



**Program Directory for
IBM Db2 Accessories Suite for z/OS
Database Services Expansion Pack Feature
SQL Tuning Services**

04.02.01

Program Number 5697-Q05

FMID H2AT210

for Use with
z/OS

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Note

Before using this information and the product it supports, be sure to read the general information under 7.0, "Notices" on page 22.

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1.0 Introduction

This program directory is intended for system programmers who are responsible for program installation and maintenance. It contains information about the material and procedures associated with the Database Services Expansion Pack (a feature of the Db2 Accessories Suite for z/OS product), and delivers one FMID to SMP/E install: H2AT210 - SQL Tuning Services.

The Program Directory contains the following sections:

- 2.0, “Program Materials” on page 3 identifies the basic program materials and documentation for SQL Tuning Services.
- 3.0, “Program Support” on page 5 describes the IBM support available for SQL Tuning Services.
- 4.0, “Program and Service Level Information” on page 7 lists the APARs (program level) and PTFs (service level) that have been incorporated into SQL Tuning Services.
- 5.0, “Installation Requirements and Considerations” on page 8 identifies the resources and considerations that are required for installing and using SQL Tuning Services.
- 6.0, “Installation Instructions” on page 15 provides detailed installation instructions for SQL Tuning Services. It also describes the procedures for activating the functions of SQL Tuning Services, or refers to appropriate publications.

Before installing SQL Tuning Services, read the *CBPDO Memo To Users* and the *CBPDO Memo To Users Extension* that are supplied with this program in softcopy format and this program directory; after which, keep the documents for your reference. Section 3.2, “Preventive Service Planning” on page 5 tells you how to find any updates to the information and procedures in this program directory.

SQL Tuning Services is supplied in a Custom-Built Product Delivery Offering (CBPDO, 5751-CS3) in feature Database Services Expansion Pack. The program directory that is provided in softcopy format on the CBPDO is identical to the hardcopy format if one was included with your order. All service and HOLDDATA for SQL Tuning Services are included on the CBPDO.

Do not use this program directory if you install SQL Tuning Services with a SystemPac or ServerPac. When you use one of those offerings, use the jobs and documentation supplied with the offering. The offering will point you to specific sections of this program directory as needed.

1.1 Database Services Expansion Pack feature Description

IBM Db2 Accessories Suite for z/OS 4.2.1 *Database Services Expansion Pack feature* delivers SQL Tuning Services 2.1. SQL Tuning Services is a set of RESTful APIs that you can use to analyze and tune SQL applications that work with Db2 for z/OS.

The SQL Tuning Services FMID H2AT210 provides the following standard capabilities:

- Capture Query Environment

- SQL Formatter
- Statistics Advisor
- Visual Explain
- APIs that enable you to retrieve SQL statements from the following sources:
 - A user-defined repository
 - A local file
 - For dynamic SQL, from the statement cache
 - For stabilized dynamic SQL and for static SQL, from Db2 catalog tables

SQL Tuning Services FMID H2AT210 provides many additional APIs listed below. To use these APIs requires a license key delivered with the IBM Db2 Query Workload Tuner for z/OS 6.1 (5698-QW6) product.

- Access Path Advisor
- Access Path Comparison
- Index Advisor
- Query Rewrite Advisor
- SQL Annotator
- Workload Access Path Advisor
- Workload Access Path Comparison
- Workload Explain
- Workload Index Advisor
- Workload Management
- Workload Query Rewrite Advisor
- Workload Statistics Advisor

You may use the SQL Tuning Services FMID H2AT210 obtained from this feature to use the standard APIs. If you wish to use the additional APIs in H2AT210, and you have purchased the Query Workload Tuner for z/OS 6.1 product, which provides the activation key to use the additional API's, and also provides FMID H2AT210, you may use this installation of H2AT210. Refer to the respective products' License Information documents for more information.

1.2 Database Services Expansion Pack FMIDs

Database Services Expansion Pack consists of the following FMID:

H2AT210 (SQL Tuning Services)

Note: The prior SQL Tuning Services FMID H2AT110 was packaged to install on Unix System Services (USS). With this new H2AT210 FMID, SQL Tuning Services installs DBRMs and sample members in z/OS datasets, simplifying installability, usability and maintainability.

