hence the relevant information is provided to fix the problem.

2.2 Performance

- More specific usage of logical read ahead:
  As of SESAM/SQL V9.1 the feature logical read ahead is used more specific. This means the trigger to the asynchronous read ahead of the subsequent database block if only performed, if it this expected that there is enough time to the access to this block. This is the case e.g., if direct afterwards an output is given to the user.

- RECOVER-OPTIONS SYSTEM- and USER-DATA-BUFFER in relation to the DBH options:
  As of SESAM/SQL V9.1 the DBH sets the values for the RECOVER-OPTIONS SYSTEM- and USER-DATA-BUFFER automatically for a minimal runtime of a RECOVER run, if the new default value *STD is specified for this option. Hints for reasonable buffer sizes for RECOVER are supplied in the view SYS_DA_LOGS.

2.3 Miscellaneous

- Improved logging in service tasks:
  As of SESAM/SQL V9.1 logging in service tasks is improved in order that messages to analyse errors need not to be collected from SYSOUT and SYSLST files.

- Dump in service task:
  In SESAM/SQL V9.1 there is the new administration command CREATE-SERVICE-TASK-DUMP. With it diagnosis documents can be created for a service task, without cancelling it in case, if any action takes an incomprehensibly long time.

2.4 Implemented Change Requests (CR)

No Change Requests have been implemented in this version

2.5 Optional Reps

The optional reps described here are contained in the library SIPLIB.SESAM-SQL.091.SPEZ as J elements with the name PRC.LMS.091.OPT.<hw-line>.<rep>, whereby <hw-line> refers to the hardware line and <rep> is the name of the rep. The following can be available for <hw-line>:

SYS – Rep for the S line (/390)
SKU – Rep for the SQ line (X86)

Each rep is available for all hardware lines.

The Rep procedures also always contain the 'UNREP function', i.e. the optionally activated rep can also be deactivated. Details are in the inline description for each rep.

If an optional rep is required, a target library is demanded when calling the respective rep procedure. The user should note that the rep must be installed both in the version-specific library SYSLNK.SESAM-SQL.091 or SKULNK.SESAM-SQL.091 as well as in any library additionally used.

2.5.1 Rep: CATCACHE

This rep is used to modify the size of the catalog cache.

In other words:

C the value of the DBH load option COLUMNS,
P the value of the DBH load option PLANS,
F a specific factor which has 2 as standard value and which can be modified via this optional LMS rep procedure.

The catalog cache offers space for the meta data for exactly F*C*P columns. If F has the value 0, the catalog cache is thus switched off.

2.5.2 Rep: COSSQLLN

This rep modifies the maximum length of the output of SQL strings regarding the order log. The purpose of this rep is to reduce the high length value in order to make the write of the SQL string to CO-LOG more performant. A smaller value reduces the output of SQL strings so that IOs can be saved.

2.5.3 Rep: DCN-ZEIT

Sending messages with DCAM can fail due to a lack of work memory. There are a further two 2 send attempts. A wait of 100 milliseconds is between the two send attempts. If all send attempts fail, the send is regarded as failed.

This optional LMS rep procedure is used to set - for the DCAM operations - the number of send attempts and the time intervals between the send attempts. Please note when selecting the values that larger values for send attempts and intervals negatively affect the performance of the DBH. Values outside these ranges can result in incorrect DBH behaviour.

The default is:

Standard value of the number of send attempts: 3
(change possible between X'0001' and X'7FFF')

Standard value for the wait time
between two send attempts: 100 milliseconds
(change possible between X'0032' and X'03E8')

2.5.4 Rep: DOPPELDUMP

When a consistency check occurs several consecutive times, the diagnostic documents are only created only on the first time as normal. This rep creates the dump at all times.

Please only use this rep in agreement with your Software Service.

A once-only retry to create the diagnostics documents is possible with the administration command:

//SET-DIAGNOSIS-DUMP-PARAMETER
DUMP=*ON(SELECT=*SQL(SQLSTATE=...))

2.5.5 Rep: DRIVE60

This rep means that DRIVE-TIAM applications can be handled in the old style mode by SESAM/SQL as TIAM applications and not as DCAM applications. The multiple start of such DRIVE-TIAM applications can thus no longer result in the status 2B/AG. If several running DRIVE applications have specified the same user name when starting the DRIVE in "PAR USER=", they are rejected with status 2U/DR. The specification "PAR USER=" as application name is transferred to the SESAM-Userid when this rep is activated.

2.5.6 Rep: ESCALATION-MSG

This rep issues a system message SES3207 or SES3208 when escalating a transaction disable from record or index value to table or index.

