IBM

Program Directory for

IBM Db2 12 for z/OS

V12.01.00

Program Number 5650-DB2

for Use with
z/OS
Service Updated 19 October 2020

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Contents

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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 installation of Db2 12 for z/OS. This publication refers to Db2 12 for z/OS as Db2 12.

The Program Directory contains the following sections:

- 2.0, "Program Materials" on page 8 identifies the basic program materials and documentation for Db2 12.

- 3.0, "Program Support" on page 13 describes the IBM support available for Db2 12.

- 4.0, "Program and Service Level Information" on page 16 lists the APARs (program level) and PTFs (service level) that have been incorporated into Db2 12.

- 5.0, "Installation Requirements and Considerations" on page 17 identifies the resources and considerations that are required for installing and using Db2 12.

- 6.0, "Installation Instructions" on page 35 provides detailed installation instructions for Db2 12. It also describes the procedures for activating the functions of Db2 12, or refers to appropriate publications.

Before installing Db2 12, 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; then keep them for future reference. Section 3.2, "Preventive Service Planning" on page 13 tells you how to find any updates to the information and procedures in this program directory.

Db2 12 is supplied in a Custom-Built Product Delivery Offering (CBPDO, 5751-CS3). The program directory that is provided in softcopy format on the CBPDO tape is identical to the hardcopy format if one was included with your order. All service and HOLDDATA for Db2 12 are included on the CBPDO tape.

Do not use this program directory if you install Db2 12 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 Db2 12 Description

IBM Db2 12 for z/OS continues to extend the value delivered to your business by IBM's industry-leading data server, while empowering your future, in the following ways:

- Delivers business insights faster while helping to reduce costs
- Enables easy access, scale, and application development for the mobile enterprise
- Improves in-memory database performance, helping to reduce costs
- Continues to be the industry gold standard for availability, reliability, and security for business-critical information

Db2 12 takes DB2 to a new level, both extending the core capabilities and empowering the future. Db2 12 extends the core with new enhancements to scalability, reliability, efficiency, security, and availability. Db2 12 also empowers the next wave of analytics and mobile applications.

Db2 12 delivers selected features that bring valuable benefits to your business.

- Extending IBM analytics leadership

    - Improvements in support of analytics workloads, including optimized performance and improved zIIP offload in support of in-transaction analytics. All parallel child task processing is now zIIP eligible.
    - Deliver insights faster with up to 50% elapsed query time improvement.
    - Expanded Db2 Analytics Accelerator performance and query support.

- Mobile and Internet of Things (IoT) support for your enterprise

    - Support for SQL as a service (SQLaaS) through RESTful connectivity to your Db2 for z/OS data
    - Support for modernized, multiplatform, automated application deployments through DevOps using IBM Urban Code Deploy and z/OSMF, which provide agility and speed to market
    - Enhanced support for cloud and mobile workloads with dramatic scalability improvements for tables, increasing the maximum table size from 16 TB to 4 PB, enabling support for up to 256 trillion rows in a single Db2 table
    - Enhanced support for the next generation of mobile applications through the optimization of syntax common to mobile workloads such as OFFSET, SQL PL in triggers and many other improvements
    - Enhanced load capability that enables cloud and mobile workloads to upload data directly into a table on Db2 z/OS using a new high-performance, low-latency zLOAD API

- IBM Cloud Provisioning and Management

    Db2 12 exploits the IBM Cloud Provisioning and Management functionality provided in IBM z/OS V2.2.These z/OS cloud capabilities provide added benefits to simplify and improve configuration and deployment of a number of components of the z/OS software landscape, thereby enabling you to improve the agility, efficiency, and economics of your IT infrastructure. With these added cloud capabilities, Db2 12 supports the following capabilities:

    - Rapidly provision environments for workload deployment and release the resources to a shared pool when complete

- Enable direct access of z/OS computing resources by end users through your existing self-service portal or by using IBM's sample portal
- Create service catalogs with customizable services that exploit the multitenancy and rapid elasticity of z/OS
- Invoke these new functions through a web browser-based user interface or through programmable REST interfaces
- Provision DB2 12 subsystems and other z/OS software subsystems such as IBM CICS Transaction Server for z/OS, IBM IMS for z/OS, IBM MQ for z/OS, and IBM WebSphere Application Server for z/OS
- Provision known Db2 database schemas by leveraging the IBM Db2 Change Management Solution Pack for z/OS, V1.1 (5655-CH1)