2.0 Program Materials

An IBM program is identified by a program number. The program number for IBM Db2 Accessories Suite for z/OS is 5697-Q05.

Basic Machine-Readable Materials are materials that are supplied under the base license and are required for the use of the product.

The program announcement material describes the features supported by SQL Tuning Services. Ask your IBM representative for this information if you have not already received a copy.

2.1 Basic Machine-Readable Material

The distribution medium for this program is physical media or downloadable files. This program is in SMP/E RELFILE format and is installed by using SMP/E. See 6.0, "Installation Instructions" on page 15 for more information about how to install the program.

You can find information about the physical media for the basic machine-readable materials for SQL Tuning Services in the *CBPDO Memo To Users Extension*.

Figure 1. Program File Content

Name	ORG	REC	LEN	BLK SIZE
SMPMCS	SEQ	FB	80	6400
IBM.H2AT210.F1	PS	VS	8816	8820
IBM.H2AT210.F2	PS	VS	8816	8820
IBM.H2AT210.F3	PS	VS	8816	8820
IBM.H2AT210.F4	PS	VS	32650	32654

Figure 2 identifies the basic unlicensed publications for Database Services Expansion Pack feature. Those that are in softcopy format publications can be obtained from the IBM Publications Center website at <https://www.ibm.com/resources/publications>

You may also search the online IBM Documentation site for more product information.

Figure 2. Basic Material: Unlicensed Publications

Publication Title	Form Number	Media Format
IBM Database Services Expansion Pack License Information	GC28-3247	CD image

No optional publications are provided for SQL Tuning Services.

2.2 Program Source Materials

No program source materials or viewable program listings are provided for SQL Tuning Services.

2.3 Publications Useful During Installation

You might want to use the publications listed in Figure 3 during the installation of SQL Tuning Services.

Figure 3. Publications Useful During Installation

Publication Title	Form Number
IBM SMP/E for z/OS User's Guide	SA23-2277
IBM SMP/E for z/OS Commands	SA23-2275
IBM SMP/E for z/OS Reference	SA23-2276
IBM SMP/E for z/OS Messages, Codes, and Diagnosis	GA32-0883

Note: IBM Publications Center <https://www.ibm.com/resources/publications>

3.0 Program Support

This section describes the IBM support available for SQL Tuning Services.

3.1 Program Services

Contact your IBM representative for specific information about available program services.

3.2 Preventive Service Planning

Before you install SQL Tuning Services, make sure that you have reviewed the current Preventive Service Planning (PSP) information. Review the PSP Bucket for General Information, Installation Documentation, and the Cross Product Dependencies sections. For the Recommended Service section, instead of reviewing the PSP Bucket, it is recommended you use the IBM.PRODUCTINSTALL-REQUIRESERVICE fix category in SMP/E to ensure you have all the recommended service installed. Use the **FIXCAT(IBM.PRODUCTINSTALL-REQUIRESERVICE)** operand on the **APPLY CHECK** command. See 6.1.9, “Perform SMP/E APPLY” on page 18 for a sample APPLY command

If you obtained SQL Tuning Services as part of a CBPDO, HOLDDATA is included.

If the CBPDO for SQL Tuning Services is older than two weeks by the time you install the product materials, you can obtain the latest PSP Bucket information by going to the following website:

<http://www14.software.ibm.com/webapp/set2/psearch/search?domain=psp>

You can also use S/390 SoftwareXcel or contact the IBM Support Center to obtain the latest PSP Bucket information.

For program support, access the Software Support Website at <http://www.ibm.com/support/>.

PSP Buckets are identified by UPGRADEs, which specify product levels; and SUBSETs, which specify the FMIDs for a product level. The UPGRADE and SUBSET values for SQL Tuning Services are included in Figure 4.

UPGRADE	SUBSET	Description
5697Q05	H2AT210	SQL Tuning Services

3.3 Statement of Support Procedures

Report any problems which you feel might be an error in the product materials to your IBM Support Center. You may be asked to gather and submit additional diagnostics to assist the IBM Support Center in their analysis.

Figure 5 on page 6 identifies the component IDs (COMPID) for SQL Tuning Services.