The rep setting is not changed with the parameter "ESCALATION-MESSAGE=*UNCHANGED".

The parameter "ESCALATION-MESSAGE=FALSE" deactivates the output of the MSG7 message.

The output of the MSG7 message is activated with the parameter "ESCALATION-MESSAGE=TRUE".

As the frequency of an escalation cannot be foreseen during a SESAM session, the use of this rep can result in many messages SES3207 and SES3208.

Only use this rep in agreement with Software Service!

2.5.7 Rep: JOPTGRENZE

This optional LMS rep procedure is used to modify the algorithm to optimize the CALL-DML join processing.

This limit defines the cut between 'nested-loop' and 'merge' join. This limit can be reduced by the SI length of the join attribute as this length defines the size of a join record in the join value CD.

The following is the default for this limit:

Standard value of the limit used: 16 (X'00000010')
(change possible between X'00000001' and
X'00007FFF')

2.5.8 Rep: LOCK-V1

This rep is used to set the lock behaviour according to the behaviour in the version SESAM/SQL V1.*.

2.5.9 Rep: NORTSTRACE

A small trace buffer is configured in SESAM/SQL V3.0A in SQL-RTS in order to improve problem diagnostics. This trace buffer requires about 400 bytes in UTM transaction memory.

This does not have any effect on most applications. If, however, an application so far (in a version < SESAM/SQL V3.0) uses the UTM transaction memory as far as the last 400 bytes, a lack of memory can occur. In such a situation, this rep is used to switch off the trace.

2.5.10 Rep: RPTC

The effect of this rep is that an INTR RESET with SESDCN which refers to a transaction that has the status "external PTC" is not rejected with the message SEN2012 but executed.

2.5.11 Rep: SCVINAKT

This rep releases user resources to system memory administration.

Resources are enabled with CLOSE SCAN at the end of a statement or with CLOSE CURSOR. They are first managed in a user-specific chain and possibly used in this chain again.

If the chain contains more than "n" scans and their resources, the resources are returned to the system administration. This limit "n" can be influenced by this rep. If large "n" is selected, the resource requirements (here: memory) are greater.

If small "n", the path length of a statement is greater and serialization conflicts can occur in the memory administration.

2.5.12 Rep: SIGNCODE-F

x'C' is as standard the code for positive sign in COBOL output variables of the data types NUMERIC and DECIMAL. In some previous versions x'F' is used as code for positive sign.

This optional LMS rep procedure can be used to recover the old SQL programs behaviour.

If it is used on the module library from where the SQL programs load the SESAM/SQL modules, then output variables of the data types NUMERIC and DECIMAL in these SQL programs use the old code x'F' if the value is positive.

2.5.13 Rep: SONDEROPEN

Specific special open codes have no longer been used since SESAM/SQL V3.0. This rep enables the use of special open codes.

2.5.14 Rep: STATUS97

This optional LMS rep procedure is used to switch off the check of the question area length field.

2.5.15 Rep: SYSDUMP

A system dump for better diagnostics - instead of a user dump -is created when a DBH task aborts with any P error. The parameter "SYSDUMP=TRUE" activates the creation of a system dump. The parameter "SYSDUMP=FALSE" deactivates the creation of a system dump.

Only use this rep in agreement with system diagnostics. The following information must be observed on all accounts!

- The user ID in which the DBH is started must have at least test privilege READ-PRIVILEGE=3 in the user catalog in order to create a system dump.
- When a DBH task aborts, all other tasks of the multitask DBH end.

2.5.16 Rep: SYSDUMP-ALL

This rep means that if a CC occurs, a system dump is performed instead of a user dump.
A system dump generation is activated with the parameter "SYSDUMP=TRUE".

The parameter "SYSDUMP=TRUE" activates the creation of a system dump.

The parameter "SYSDUMP=FALSE" deactivates the creation of a system dump.

Only use this rep in agreement with system diagnostics. The following information must be observed on all accounts:
- The user ID in which the DBH is started must have at least the following test privileges in the JOIN entry:
  READ-PRIVILEGE=3,
  WRITE-PRIVILEGE=1.
- The remaining CC handling is continued as "normal", i.e. any necessary defect markings are executed in the same way as an internal restart (if intended).

2.5.17 Rep: TEMPVIEW

Temporary views have no longer been supported since SESAM/SQL V3.1 and should be replaced with static views.

This rep permits the use of temporary views.

2.5.18 Rep: UTIKEL

This optional LMS rep procedure is used to modify the buffer size for recording utility statements.