For additional details, see the Software Announcement for z/OS Version 2.2

- Extending the unique value of z Systems

  - Expanded in-memory processing for greater performance improvement and emerging use case support, such as synergy with the latest IBM z Systems processors, which offer significantly expanded memory capacity.
  - Up to 25% CPU improvement for query workloads and up to 10% online transaction processing (OLTP) CPU savings with larger memory and activation of memory exploitation features. CPU reductions and performance improvements for certain OLTP as well as select query workloads.
  - High-volume insert performance equalling two times throughput increase for concurrent sequential insert without clustering.

- Simplified management and application deployment

  - More flexible data partitioning enables partitions to grow past previous size limits and new partitions to be dynamically inserted.
  - Extends unprecedented query performance reliability and stability to dynamic SQL with dynamic plan stability.
  - Online schema enhancements that improve manageability and availability in addition to support for improved partition management, reducing the need for planned outages.
  - Greater than 4GB active log data set, which simplifies log management and improves recovery time.
  - Exploitation of recent z Systems enhancements to compress LOB data, which can dramatically reduce the amount of storage and memory for storing and manipulating large objects.
  - Extended leadership with security enhancements, including support for TRANSFER OWNER and more granular ADMIN authority.
  - Enhanced system administrator capabilities to migrate and install Db2 systems while preventing access to user data.
  - Optimized management through improved utility performance, usability, and availability of your mission-critical assets through enhanced REORG partition processing, new FlashCopy and system-level backup capability, and further zIIP processor exploitation.
  - Single-phase catalog migration, which reduces the change windows involved in migrating completely to the new release.

- Benefiting from enhancements in a faster, more consumable way

- – Db2 12 continually delivers new Db2 capabilities and enhancements in a single service stream as the code becomes ready. The result is that clients can benefit from new capabilities and enhancements without waiting for a new release. Clients can activate the new capabilities when a function level is delivered
- – Function levels enable you to control the timing of the activation and adoption of new features, with the option to continue to apply corrective and preventative service without adopting new features and functions

- • SAP solutions

  - – Many enhancements are available for clients using SAP applications on Db2 for z/OS; for instance, query engine improvements and a new UDF cache for SAP Core Data Services (CDS). Also, the Zero Downtime Option (ZDO) of the SAP's Software Update Manager benefits from online DDL improvements. Scalability is enhanced with tables that can grow up to 4 PB in size. For the SAP fast loader, Db2 12 introduces the new ultra-fast remote load capability from Db2 Connect-based clients
  - – SAP has announced their successful validation and support of Db2 12 to run SAP applications immediately when Db2 12 is generally available. Details can be found in SAP Note 2302997

The demands of the mobile economy and the greater need for faster business insights, combined with the explosive growth of data, present unique opportunities and challenges for companies wanting to take advantage of their mission-critical resources. Built on the proven, trusted availability, security, and scalability of Db2 11 for z/OS and the z Systems platform, the gold standard in the industry, Db2 12 gives you the capabilities needed to securely meet the business demands of mobile workloads and increased mission-critical data. It delivers world-class analytics and OLTP performance in real-time.

Db2 for z/OS delivers innovations in these key areas:

- • Scalable, low-cost, enterprise OLTP and analytics

  Db2 12 continues to improve upon the value offered with Db2 11 with further CPU savings and performance improvements utilizing more memory optimization. Compared to Db2 11, Db2 12 clients can achieve up to 10% CPU savings for various traditional OLTP, heavy concurrent INSERT query workloads may see higher benefits, with up to 30% CPU savings and even more benefit for select query workload utilizing UNION ALL, large sort, and selective user-defined functions (UDFs).

  Db2 12 provides deep integration with the IBM z13, offering the following benefits:

  - – More efficient use of compression
  - – Support for compression of LOB data (also available with the IBM zEnterprise EC12)
  - – Support for large memory

  Enhancements to compression aids Db2 utility processing by reducing elapsed time and CPU consumption with the potential to improve data and application availability. Hardware exploitation to support compression of LOB data can significantly reduce storage requirements and improve overall efficiency of LOB processing.