<i>Figure 5. Component IDs</i>			
FMID	COMPID	Component Name	RETAIN Release
H2AT210	5655R1406	SQL Tuning Services	210

4.0 Program and Service Level Information

This section identifies the program and relevant service levels of SQL Tuning Services. The program level refers to the APAR fixes that have been incorporated into the program. The service level refers to the PTFs that have been incorporated into the program.

4.1 Program Level Information

No APARs have been incorporated into SQL Tuning Services.

4.2 Service Level Information

No PTFs against this release of SQL Tuning Services have been incorporated into the product package.

Frequently check the SQL Tuning Services PSP Bucket for HIPER and SPECIAL attention PTFs against all FMIDs that you must install. You can also receive the latest HOLDDATA, then add the **FIXCAT(IBM.PRODUCTINSTALL-REQUIRESERVICE)** operand on your **APPLY CHECK** command. This will allow you to review the recommended and critical service that should be installed with your FMIDs.

5.0 Installation Requirements and Considerations

The following sections identify the system requirements for installing and activating SQL Tuning Services. The following terminology is used:

- *Driving system*: the system on which SMP/E is executed to install the program.
The program might have specific operating system or product level requirements for using processes, such as binder or assembly utilities during the installation.
- *Target system*: the system on which the program is configured and run.
The program might have specific product level requirements, such as needing access to the library of another product for link-edits. These requirements, either mandatory or optional, might directly affect the element during the installation or in its basic or enhanced operation.

In many cases, you can use a system as both a driving system and a target system. However, you can make a separate IPL-able clone of the running system to use as a target system. The clone must include copies of all system libraries that SMP/E updates, copies of the SMP/E CSI data sets that describe the system libraries, and your PARMLIB and PROCLIB.

Use separate driving and target systems in the following situations:

- When you install a new level of a product that is already installed, the new level of the product will replace the old one. By installing the new level onto a separate target system, you can test the new level and keep the old one in production at the same time.
- When you install a product that shares libraries or load modules with other products, the installation can disrupt the other products. By installing the product onto a separate target system, you can assess these impacts without disrupting your production system.

5.1 Driving System Requirements

This section describes the environment of the driving system required to install SQL Tuning Services.

5.1.1 Machine Requirements

The driving system can run in any hardware environment that supports the required software.

5.1.2 Programming Requirements

Figure 6. Driving System Software Requirements

Program Number	Product Name	Minimum VRM	Minimum Service Level will satisfy these APARs	Included in the shipped product?
5650-ZOS	z/OS	V02.04.00	N/A	No

Note: SMP/E is a requirement for Installation and is an element of z/OS.

Note: Installation might require migration to new z/OS releases to be service supported. See <https://www.ibm.com/support/lifecycle/>

5.2 Target System Requirements

This section describes the environment of the target system required to install and use SQL Tuning Services.

SQL Tuning Services installs in the DBS (P115) SREL.

5.2.1 Machine Requirements

The target system can run in any hardware environment that supports the required software.

5.2.2 Programming Requirements

5.2.2.1 Installation Requisites

Installation requisites identify products that are required and *must* be present on the system or products that are not required but *should* be present on the system for the successful installation of this product.

Mandatory installation requisites identify products that are required on the system for the successful installation of this product. These products are specified as PREs or REQs.

Figure 7 (Page 1 of 2). Target System Mandatory Installation Requisites

Program Number	Product Name	Minimum VRM	Minimum Service Level will satisfy these APARs	Included in the shipped product?
Any one of the following:				
5650-DB2	Db2 for z/OS	12.1.0	N/A	No

Figure 7 (Page 2 of 2). Target System Mandatory Installation Requisites

Program Number	Product Name	Minimum VRM	Minimum Service Level will satisfy these APARs	Included in the shipped product?
5770-AF3	Db2 for z/OS Value Unit Edition	12.1.0	N/A	No
5698-DB2	Db2 for z/OS	13.1.0	N/A	No
5698-DBV	Db2 for z/OS Value Unit Edition	13.1.0	N/A	No

Note: Installation might require migration to new releases to obtain support. See <https://www.ibm.com/support/lifecycle/>

Conditional installation requisites identify products that are *not* required for successful installation of this product but can resolve such things as certain warning messages at installation time. These products are specified as IF REQs.

SQL Tuning Services has no conditional installation requisites.

5.2.2.2 Operational Requisites

Operational requisites are products that are required and *must* be present on the system or products that are not required but *should* be present on the system for this product to operate all or part of its functions.