F defines the buffer size in kilo bytes. The default value for F is 1024, that means the default buffer size is 1 MByte.
If F is set to zero, the recording of utility statements is switched off.

*3 2.6 News in SESAM/SQL-Server with SP 24.1

*3
*3 SP 24.1 contains the following improvements and corrections:
*3 - UTILITY-MONITOR: Bug fix when starting on a system without AID

*4 2.7 News in SESAM/SQL-Server with SP 26.1

*4
*4 SP 26.1 contains following changes:
*4 - Copyright changed to Fujitsu Germany GmbH

3 Technical information

3.1 Resource requirements

The use of SESAM/SQL server V9.1 is possible on systems as of 512 MB main memory configuration.

The maximum user address area of the DBH process ID should be defined in the user catalog of the home pubset to be large enough to avoid messages about an address area bottleneck during the session.

The minimum value should be 512 MB. A much high user address area could be required depending on the application.

The supplied CD-ROM has an Excel chart in the directory 'produktinfo' which is used to estimate the required address area depending on the user-specific DBH option. The name of the file is:

SYSDAT.SESAM-SQL.091.SP.D.xlsx.

In the same directory exists another Excel chart

SYSDAT.SESAM-SQL.091.RESIDENT.xlsx

to calculate the number of resident pages for the optimal usage of FASTPAM.

The performance of the SESAM/SQL-Version V9.1 has been compared in benchmark tests with the performance of the previous version SESAM/SQL V9.0. The benchmarks TPCB, TPS and Wisconsin are used on various HW technologies (S and SQ servers).

No differences are determined in the measurements regarding throughput and resource requirements.

3.2 SW configuration

SESAM/SQL-Server V9.1 works with the following SW product versions:

If no version is explicitly specified for a product, the version is assumed which is supplied with the respective OSD package (of the respective operating system version) as a technically coupled or uncoupled release.

Required operating system version, depending on the HW architecture:

BS2000/OSD	as of V10.0	for HW line /390 (S line)
OSD/XC	as of V10.0	for HW line X86 (SQ line)

Other software required for production operations:
(Versions according to the software configuration list BS2000/OSD V10.0)

CRTE	as of V10.0	
ONETSERV	as of V3.6	also includes XHCS V2.1
SORT	as of V8.0	
TIAM	as of V13.2	

Optional software products for specific functions

- According to the software configuration list BS2000/OSD V10.0

ARCHIVE	as of V10.0	for tape backup
COBOL85	as of V2.3	
COBOL2000	as of V1.5	
EDT	as of V17.0	
ESQL-COBOL	as of V 3.0	
DRIVE	as of V3.1A10	
HSMS	as of V10.0	
JV	as of V15.1	
LMS	as of V3.5	
INETSERV	as of V3.4	
openUTM	as of V6.2	
SDF-P	as of V2.5	for additionally supplied tool procedures
SECOS	as of V5.4	
*1 (deleted)		
SHC-OSD	as of V11.0	for use of BCV/Timefinder
JENV	as of V6.0	for use of the JDBC, ADO.NET or PHP/PDO interface

- Outside the software configuration list BS2000/OSD V10.0

ADILOS	as of V6.4C
INFPLAN	as of V5.3B
SESAM-KLDS	as of V3.1D

- For use of JDBC in the JDBC client environment (Windows / LINUX / UNIX):

Java JRE	as of V1.6

- For use of ADO.NET in the ADO.NET client environment (Windows / LINUX / UNIX):

.NET	as of V3.5

- For use of PHP/PDO in the PHP client environment (LINUX):

PHP	as of V5.3.8

Please observe the release notes for the listed SW products with regard to the SW configuration.

3.3 Product installation

SESAM/SQL must be installed using the installation monitor IMON. When installing the product, the information in the release notes, the installation information in the delivery letter and in the product manual must all be taken into consideration.

The following activities must be carried out before activating IMON:

- Before converting to SESAM/SQL-Server V9.1 all applications of the DBHs to be converted are first terminated correctly.

- The DBH must then be terminated correctly with
  //STOP-DBH UTM-SESSION-INFO=*DELETE (in SESADM) or
  /INFORM-PROGRAM MSG='STOP,DELETE', ...
  (UTM-SESSION-INFO=*KEEP or MSG='STOP,KEEP' is not enough!). Any shared loaded modules or subsystems from the previous version do not have to be unloaded.

- SESAM/SQL-DCN must - if available – also be ended correctly with
  //STOP-DCN (in SESADM) or
  /INFORM-PROGRAM MSG='STOP', ...
  For version-overlapping communication, see section 3.5.2.