  Db2 12 includes the new SQL TRANSFER OWNERSHIP statement, enabling better security and control of objects that contain sensitive data. In addition, Db2 12 enables system administrators to migrate and install Db2 systems while preventing access to user data. The real-world proven,

system-wide resiliency, availability, scalability, and security capabilities of Db2 and z Systems continue to be the industry standard, keeping your business running when other solutions may not. This is especially important as enterprises support dynamic mobile workloads and the explosion of data in their enterprises. Db2 12 continues to excel and extend the unique value of z Systems, while empowering the next wave of applications.

- Easy access, easy scale, and easy application development for the mobile enterprise:

  - In-memory performance improvements

    As enterprises manage the emergence of the next generation of mobile applications and the proliferation of the IoT, database management system (DBMS) performance can become a critical success factor. To that end, Db2 12 contains many features that exploit in-memory techniques to deliver world-class performance, including:

    - In-memory fast index traverse
    - Contiguous and larger buffer pools
    - Use of in-memory pipes for improved insert performance
    - Increased sort and hash in-memory to improve sort and join performance
    - Caching the result of UDFs
    - In-memory optimization in Declare Global Temporary Table (DGTT) to improve declare performance
    - In memory optimization in Resource Limit Facility to improve RLF checking

    Db2 12 offers features to facilitate the successful deployment of new analytics and mobile workloads. Workloads connecting through the cloud or from a mobile device may not have the same performance considerations that enterprise workloads had. To that end, Db2 12 has many features to help ensure that new application deployments are successful. Improvements for sort-intensive workloads, workloads that use outer joins and UNION ALL as well as CASE expressions can experience improved performance and increased CPU parallelism offload to zIIP.

- Easy access to your enterprise systems of record

  Db2 12 is used to connect RESTful web, mobile, and cloud applications to Db2 for z/OS, providing an environment for service, management, discovery, and invocation. This feature works with IBM z/OS Connect Enterprise Edition (z/OS Connect EE, 5655-CEE) and other RESTful providers to provide a RESTful solution for REST API definition and deployment.

  The IBM Data Studio capability, which can be used as the front-end tooling to create, deploy, or remove Db2 for z/OS services, is supported. Alternatively, new RESTful management services and BIND support are provided to manage services created in Db2 for z/OS. This capability was first available in the DB2 Adapter for z/OS Connect feature of the Db2 Accessories Suite for z/OS, V3.3 product (5697-Q04) product, working with both DB2 10 for z/OS and Db2 V11 for z/OS.

For a current list of Db2 12 capabilities in function levels, search IBM Knowledge Center for "What's new in Db2 12 function levels".

For a current list of service-stream Db2 APARs, search IBM Knowledge Center for "Highlighted new capabilities in the Db2 12 base release".

For a current summary of all external changes in Db2 12, search IBM Knowledge Center for "What's changed in Db2 12.". You can also find this information in the latest edition of "Db2 12 for z/OS What's new?".

For a more in-depth overview of continuous delivery in Db2 12, see the IBM Redpaper publication "Exploring IBM Db2 for Continuous Delivery".

1.2 Db2 12 FMIDs

Db2 12 consists of the following FMIDs:

- **Required FMIDs:**

    - HDBCC10 (Db2 Base)
    - HIYCC10 (IMS Attach - must be installed even if you do not have IMS)
    - HIZCC10 (Db2 Subsystem Initialization)
    - HIR2230 (IRLM V02.03.00)
    - HDREC10 (Db2 RACF Authorization Exit)
    - JDBCC14 (Db2 English Panels)

- **Optional FMIDs:**

    - JDBCC12 (Db2 JDBC/SQLJ)
    - JDBCC17 (Db2 ODBC)
    - JDBCC11 (Db2 Kanji Panels delivered in the Db2 Japanese feature)

2.0 Program Materials

An IBM program is identified by a program number. The program number for Db2 12 is 5650-DB2.

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 Db2 12. 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 35 for more information about how to install the program.

You can find information about the physical media for the basic machine-readable materials for Db2 12 in the *CBPDO Memo To Users Extension*.

Figure 1 describes the program file content for Db2 12. You can refer to the *CBPDO Memo To Users Extension* to see where the files reside on the tape.

Notes:

1. The data set attributes in this table must be used in the JCL of jobs that read the data sets. However, because the data sets are in IEBCOPY unloaded format, their actual attributes might be different.