Mandatory operational requisites identify products that are required for this product to operate its basic functions.

Figure 8. Target System Mandatory Operational Requisites

Program Number	Product Name and Minimum VRM/Service Level
5650-ZOS	IBM z/OS V02.03 or higher, plus APAR OA56570
5650-ZOS	IBM Liberty Embedded 21.0.0.9 or higher, (included with z/OS)
5650-ZOS	IBM z/OS Integrated Cryptographic Service Facility (ICSF)
5655-DGH	IBM 64-bit SDK for z/OS, Java Technology Edition, V8, SR6 or higher - Ensure that JAVA_HOME is set as your installation directory

Note: Installation might require migration to new releases to obtain support. See <https://www.ibm.com/support/lifecycle/>

Conditional operational requisites identify products that are *not* required for this product to operate its basic functions but are required at run time for this product to operate specific functions. These products are specified as IF REQs.

SQL Tuning Services has no conditional operational requisites.

5.2.2.3 Toleration/Coexistence Requisites

Toleration/coexistence requisites identify products that must be present on sharing systems. These systems can be other systems in a multisystem environment (not necessarily sysplex), a shared DASD environment (such as test and production), or systems that reuse the same DASD environment at different time intervals.

SQL Tuning Services has no toleration/coexistence requisites.

5.2.2.4 Incompatibility (Negative) Requisites

Negative requisites identify products that must *not* be installed on the same system as this product.

SQL Tuning Services has no negative requisites.

5.2.3 DASD Storage Requirements

SQL Tuning Services libraries can reside on all supported DASD types.

Figure 9 lists the total space that is required for each type of library.

<i>Figure 9. Total DASD Space Required by SQL Tuning Services</i>		
Library Type	Total Space Required in 3390 Trks	Description
Target	28 tracks	
Distribution	1568 tracks	
File System(s)	2300 tracks	usr/lpp/IBM/db2tms/v2r1/IBM

Notes:

1. For non-RECFM U data sets, IBM recommends using system-determined block sizes for efficient DASD utilization. For RECFM U data sets, IBM recommends using a block size of 32760, which is most efficient from the performance and DASD utilization perspective.
2. Abbreviations used for data set types are shown as follows.

- U** Unique data set, allocated by this product and used by only this product. This table provides all the required information to determine the correct storage for this data set. You do not need to refer to other tables or program directories for the data set size.
- S** Shared data set, allocated by this product and used by this product and other products. To determine the correct storage needed for this data set, add the storage size given in this table to those given in other tables (perhaps in other program directories). If the data set already exists, it must have enough free space to accommodate the storage size given in this table.
- E** Existing shared data set, used by this product and other products. This data set is *not* allocated by this product. To determine the correct storage for this data set, add the storage size given in this table to those given in other tables (perhaps in other program directories). If the data set already exists, it must have enough free space to accommodate the storage size given in this table.

If you currently have a previous release of this product installed in these libraries, the installation of this release will delete the old release and reclaim the space that was used by the old release and any service that had been installed. You can determine whether these libraries have enough space by deleting the old release with a dummy function, compressing the libraries, and comparing the space requirements with the free space in the libraries.

For more information about the names and sizes of the required data sets, see 6.1.5, "Allocate SMP/E Target and Distribution Libraries" on page 17.

3. Abbreviations used for the file system path type are as follows.

- N** New path, created by this product.
- X** Path created by this product, but might already exist from a previous release.
- P** Previously existing path, created by another product.

4. All target and distribution libraries listed have the following attributes:

- The default name of the data set can be changed.
- The default block size of the data set can be changed.
- The data set can be merged with another data set that has equivalent characteristics.
- The data set can be either a PDS or a PDSE, with some exceptions. If the value in the "ORG" column specifies "PDS", the data set must be a PDS. If the value in "DIR Blks" column specifies "N/A", the data set must be a PDSE.

5. All target libraries listed have the following attributes:

- These data sets can be SMS-managed, but they are not required to be SMS-managed.
- These data sets are not required to reside on the IPL volume.
- The values in the "Member Type" column are not necessarily the actual SMP/E element types that are identified in the SMPMCS.