- The transaction backup files TA-LOG1, TA-LOG2 and WA-LOG (of the independent DBH-LOG files with prefix SESAM as well as all service tasks and the inlinked DBH-LOG files with prefix SESLK) and the SESDCN logging file SESDLG of the old version must be deleted.

- When converting from a previous version < V4.0 check the file with the load options for incompatibilities and adapt as required. As of SESAM/SQL V4.0 the load options are upward-compatible.

After these activities, the product is installed with IMON. The required inputs as well as the installation procedure are described in the IMON manual. The installation ID for all delivery units is not fixed. IMON installs SESAM/SQL completely in an operable form.

The following activities must be executed after a successful installation of the product with IMON:

1. If the customer does not use the SESAM start commands, the file names for the SESAM message file (SYSMES).
   the SESAM-SDF syntax file (SYSSDF.)
   the SESAM module library (SYSLNK or SKULNK.)
   the FHS module libraries for SESMON and SESUTI (SYSFHS.)
   the help texts for SESUTI (SYSMAN.)
   must be adapted to the new names (see section 1.2).

2. When installing with IMON the message file SYSMES.SESAM-SQL.091 and the subsystem syntax file SYSSDF.SESAM-SQL.091 are activated as standard.

   If parallel operation of two SESAM/SQL versions is planned on one processor, it must be ensured that each product version takes its messages from the suitable message file. The start commands from SESAM/SQL thus assign the appropriate message file on a task-local basis.

For user specific use, a user syntax file is supplied under the name SYSSDF.SESAM-SQL.091.USER, which contains the SDF statements of the SESAM/SQL programs. These must then be used if there was no IMON installation or the subsystem syntax file is not activated.
The allocation is via:

```
/MODIFY-SDF-OPTIONS SYNTAX-FILE = *ADD ( -
/    ADD-NAME =<user-id>.SYSSDF.SESAM-SQL.<version>.USER )
```

The start commands from SESAM/SQL V9.1 execute this allocation automatically. However, the start commands themselves are always defined via the subsystem syntax file. The subsystem syntax file must be activated if the functionality 'Global configuration file is to be used with the command /CONNECT-SESAM-CONFIGURATION.

3. If required, the subsystems from SESAM/SQL V9.1 can be started at the end of the installation.

3.4 Product usage

3.4.1 Information about converting to version SESAM/SQL V9.1

The following information applies for converting from an earlier version of SESAM/SQL as of V2.0.

When converting from a version older than the one directly before, the appropriate version conversion information in the release notes should be observed.

When converting to SESAM/SQL V9.1 more than one version of SESAM/SQL is usually installed on a processor during a certain conversion phase. Please note that you always start the SESAM programs of the correct version. If the SESAM-DBH of Version 9.1 is erroneously started the specified catalog spaces are immediately migrated (see section 3.4.1.1) and could thus no longer be processed in the previous version. That is why we urgently recommend using the SESAM start command with the operand VERSION.

```
/START-SESAM-<program> VERSION = <version>
```

or the BS2000 command

```
/SELECT-PRODUCT-VERSION PRODUCT = SESAM-SQL, VERSION =
<version>
```

The version can be supplied, for example, from a central job variable.

DBH sessions for older versions must be ended correctly with STOP-DBH UTM-SESSION-INFO = *DELETE (SESADM statement). All involved DBH and openUTM sessions must be ended in the transaction-free status.
The transaction backup files TA-LOG1, TA-LOG2 and WA-LOG (both the independent DBH-LOG files with prefix SESAM, as well as all service tasks and the inlinked DBH LOG files with prefix SESLK) and where necessary the SESDCN logging file SESDLG of the old version must be deleted.

3.4.1.1 Migration of the databases

Observe the following when changing from a previous version to SESAM/SQL V9.1:

- Neither a recovery nor synchronization with openUTM nor a media recovery is possible beyond the version conversion.
- When changing the version, the catalogs are migrated to the administration structures. The migration of the catalog spaces to SESAM/SQL V9.1 is implicit with the first access with the DBH from SESAM/SQL SESAM/SQL V9.1.

The following procedure should be followed when changing versions:

- Prerequisite for the migration of a catalog to SESAM/SQL V9.1 is that the catalog and the user spaces are intact and complete, i.e. they are not faulty nor have the status check, copy, recover-pending or load-running. We recommend that a backup is made before migrating which can be used in emergencies.

- The installation is carried out as described in the section 3.3.

- Existing TA- and WA-LOG files in the previous version must be deleted.

- The DBH of the SESAM/SQL V9.1 must be started.