2. If any RELFILEs are identified as PDSEs, ensure that SMPTLIB data sets are allocated as PDSEs.

Figure 1 (Page 1 of 2). Program File Content: Db2 12 for z/OS				
Name	**ORG**	**RECFM**	**LRECL**	**BLK SIZE**
SMPMCS	SEQ	FB	80	6400
IBM.HDBCC10.F1	PDS	FB	80	8800
IBM.HDBCC10.F2	PDSE	U	0	6144
IBM.HDBCC10.F3	PDS	FB	80	8800
IBM.HDBCC10.F4	PDSE	U	0	6144
IBM.HDBCC10.F5	PDS	FB	80	8800
IBM.HDBCC10.F6	PDS	VB	8188	27998

Figure 1 (Page 2 of 2). Program File Content: Db2 12 for z/OS				
Name	**O R G**	**R E C F M**	**L R E C L**	**BLK SIZE**
IBM.HDBCC10.F7	PDS	VB	255	6475
IBM.HIYCC10.F1	PDS	FB	80	8800
IBM.HIYCC10.F2	PDS	FB	80	8800
IBM.HIYCC10.F3	PDSE	U	0	6144
IBM.HIZCC10.F1	PDS	FB	80	8800
IBM.HIZCC10.F2	PDSE	U	0	6144
IBM.HDREC10.F1	PDS	FB	80	8800
IBM.JDBCC14.F1	PDS	FB	80	8800

Figure 2. Program File Content: IRLM V02.03.00				
Name	**O R G**	**R E C F M**	**L R E C L**	**BLK SIZE**
SMPMCS	SEQ	FB	80	6400
IBM.HIR2230.F1	PDS	FB	80	8800
IBM.HIR2230.F2	PDS	U	0	6144
IBM.HIR2230.F3	PDS	FB	80	8800

Figure 3 (Page 1 of 2). Program File Content: Db2 JDBC/SQLJ				
Name	**O R G**	**R E C F M**	**L R E C L**	**BLK SIZE**
SMPMCS	SEQ	FB	80	6400
IBM.JDBCC12.F1	PDS	FB	80	8800
IBM.JDBCC12.F2	PDSE	U	0	6144
IBM.JDBCC12.F3	PDS	FB	80	8800
IBM.JDBCC12.F4	PDS	VB	255	27998
IBM.JDBCC17.F1	PDS	FB	80	8800

Figure 3 (Page 2 of 2). Program File Content: Db2 JDBC/SQLJ				
Name	**O R G**	**R E C F M**	**L R E C L**	**BLK SIZE**
IBM.JDBCC17.F2	PDSE	U	0	6144
IBM.JDBCC17.F3	PDS	FB	80	8800

Figure 4. Program File Content: Db2 Kanji Panels				
Name	**O R G**	**R E C F M**	**L R E C L**	**BLK SIZE**
SMPMCS	SEQ	FB	80	6400
IBM.JDBCC11.F1	PDS	FB	80	8800

2.2 Optional Machine-Readable Material

No optional machine-readable materials are provided for Db2 12.

The distribution medium for this program is physical media or downloadable files.

2.3 Program Publications

The following sections identify the basic information for Db2 12.

Figure 5 identifies the basic license information for Db2 12 which is available from the IBM Publications Center website at: http://www.ibm.com/shop/publications/order/

Figure 5. Basic Material: License Information	
Information Title	
Db2 12 License Program Specification	GC27-8853

Figure 6 identifies the basic unlicensed information for Db2 12 which is available on IBM Knowledge Center.

Figure 6. Basic Material: Unlicensed Information
Information Title
Db2 12 for z/OS Administration Guide
Db2 12 for z/OS Application Programming and SQL Guide
Db2 12 for z/OS Application Programming Guide & Reference for JAVA
Db2 12 for z/OS Codes
Db2 12 for z/OS Command Reference
Db2 12 for z/OS Data Sharing: Planning and Administration
Db2 12 for z/OS Installation and Migration
Db2 12 for z/OS Internationalization Guide
Db2 12 for z/OS Introduction to Db2 for z/OS
Db2 12 for z/OS IRLM Messages and Codes for IMS and Db2 for z/OS
Db2 12 for z/OS Managing Performance
Db2 12 for z/OS Managing Security
Db2 12 for z/OS Messages
Db2 12 for z/OS ODBC Guide and Reference
Db2 12 for z/OS RACF Access Control Module Guide
Db2 12 for z/OS SQL Reference
Db2 12 for z/OS Utility Guide and Reference
Db2 12 for z/OS What's New?
Db2 12 for z/OS pureXML Guide

Note: The Db2 for z/OS Diagnosis Guide and Reference, which has been available in previous versions of Db2 as a licensed publication, is not available for Db2 12. Much of the content of that publication is now available in IBM Knowledge Center, under "Troubleshooting problems in Db2." The remainder of the content is available to users who have Db2 12 licenses, in entitled techdocs on the web.