6. All target libraries that are listed and contain load modules have the following attributes:

- These data sets can not be in the LPA, with some exceptions. If the data set should be placed in the LPA, see the Special Considerations section below.
- These data sets can be in the LNKLIST. If so, see the Special Considerations section below.
- These data sets are not required to be APF-authorized, with some exceptions. If the data set must be APF-authorized, see the Special Considerations section below.

The following figures describe the target and distribution libraries and file system paths required to install SQL Tuning Services. The storage requirements of SQL Tuning Services must be added to the storage required by other programs that have data in the same library or path.

Note: Use the data in these tables to determine which libraries can be merged into common data sets. In addition, since some ALIAS names may not be unique, ensure that no naming conflicts will be introduced before merging libraries.

Figure 10. Storage Requirements for SQL Tuning Services Target Libraries

Library DDNAME	Member Type	Target Volume	T Y P E	O R G	R E C O R D M	L R E C O R D L	No. of 3390 Trks	No. of DIR Blks
SDSN5TBA	Sample	Any	U	PDS	FB	80	10	3
SDSN5TDB	DBRMs	Any	U	PDS	FB	80	15	5
SDSN5TSA	Sample	Any	U	PDS	FB	80	3	3

Figure 11. SQL Tuning Services File System Paths

DDNAME	T Y P E	Path Name
SDSN5TZF	N	usr/lpp/IBM/db2tms/v2r1/IBM

Figure 12. Storage Requirements for SQL Tuning Services Distribution Libraries

Library DDNAME	T Y P E	O R G	R E C O R D M	L R E C O R D L	No. of 3390 Trks	No. of DIR Blks
ADSN5TBA	U	PDS	FB	80	10	3
ADSN5TDB	U	PDS	FB	80	15	5
ADSN5TSA	U	PDS	FB	80	3	3
ADSN5TZF	U	PDSE	VB	32630	1540	N/A

5.3 FMIDs Deleted

Installing SQL Tuning Services will result in the deletion of other FMIDs.

5.4 Special Considerations

Upon completion of the H2AT210 SMP/E installation, please see the IBM Documentation link below and complete the steps that are required to configure a SQL Tuning Services environment.

<https://www.ibm.com/docs/en/db2-for-zos/13?topic=services-installation-roadmap>.

6.0 Installation Instructions

This chapter describes the installation method and the step-by-step procedures to install and to activate the functions of SQL Tuning Services.

Please note the following points:

- If you want to install SQL Tuning Services into its own SMP/E environment, consult the SMP/E manuals for instructions on creating and initializing the SMPCSI and the SMP/E control data sets.
- You can use the sample jobs that are provided to perform part or all of the installation tasks. The SMP/E jobs assume that all DDDEF entries that are required for SMP/E execution have been defined in appropriate zones.
- You can use the SMP/E dialogs instead of the sample jobs to accomplish the SMP/E installation steps.

6.1 Installing SQL Tuning Services

6.1.1 SMP/E Considerations for Installing SQL Tuning Services

Use the SMP/E RECEIVE, APPLY, and ACCEPT commands to install this release of SQL Tuning Services.

6.1.2 SMP/E Options Subentry Values

The recommended values for certain SMP/E CSI subentries are shown in Figure 13. Using values lower than the recommended values can result in failures in the installation. DSSPACE is a subentry in the GLOBAL options entry. PEMAX is a subentry of the GENERAL entry in the GLOBAL options entry. See the SMP/E manuals for instructions on updating the global zone.

Subentry	Value	Comment
DSSPACE	500,500,500	3390 DASD Tracks
PEMAX	SMP/E Default	IBM recommends using the SMP/E default for PEMAX.

6.1.3 Sample Jobs

The following sample installation jobs are provided as part of the product to help you install SQL Tuning Services:

Figure 14. Sample Installation Jobs

Job Name	Job Type	Description	SMPTLIB Data Set
DSN5TALA	CSI Allocation	Optional sample to allocate a new SMP/E CSI	IBM.H2AT210.F1
DSN5TALB	SMP/E dataset Allocation	Optional sample to allocate datasets needed by SMP/E itself	IBM.H2AT210.F1
DSN5TRCV	RECEIVE	Sample RECEIVE job	IBM.H2AT210.F1
DSN5TALC	ALLOCATE	Sample job to allocate target and distribution libraries	IBM.H2AT210.F1
DSN5TZFS	ALLOMZFS	Sample job to allocate, create mountpoint, & mount zFS data sets	IBM.H2AT210.F1
DSN5TMKD	MKDIR	Sample job to invoke the supplied DSN5TDIR EXEC to allocate file system paths	IBM.H2AT210.F1
DSN5TDEF	DDDEF	Sample job to define SMP/E DDDEFS	IBM.H2AT210.F1
DSN5TAPL	APPLY	Sample APPLY job	IBM.H2AT210.F1
DSN5TACP	ACCEPT	Sample ACCEPT job	IBM.H2AT210.F1