- The first access of the DBH of the SESAM/SQL V9.1 to a catalog or user space automatically triggers the migration. The migration of the catalog space takes place during the session initialization for all catalogs which are listed in the DBC (SQL Database Catalog). The prerequisite is that the catalogs are mounted with ACCESS=ADMIN - With ACCESS=WRITE or ACCESS=READ access to a catalog in the previous version fails.

- Migration to SESAM/SQL V9.1 interrupts the logical data backup as backups and logging files in a previous version cannot be used in SESAM/SQL V9.1 for media recovery. Migrated spaces, for which logging is agreed, are automatically set in the status "copy-pending".

We recommend as first access to a catalog in a previous version with SESAM/SQL V9.1 the utility statement

```
COPY CATALOG ... OFFLINE
```

as thus all the spaces of the catalog are migrated in one run and the backup copies of all required spaces of the catalog after the migration can be created. This enables problem-free work with all catalog spaces.

It is also possible to backup catalog space first with the statement

```
COPY CATALOG_SPACE ... OFFLINE
```

The user spaces can then be backed up with

```
COPY ... ONLINE
```

or other suitable means (e.g. foreign copy). A foreign copy must be initiated via the SESADM command

```
//PREPARE-FOREIGN-COPY
```

and ended via the SESADM command

```
//END-FOREIGN-COPY
```

When the first backup has been made in V9.1, the no longer required recovery unit entries in the CAT-REC file and in the meta data of the catalog should be deleted.

Replicates are not migrated. Replicates of a previous version cannot be processed in V9.1. If replicates are used, they must be created anew.

3.4.1.2 Backup sets

Backup sets are not migrated. A backup from a previous version as of V2.0 can be used for reading to a V9.1-DBH session.

Resetting to a backup of a previous version as of V2.2 is possible with

```
RECOVER SPACE ... TO ...
```

The backup is not migrated but the space that arises when loading. The space has the statue "copy-pending" and must then be saved.

Resetting a catalog to a backup of a previous version as of V3.1 with

```
RECOVER CATALOG ... TO ...
```

is also possible. Resetting must be in several steps:

1. Reset the catalog space with
   ```
   RECOVER CATALOG_SPACE ... TO ...
   ```
   The loaded catalog space is migrated.

2. Save the catalog space with
   ```
   COPY CATALOG_SPACE
   ```

3. Reset the spaces with
   ```
   RECOVER SPACESET ...
   ```
   by specifying the timestamp of the catalog backup which is to be reset. Individual spaces can also be reset if only these are required. The loaded spaces are migrated.

4. Save the spaces which are in logging as these spaces are in the status "copy-pending" as a result of the migration.

3.4.1.3 Conversion information for SESAM/SQL-DCN

DCN sessions of older versions must be ended correctly with STOP-DCN (SESADM-statement).It is necessary that all involved DBH and openUTM sessions are ended in a transaction-free status.

The SESDLG file of the previous version must then be deleted.

3.4.1.4 Conversion information when using virtual hosts

When using virtual hosts with SESAM/SQL V9.1 the application name is:

SES091cnf

(cnf is the configuration name).

Please consider this in the file $.SYSDAT.BCAM.APPLICATIONS. See section 8.3 in the manual "Database operations".

3.4.1.5 Conversion of the user programs

CALL-DML and SQ user programs need not be separately translated or linked. The allocation to the module library belonging to SESAM/SQL V9.1 is sufficient.

openUTM applications only have to be generated anew and linked when the connection module SESUTMC is loaded from a module library defined in the generation.

Please note in this context an extension of openUTM: In the KDCDEF control statement DATABASE LIB=... the load library can be specified via a "logical ID" like the IMON installation. The connection module SESUTMC is dynamically loaded from the SESAM/SQL module library defined via IMON. That is usually the one with the highest version number. If an older version is to be used, this must be explicitly selected with the BS2000 command.

/SELECT-PRODUCT-VERSION PRODUCT = SESAM-SQL,VERSION = <version>

3.4.1.6 Reverse migration

A reverse migration to a previous version is only possible together with your Service and Support Center, as some initial checks and manual interventions are required for everything to work correctly.

3.4.2 Version-overlapping communication and parallel operations with SESAM/SQL

SESAM/SQL-Server V9.1 works locally only with SESAM/SQL-DCN V9.1; all DBHs and DCNs must have the same version in a configuration.

Version-overlapping communication is only possible with configuration-overlapping with SESAM/SQL-DCN. If both configurations are on the same processor, they must have different configuration IDs.