2.4 Program Source Materials

No program source materials or viewable program listings are provided for Db2 12.

2.5 Publications Useful During Installation

You might want to use the publications listed in Figure 7 during the installation of Db2 12.

Figure 7. Publications Useful During Installation		
Publication Title	**Form Number**	**Media Format**
IBM SMP/E for z/OS User's Guide	SA23-2277	http://www.ibm.com/shop/publications/order/
IBM SMP/E for z/OS Commands	SA23-2275	http://www.ibm.com/shop/publications/order/
IBM SMP/E for z/OS Reference	SA23-2276	http://www.ibm.com/shop/publications/order/
IBM SMP/E for z/OS Messages, Codes, and Diagnosis	GA32-0883	http://www.ibm.com/shop/publications/order/

3.0 Program Support

This section describes the IBM support available for Db2 12.

3.1 Program Services

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

3.2 Preventive Service Planning

Before you install Db2 12, and IRLM 2.3, 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-RequiredService fix category in SMP/E to ensure you have all the recommended service installed. Use the **FIXCAT(IBM.ProductInstall-RequiredService)** operand on the **APPLY CHECK command**. See 6.1.10, "Perform SMP/E APPLY" on page 40 for a sample APPLY command

If you obtained Db2 12 as part of a CBPDO, HOLDDATA is included.

If the CBPDO for Db2 12 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-01.ibm.com/software/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 Db2 12 are included in Figure 8 on page 14.

Figure 8. PSP Upgrade and Subset ID		
UPGRADE	**SUBSET**	**Description**
DB2C10	HDBCC10/2043	Db2 BASE/TSO
	HIYCC10/2043	IMS ATTACH
	HIZCC10/2043	Db2 SUBSYSTEM INITIALIZATION
	HIR2230/2233	IRLM V02.03.00
	HDREC10/2043	RACF AUTHORIZATION EXIT
	JDBCC12	Db2 JDBC/SQLJ
	JDBCC14/2043	Db2 ENGLISH PANELS
	JDBCC17/1635	Db2 ODBC
	JDBCC11	Db2 KANJI PANELS

3.3 Statement of Support Procedures

The PSP **SUBSET** name reflects the Function Module Identifier (FMID) that was updated and the corresponding CBPDO weekly service offering used to supply the integrated PTFs.

Example: FMID/YYWW where 'YY' is the year and 'WW' is the week number the CBPDO was created.

The CBPDO weekly Service tape is the Service Level Indicator for any products updated by the Software Delivery Center (SDC) processes. If you wish to determine the latest level of PDO (Product Delivery Offering) maintenance installed in this product, please refer to the 4.0, "Program and Service Level Information" on page 16 section of this program directory.

Additionally, these upgrades contain HIPER (High Impact PERvasive) APARs and should be reviewed on a monthly basis.

Note: When pulling PTFs from IBMLink, you need to include your Service Type/Level:

```
    Example:  Service Type          PDO
              Service Level         1328
```

Authorized Program Analysis Report (APAR) fixes will be distributed as PTFs containing either object module or macro replacements with control statements used by the System Modification Program/Extended (SMP/E).

The normal process for applying maintenance to Db2 12 includes the following steps:

- Check for prerequisites and corequisites as well as additional steps that may be needed as noted in the following sections.
- Use SMP/E to receive and apply the fix.
- Perform any needed special procedures.
- Stop and start Db2 to make the fix active, as required.

- Test the fix.
- Accept the fix (after testing is complete).

Fixes to some parts of the subsystem or subsystem data may involve special procedures. For example, a BIND may be required for some changes. CLISTs and jobs that are customized during the installation process often require some additional work. When applicable, the install CLIST can be used for customizing. If the DSN6xxxx macros are changed, the DSNZP*xxx* subsystem parameters load module must be reassembled and link edited. For information on assembling and link editing DSNZPxxx, refer to the description of job DSNTIJUZ in the Db2 12 for z/OS Installation and Migration.