You can access the sample installation jobs by performing an SMP/E RECEIVE (refer to 6.1.4, “Perform SMP/E RECEIVE” on page 17) then copy the jobs from the SMPTLIB data sets to a work data set for editing and submission. See Figure 14 on page 15 to find the appropriate data set.

You can also copy the sample installation jobs from the product files by submitting the following job. Before you submit the job, add a job card and change the lowercase parameters to uppercase values to meet the requirements of your site.

```
//STEP1 EXEC PGM=IEBCOPY
//SYSPRINT DD SYSOUT=*
//IN DD DSN=IBM.H2AT210.F1,UNIT=SYSALLDA,DISP=SHR,
// VOL=SER=filevol
//OUT DD DSN=jcl-library-name,
// DISP=(NEW,CATLG,DELETE),
// VOL=SER=dasdvol,UNIT=SYSALLDA,
// SPACE=(TRK,(primary,secondary,dir))
//SYSUT3 DD UNIT=SYSALLDA,SPACE=(CYL,(1,1))
//SYSIN DD *
COPY INDD=IN,OUTDD=OUT
/*
```

See the following information to update the statements in the previous sample:

IN:

filevol is the volume serial of the DASD device where the downloaded files reside.

OUT:

jcl-library-name is the name of the output data set where the sample jobs are stored.

dasdvol is the volume serial of the DASD device where the output data set resides.

6.1.4 Perform SMP/E RECEIVE

If you have obtained SQL Tuning Services as part of a CBPDO, use the RCVPDO job in the CBPDO RIMLIB data set to receive the SQL Tuning Services FMIDs, service, and HOLDDATA that are included on the CBPDO package. For more information, see the documentation that is included in the CBPDO.

You can also choose to edit and submit sample job DSN5TRCV to perform the SMP/E RECEIVE for SQL Tuning Services. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will receive a return code of 0 if this job runs correctly.

6.1.5 Allocate SMP/E Target and Distribution Libraries

Edit and submit sample job DSN5TALC to allocate the SMP/E target and distribution libraries for SQL Tuning Services. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will receive a return code of 0 if this job runs correctly.

6.1.6 Allocate, create and mount ZFS Files (Optional)

This job allocates, creates a mountpoint, and mounts zFS data sets.

If you plan to install SQL Tuning Services into a new z/OS UNIX file system, you can edit and submit the optional DSN5TZFS job to perform the following tasks:

- Create the z/OS UNIX file system
- Create a mountpoint
- Mount the z/OS UNIX file system on the mountpoint

Consult the instructions in the sample job for more information.

The recommended z/OS UNIX file system type is zFS. The recommended mountpoint is *&mntpnt1..*

Before running the sample job to create the z/OS UNIX file system, you must ensure that OMVS is active on the driving system. zFS must be active on the driving system if you are installing SQL Tuning Services into a file system that is zFS.

If you create a new file system for this product, consider updating the BPXPRMxx PARMLIB member to mount the new file system at IPL time. This action can be helpful if an IPL occurs before the installation is completed.

```
MOUNT FILESYSTEM('#dsn')
MOUNTPOINT('&mntpnt1.')
MODE(RDWR) /* can be MODE(READ) */
TYPE(ZFS) PARM('AGGRGROW') /* zFS, with extents */
```

See the following information to update the statements in the previous sample:

#dsn is the name of the data set holding the z/OS UNIX file system.

&mntpnt1. is the name of the mountpoint where the z/OS UNIX file system will be mounted.

Expected Return Codes and Messages: You will receive a return code of 0 if this job runs correctly.

6.1.7 Allocate File System Paths

The target system HFS or zFS data set must be mounted on the driving system when running the sample DSN5TMKD job since the job will create paths in the HFS or zFS.