1. SESAM/SQL user programs with a connection module of the version >= V2.0 can communicate via SESAM/SQL-DCN with a SESAM/SQL-DBH V9.1. As a SESAM/SQL user program connection of the version < V5.0 does not know the connection module parameter CCSN, it is handled in the DBH of version V9.1, as if CCSN=*NONE were specified, i.e. the user program can only process one catalog for which "_NONE_" is defined as code table.

2. SESAM/SQL user programs with a connection module of Version V9.1 can communicate with a SESAM/SQL-DBH as of V3.2. When a user program which has allocated a SESAM module library of version V9.1, communicates with a DBH of a version < V5.0, the DBH does not run a check of the CCSN.

Versions before SESAM/SQL V3.2 cannot work together version-overlapping with SESAM/SQL V9.1A.

Even if the subsystem syntax file of a previous version is active, the start commands can start SESAM/SQL V9.1 programs. These commands access the user syntax file SYSSDF.SESAM-SQL.091.USER.

3.4.3 Use larger transaction memory with openUTM

Above 128 KB transaction memory (specified via KDCDEF control statement MAX VGMSIZE), it is recommended to use the KDCDB macros from the library SIPLIB.SESAM-SQL.091.MACUTM.1.

3.4.4 User ID of the HSMS archive

When using HSMS for tape backups, the HSMS archive can also be in a user ID other than that of the DBH if the user ID of the DBH is co-owner of the HSMS archive.

3.4.5 Usage of resident pages

When using the administrations statements //RECONFIGURE-DBH-SESSION and //RELOAD-DBH-SESSION the optional REP A0599981 must be assigned, if resident pages should be used by FASTPAM. If this REP is not assigned FASTPAM cannot use resident pages after the restart of the DBH.

3.5 Dropped and withdrawn functions

None

3.6 Incompatibilities

SESAM/SQL V9.1 is compatible to SESAM/SQL V9.0 apart from the restrictions described below.

3.6.1 Replicates

Replicates are not migrated. Replicates of SESAM/SQL V9.0 cannot be processed in V9.1. If replicates are used, they must be created anew.

3.6.2 Backup files

Backup sets are not migrated. Backup sets as of version SESAM/SQL V2.0 can be mounted in V9.1 for reading.

3.6.3 Logging files

Logging files of the SESAM/SQL V9.0 cannot be processed in V9.1. The following are affected:

- Transaction backup files TA-LOG and WA-LOG,
- DCN backup file SESDLG,
- Logging files DA-LOG and CAT-LOG,

RECOVER [USING] based on V9.0 backup is thus no longer possible in V9.1.

3.7 Restrictions

None

3.8 General information

The following sections list no modified behaviour in contrast to the previous version. They provide the user with helpful information for product usage.

3.8.1 Example database

The delivery scope for SESAM/SQL server includes the example database ORDER CUSTOMER (AUFTRAGSKUNDEN). This SESAM/SQL database is described in section 3 of the basic manual. The library SIPANY.SESAM-SQL.091.MAN-DB contains all the components you need in order to try out the examples in the manual and to develop one's own application in a smaller environment.

The instruction file INSTR.AUFTRAGKUNDEN.091 has an example with instructions for the new functions of this version.

3.8.2 Information about /START-PROGRAM

If, when starting the SESAM/SQL programs the command /START-PROGRAMM is used and not the SESAM start command, the parameter RUN-MODE must be specified with the following operand values:

```
RUN-MODE = *ADVANCED ( ALTERNATE-LIBRARIES = *YES,
                       UNRESOLVED-EXTRNS = *DELAY,
                       LOAD-INFORMATION = *REFERENCES )
```

A start command for a SESAM program can be formulated as follows:

```
/START-PROGRAM FROM = *MODULE ( LIBRARY = <sesam-library>, -
/   ELEMENT-OR-SYMBOL = <sesam-program>, -
/   PROGRAM-MODE = *ANY, -
/   RUN-MODE = *ADVANCED ( ALTERNATE-LIBRARIES = *YES, -
/                          UNRESOLVED-EXTRNS = *DELAY, -
/                          LOAD-INFORMATION = *REFERENCES ))
```

As both SESAM modules as well as the C runtime system modules can be loaded, both the SESAM module library as well as the library of the Common RunTime Environment CRTE is assigned before the start command via symbolic links. The load module library of CRTE must be the one with /390 code (independent of the hardware line), this is generally $.SYSLNK.CRTE.