Notification of these required special procedures will be via the SMP/E EXCLUDE list, PTF prologues, and RETAIN information. The SMP/E control statement ++HOLD will be used when there is additional work necessary to incorporate the fix into the Db2 system.

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 9 identifies the component IDs (COMPID) for Db2 12.

Figure 9. Component IDs			
FMID	**COMPID**	**Component Name**	**RETAIN Release**
HDBCC10	5740XYR00	Db2 BASE/TSO	C10
HIYCC10	5740IY100	IMS ATTACH	C10
HIZCC10	5740XYR01	Db2 SUBSYSTEM INITIALIZATION	C10
HIR2230	569516401	IRLM V02.03.00	230
HDREC10	5740DRE00	RACF AUTHORIZATION EXIT	C10
JDBCC12	5740XYR02	Db2 JDBC/SQLJ	C12
JDBCC14	5740XYR00	Db2 ENGLISH PANELS	C14
JDBCC17	5740XYR02	Db2 ODBC	C17
JDBCC11	5740XYR00	Db2 KANJI PANELS	C11

Note: For detailed instructions on how to use FTP to transmit documentation to/from IBM (Db2), please see APAR II11945. Additional information is also available in publication *z/OS MVS Diagnosis Tools and Service Aids (GA22-7589)*.

For information about the operating system availability and withdrawal-of-service dates, please review the following web sites:

http://www-01.ibm.com/software/data/support/lifecycle/
http://www-01.ibm.com/software/support/systemsz/lifecycle/

4.0 Program and Service Level Information

This section identifies the program and relevant service levels of Db2 12. 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

4.2 Service Level Information

PTFs containing APAR fixes against Db2 12 have been incorporated into this product package. For a list of included PTFs, examine the ++VER statement in the product's SMPMCS.

Frequently check the Db2 12 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-REQUIREDSERVICE)** 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 Db2 12. 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. For example, if you install Db2 12 with IRLM V2R3 in the same SMP/E zone as any version of IMS currently running with IRLM V2R2, IRLM V2R2 WILL BE DELETED by the installation of IRLM V2R3. IBM recommends that levels of Db2 and IMS without a note of IRLM V2R3 support in their program directory, continue to run with IRLM V2R3.

5.1 Driving System Requirements

This section describes the environment of the driving system required to install Db2 12.

5.1.1 Machine Requirements

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

5.1.2 Programming Requirements

17

			Minimum	Included
			Service Level	in the
Program	Product	Minimum	will satisfy	shipped
Number	Name	VRM	these APARs	product?
5650-ZOS	z/OS	V02.01.00	N/A	No

Figure 10. Driving System Software Requirements

Note:

- SMP/E is a requirement for Installation and is an element of z/OS but can also be ordered as a separate product, 5655-G44, minimally V03.06.00.
- Installation might require migration to new z/OS releases to be service supported. See http://www-03.ibm.com/systems/z/os/zos/support/zos_eos_dates.html.

5.2 Target System Requirements

This section describes the environment of the target system required to install and use Db2 12.

Db2 12 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.

5.2.1.1 Processors

Db2 12 operates on z196 or z114, or higher processors running z/OS V02.01 or higher. The processors must have enough real storage to satisfythe combined requirements of:

- Db2 12 for z/OS
- z/OS
- The appropriate DFSMS (tm) storage management subsystem components, access methods, telecommunications, batch requirements, and other customer required applications

Db2 12 will probably require increased real storage as compared to Db2 11 for z/OS.

The configuration must include sufficient I/O devices to support the requirements for system output, system residence, and system data sets. Sufficient disk storage must be available to satisfy the user's information storage requirements and can consist of any direct-access facility supported by the system configuration and the programming system.

5.2.1.2 Auxiliary Storage

Db2 is independent of disk, solid-state devices (SSDs), and tape device type. You can use any magnetic, optical, or tape device that is supported by the data facilities component of DFSMS or the Db2 data sets. Tape products are not supported for databases but can be used for the Db2 archive log and utility functions.