Before running the sample job to create the paths in the file system, you must ensure that OMVS is active on the driving system and that the target system's HFS or zFS file system is mounted to the driving system. zFS must be active on the driving system if you are installing SQL Tuning Services into a file system that is zFS.

If you plan to install SQL Tuning Services into a new HFS or zFS file system, you must create the mountpoint and mount the new file system to the driving system for SQL Tuning Services.

The recommended mountpoint is */usr/lpp/IBM/db2tms/v2r1/IBM*.

Edit and submit sample job DSN5TMKD to allocate the HFS or zFS paths for SQL Tuning Services. Consult the instructions in the sample job for more information.

If you create a new file system for this product, consider updating the BPXPRMxx PARMLIB member to mount the new file system at IPL time. This action can be helpful if an IPL occurs before the installation is completed.

Expected Return Codes and Messages: You will receive a return code of 0 if this job runs correctly.

6.1.8 Create DDDEF Entries

Edit and submit sample job DSN5TDEF to create DDDEF entries for the SMP/E target and distribution libraries for SQL Tuning Services. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will receive a return code of 0 if this job runs correctly.

6.1.9 Perform SMP/E APPLY

1. Ensure that you have the latest HOLDDATA; then edit and submit sample job DSN5TAPL to perform an SMP/E APPLY CHECK for SQL Tuning Services. Consult the instructions in the sample job for more information.

Perform an SMP/E APPLY CHECK for SQL Tuning Services.

The latest HOLDDATA is available through several different portals, including <http://service.software.ibm.com/holdata/390holddata.html>. The latest HOLDDATA may identify HIPER

and FIXCAT APARs for the FMIDs you will be installing. An APPLY CHECK will help you determine if any HIPER or FIXCAT APARs are applicable to the FMIDs you are installing. If there are any applicable HIPER or FIXCAT APARs, the APPLY CHECK will also identify fixing PTFs that will resolve the APARs, if a fixing PTF is available.

You should install the FMIDs regardless of the status of unresolved HIPER or FIXCAT APARs. However, do not deploy the software until the unresolved HIPER and FIXCAT APARs have been analyzed to determine their applicability. That is, before deploying the software either ensure fixing PTFs are applied to resolve all HIPER or FIXCAT APARs, or ensure the problems reported by all HIPER or FIXCAT APARs are not applicable to your environment.

To receive the full benefit of the SMP/E Causer SYSMOD Summary Report, do *not* bypass the PRE, ID, REQ, and IFREQ on the APPLY CHECK. The SMP/E root cause analysis identifies the cause only of *errors* and not of *warnings* (SMP/E treats bypassed PRE, ID, REQ, and IFREQ conditions as warnings, instead of errors).

Here are sample APPLY commands:

- a. To ensure that all recommended and critical service is installed with the FMIDs, receive the latest HOLDDATA and use the APPLY CHECK command as follows

```
APPLY S(fmid,fmid,...) CHECK
FORFMID(fmid,fmid,...)
SOURCEID(RSU*)
FIXCAT(IBM.ProductInstall-RequiredService)
GROUPEXTEND .
```

Some HIPER APARs might not have fixing PTFs available yet. You should analyze the symptom flags for the unresolved HIPER APARs to determine if the reported problem is applicable to your environment and if you should bypass the specific ERROR HOLDS in order to continue the installation of the FMIDs.

This method requires more initial research, but can provide resolution for all HIPERs that have fixing PTFs available and are not in a PE chain. Unresolved PEs or HIPERs might still exist and require the use of BYPASS.

- b. To install the FMIDs without regard for unresolved HIPER APARs, you can add the BYPASS(HOLDCLASS(HIPER)) operand to the APPLY CHECK command. This will allow you to install FMIDs even though one or more unresolved HIPER APARs exist. After the FMIDs are installed, use the SMP/E REPORT ERRSYSMODS command to identify unresolved HIPER APARs and any fixing PTFs.

```
APPLY S(fmid,fmid,...) CHECK
FORFMID(fmid,fmid,...)
SOURCEID(RSU*)
FIXCAT(IBM.ProductInstall-RequiredService)
GROUPEXTEND
BYPASS(HOLDCLASS(HIPER)) .
..any other parameters documented in the program directory
```

This method is quicker, but requires subsequent review of the Exception SYSMOD report produced by the REPORT ERRSYSMODS command to investigate any unresolved HIPERs. If

you have received the latest HOLDDATA, you can also choose to use the REPORT MISSINGFIX command and specify Fix Category IBM.PRODUCTINSTALL-REQUIREDSERVICE to investigate missing recommended service.