The symbolic links are:

```
/ADD-FILE-LINK LINK-NAME = SESAMOML,FILE-NAME = <sesam-library>
/ADD-FILE-LINK LINK-NAME = BLSLIB01,FILE-NAME = <crte-library>
```

Before starting the SESAM performance monitor SESMON, the following command /MODIFY-DBL-DEFAULT PRIORITY = *FORCED,SCOPE=*PROGRAM-CALLS (-

/ RESOLUTION = *PARAMETERS (MMODE-CHECK = *NO))
must also be entered.

3.8.3 Use various correction delivery versions as subsystem

As of SESAM/SQL V4.0 subsystems can be loaded in parallel from various correction delivery versions. The following must be observed:

1. Installation by IMON must be done without generating the subsystem catalog.

2. The subsystem of SESAM (SESKOM, SESSQLRT, SESKOMOD and SESKOMMD) must be explicitly entered in the subsystem catalog. A new subsystem catalog must be created with SSCM using the following instructions (see manual "DSSM/SSCM, Administration of subsystems in BS2000 "):

   ```
   /START-SSCM
   //START-CATALOG-CREATION <subsystem catalog>
   //ADD-CATALOG-ENTRY
           FROM-FILE = $kenn.SYSSSC.SESAM-SQL.091.KOM (*)
   //CHECK-CATALOG
   //SAVE-CATALOG
   ```

   (*) This instruction enters SESKOM in the subsystem catalog. The other subsystems SESDBH, SESSQLRT and SESKOMOD from SESAM-SQL must be handled in the same way. If necessary, the same procedure must be used with the subsystem SESKOMMD from SES-SQL-DCN.

   The subsystem declaration files on the SX line servers the prefix SPUSSC and SKUSSC on the SQ line servers. They are called
   SKUSSC.SESAM-SQL.091.KOM

3. This subsystem catalog must then be included in the BS2000 in the catalog of the dynamic subsystems. This is done with the command

   ```
   /ADD-SUBSYSTEM CATALOG = <subsystem catalog>, -
   /                TYPE = *NEW-SUBSYSTEMS
   ```

4. Then start the subsystems using the command:

   ```
   /START-SUBSYSTEM SUBSYSTEM = <subsystem>,VERSION=V9.1A00, -
   /          VERSION-PARALLELISM = *COEXISTENCE-MODE
   ```

3.8.4 Tools for SESAM/SQL server V9.1

As in the previous versions, various tools are supplied with SESAM/SQL V9.1 which are not part of the contract and which are not subject to any service obligations.

The tools are summarized in the library SIPANY.SESAM-SQL.091.TOOLS

An overview is in SIPANY-TOOLS-INH.TXT (Type D) in this library.

More tools are in the product-specific libraries:
SYSLNK.SESAM-SQL.091
SKULNK.SESAM-SQL.091

These tools, such as DSQL, SEMSTAT, etc. are supplied without SESAM start commands. These tools always run in /390 coding independently of the hardware line.

To run them, you need components of the Common RunTime Environment CRTE. For these tools the line-specific load module library:

$.SYSLNK.CRTE

from CRTE must be available for running on all server lines, as these contain the /390 code.

3.8.4.1 Tool DSQL (DirectSQL)

DSQL (DirectSQL) is used to easily enter SQL statements directly at the terminal and to have them executed by SESAM/SQL. From the view of SESAM/SQL DSQL is a normal SQL application which executes with dynamic SQL the SQL statements entered by the user. All types of SQL statements DML, DDL, SSL, Utility) are supported which can be executed with EXECUTE IMMEDIATE as well as SELECT statements which are processed as a dynamic cursor. The number of hits is shown on the screen via the SHOW-FILE command.

The program and a description are in the library SIPANY.SESAM-SQL.091.TOOLS.

3.8.4.2 Tool SESAMDA (shows loaded DBHs and DCNs)

SESAMDA checks which DBHs and DCNs are loaded and which POOLs are configured. Having loaded SESAMDA an overview of the functions and commands of the tool can be output when entering HELP.

The program is in the module library:
SYSLNK.SESAM-SQL.091
SKULNK.SESAM-SQL.091

3.8.4.3 Tool SEMSTAT (evaluation of file outputs from SESMON)

SEMSTAT is used to evaluate file outputs from the SESAM performance monitor SESMON. In addition to creating a BS2000 file it is used to create an ASCII file, which, for example, can be processed further for graphic evaluations, e.g. with Microsoft Excel on a Windows PC. Details about the description are in SEMSTAT.

The program is in the module library:
SYSLNK.SESAM-SQL.091
SKULNK.SESAM-SQL.091

The description (pdf) is on the CD-ROM supplied with SESAM/SQL in the directory 'Tools'.

3.8.4.4 Tool SESDIAG (Diagnostics tool)

SESDIAG is a diagnostics tool used to gather catalog, space and block information.

The program is in the module library:
SYSLNK.SESAM-SQL.091
SKULNK.SESAM-SQL.091

The description (pdf) is on the CD-ROM supplied with SESAM/SQL in the directory 'Tools'.

3.8.4.5 Tool INFOTAB (information via a table)

INFOTAB provides general information via a table, the corresponding space, a list of attributes (columns) and a list of SQL default values.

The program and the corresponding description are in the library SIPANY.SESAM-SQL.091.TOOLS.

3.9 Behaviour in the event of an error

3.9.1 General information

To detect user errors SESAM/SQL applications should be started with
/MODIFY-JOB-OPTIONS LOGGING = *PARAMETERS (LISTING = *YES)

In order to get the required documents for diagnostics, SESAM/SQL-DBH and SESAM/SQL-DCN should always run with
/MODIFY-TEST-OPTIONS DUMP = *YES
and the session logged in a file. If SESAM program components determine an error, a dump is automatically created.

The DBH ID should have from the system administrator at least read privilege 3 for test and diagnostics so that SESAM/SQL can create system dumps for the diagnostics. The test privilege is set once using the BS2000 command
/MODIFY-USER-ATTRIBUTES TEST-OPTIONS = *PARAMETERS (-
/ READ-PRIVILEGE = 3)
and remains stored in the user catalog.

If the DBH is loaded as a multitask system, error documents can be generated in tasks other than those started by the administrator.
The documents which must be saved when a consistency check occurs are described in the manual
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and
SESAM/SQL-Server V9.1A Messages

There are other tools which create useful error documents if there are assumed DBH errors (e.g. non-authorized status, incorrect answer etc.):

- Set task switch 13:
  A dump is automatically created at DBH end of program.

- Switch on traces with
  //SET-DBH-MSG-TRACE (SESADM statement)
  or
  /INFORM-PROGRAM MSG = 'TRACE=ON'

  This provides information about the message transfer between the DBH and user program (e.g. which instruction is transferred to the DBH).

  Additional diagnostic functions can be activated in the program which create a dump depending on the test results (e. g. when a certain status occur or SQLSTATES). The respective statements for this are:

  //SET-DIAGNOSIS-DUMP-PARAMETER DUMP = *ON (-

```
    //                    SELECT = *CALL-DML ( STATE = xx ) )
or
    /INFORM-PROGRAM MSG = 'SES,OPT,DIAG,STATUS=xx'
```

in order for a DBH dump to be created if the CALL-DML status xx occurs.

```
    //SET-DIAGNOSIS-DUMP-PARAMETER DUMP = *ON ( -
    //                    SELECT = *SQL ( SQLSTATE = yyyyy ) )
or
    /INFORM-PROGRAM,MSG='SES,OPT,DIAG,SQLSTATE=yyyyy'
```

in order for a DBH dump to be created if the CALL-DML status yyyyy occurs.

Switching on this diagnostic function, however, negatively affects the runtime behavior of the DBH notably.

The following SESADM statements are used to switch off each of function again for CALL-DML and SQL:

```
    //SET-DIAGNOSIS-DUMP-PARAMETER DUMP = *OFF ( -
    //                    SELECT = *CALL-DML )
or
    //SET-DIAGNOSIS-DUMP-PARAMETER DUMP = *OFF ( -
    //                    SELECT = *SQL )
```

More documents can be required for the service tasks used for specific SESAM/SQL server tasks. The procedure listing and a possible dump must also be provided for the diagnostics.

It can be possible in certain situations to analyze a processing plan of an SQL statement that is created by SESAM/SQL servers. The pragma EXPLAIN is used to create a plan which must be submitted for diagnostics.

More diagnostic documents can be gathered via SESMON or SESCOS traces.

The special documents required and how to create them is described in the manual.

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The created documents must also have an exact description of the error and details about how and whether the error can be reproduced.

All dumps and lists generated must be handed over to your Support Center for diagnostic purposes.

If there are errors in conjunction with openUTM, ESQL-COBOL, DRIVE, etc. then the details in the release notes for each product must be observed.

3.9.2 Behaviour with faulty CAT-REC file

Should a CAT-REC file be faulty or no longer available (required for a RECOVER), then contact your Support Center which has the know-how needed to carry out a repair.

4 Hardware requirements

SESAM/SQL V9.1 runs on all business servers supported by BS2000 as of OSD/BC V10.0 or OSD/XC V10.0.

5 Firmware levels

This section is not relevant for SESAM-DBAccess.