If you bypass HOLDDs during the installation of the FMIDs because fixing PTFs are not yet available, you can be notified when the fixing PTFs are available by using the APAR Status Tracking (AST) function of ServiceLink or the APAR Tracking function of ResourceLink.

2. After you take actions that are indicated by the APPLY CHECK, remove the CHECK operand and run the job again to perform the APPLY.

Note: The GROUPEXTEND operand indicates that SMP/E applies all requisite SYSMODs. The requisite SYSMODS might be applicable to other functions.

Expected Return Codes and Messages from APPLY CHECK: You will receive a return code of 0 if this job runs correctly.

Expected Return Codes and Messages from APPLY: You will receive a return code of 0 if this job runs correctly.

6.1.10 Perform SMP/E ACCEPT

Edit and submit sample job DSN5TACP to perform an SMP/E ACCEPT CHECK for SQL Tuning Services. Consult the instructions in the sample job for more information.

Perform an SMP/E ACCEPT CHECK for SQL Tuning Services.

To receive the full benefit of the SMP/E Causer SYSMOD Summary Report, do *not* bypass the PRE, ID, REQ, and IFREQ on the ACCEPT CHECK. The SMP/E root cause analysis identifies the cause of *errors* but not *warnings* (SMP/E treats bypassed PRE, ID, REQ, and IFREQ conditions as warnings rather than errors).

Before you use SMP/E to load new distribution libraries, it is recommended that you set the ACCJCLIN indicator in the distribution zone. In this way, you can save the entries that are produced from JCLIN in the distribution zone whenever a SYSMOD that contains inline JCLIN is accepted. For more information about the ACCJCLIN indicator, see the description of inline JCLIN in the SMP/E Commands book for details.

After you take actions that are indicated by the ACCEPT CHECK, remove the CHECK operand and run the job again to perform the ACCEPT.

Note: The GROUPEXTEND operand indicates that SMP/E accepts all requisite SYSMODs. The requisite SYSMODS might be applicable to other functions.

Expected Return Codes and Messages from ACCEPT CHECK: You will receive a return code of 0 if this job runs correctly.

If PTFs that contain replacement modules are accepted, SMP/E ACCEPT processing will link-edit or bind the modules into the distribution libraries. During this processing, the Linkage Editor or Binder might issue messages that indicate unresolved external references, which will result in a return code of 4 during the

ACCEPT phase. You can ignore these messages, because the distribution libraries are not executable and the unresolved external references do not affect the executable system libraries.

Expected Return Codes and Messages from ACCEPT: You will receive a return code of 0 if this job runs correctly.

6.1.11 Run REPORT CROSSZONE

The SMP/E REPORT CROSSZONE command identifies requisites for products that are installed in separate zones. This command also creates APPLY and ACCEPT commands in the SMPPUNCH data set. You can use the APPLY and ACCEPT commands to install those cross-zone requisites that the SMP/E REPORT CROSSZONE command identifies.

After you install SQL Tuning Services, it is recommended that you run REPORT CROSSZONE against the new or updated target and distribution zones. REPORT CROSSZONE requires a global zone with ZONEINDEX entries that describe all the target and distribution libraries to be reported on.

For more information about REPORT CROSSZONE, see the SMP/E manuals.

6.2 Activating SQL Tuning Services

6.3 Product Customization

Upon completion of the H2AT210 SMP/E installation, please see the IBM Documentation link below and complete the steps that are required to configure a SQL Tuning Services environment.

<https://www.ibm.com/docs/en/db2-for-zos/13?topic=services-installation-roadmap>.

7.0 Notices

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APAR numbers are provided in this document to assist in locating PTFs that may be required. Ongoing problem reporting may result in additional APARs being created. Therefore, the APAR lists in this document may not be complete. To obtain current service recommendations and to identify current product service requirements, always contact the IBM Customer Support Center or use S/390 SoftwareXcel to obtain the current "PSP Bucket".

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