The following Db2 data sets are supported by the following device types:

- Active recovery log data sets: disk
- Archive recovery log data sets: disk, tape
- Image copy data sets: disk, tape
- Bootstrap data sets: disk
- User data sets: disk, tape (if migrated by HSM)
- DB2 catalog data sets: disk
- Work data sets (for utilities): disk, tape

If these data sets are on disk that is shared with other z/OS systems, you should use global resource serialization to prevent concurrent access by more than one z/OS system.

The minimum disk space requirement, based on installing Db2 using the panel default values, is approximately 1.3 GB. You need additional disk space for your data.

If you use dual logging and tape for the log archiving device, you need at least two tape drives.

5.2.1.3 Data Communication Devices

Db2 operations can be controlled from:

- The system console
- Authorized IMS Transaction Manager terminals
- Authorized CICS terminals
- TSO terminals (by authorized users)

In addition to listing auxiliary storage and data communications devices, this section identifies function-dependent hardware requirements and virtual storage requirements.

5.2.1.4 Function-Dependent Hardware Requirements

Certain functions of Db2 12 for z/OS have associated hardware requirements, as specified in the following list. If you do not use these Db2 functions, the hardware requirements do not apply.

- Data sharing requires the Coupling Facility. Refer to the latest Coupling Facility (CF) level recommended for your processor at the Parallel Sysplex website.

- DRDA data stream encryption uses the following ICSF APIs: CSNECKM, CSNERNG, CSNFPKB, CSNFPKE, CSNEENC, and CSNEDEC. Refer to z/OS ICSF Application Programmer's Guide for additional information on the usage of these APIs, including hardware requirements. However, if

possible do not use DRDA encryption and instead secure connections by using the z/OS Communications Server IP Application Transparent Transport Layer Security (AT-TLS).

- DRDA AES user ID password encryption uses the following ICSF APIs: CSNEOWH, CSNERNG, CSNFPKB, CSNFPKE, CSNESYE, and CSNESYD. Refer to z/OS ICSF Application Programmer's Guide for additional information on the usage of these APIs, including hardware requirements.

- DSNLEUSR stored procedure uses the following ICSF APIs: CSNBCKM, CSNBENC, and CSNEDEC. Refer to z/OS ICSF Application Programmer's Guide for additional information on the usage of these APIs, including hardware requirements.

- Encryption and decryption functions: Built-in functions for encryption and decryption require cryptographic hardware in a cryptographic coprocessor or cryptographic accelerator, or cryptographic instructions.

- LOB Compression uses zEnterprise Data Compression hardware. The z/OS environment needs to have the zEDC card installed to trigger the data compression capability. The zEnterprise data compress zEDC requires the following:

  - z/OS V2.1 operating system
  - IBM zEnterprise EC12 (with GA2 level microcode) or IBM zEnterprise zBC12
  - zEDC Express feature, which is the z Systems compression accelerator that can improve the speed of data compression and is sharable across up to 15 partitions and up to 8 cards per CPU
  - zEDC Express software feature must be enabled in the IFAPRDxx parmlib member

- Single Instruction Multiple Data (SIMD) Exploitation with XML Parser requires both a z/OS processor and operating software APAR that supports SIMD instruction, as follows:

  - z13 processor, or above, supporting SIMD instruction
  - z/OS APARs:
    - For z/OS V2.1: z/OS V2.1 APAR OA44545 and APAR OA49910 (see APAR descriptions below)
    - For z/OS V2.2: z/OS V2.2 APAR OA49910
  - APAR OA44545 provides vector processing support for z13 processors that is included in z/OS V2.2
  - APAR OA49910 allows IEAFP START when an EUT FRR is in effect

- Asynchronous Duplexing of CF lock structure requires the following:

  - Db2 12 enabling APAR PI66689
  - IRLM 2.3 APAR PI68378
  - z/OS V2.2 with APAR OA47796 and APAR OA49148 (available October 28, 2016)
  - CFCC level of firmware is 02.16

5.2.1.5 Virtual Storage Requirements

Most of Db2 data resides in shared memory of the Db2 address spaces, above the bar. Db2 12 requires 1 TB of contiguous 64-bit shared private storage above the 2 GB bar for each Db2 subsystem. This storage is virtual, controlled by the z/OS HVSHARE parameter in IEASYSxx. This storage is not backed at allocation, only as it is used. Most control blocks and buffers reside in the extended private area above the 2 GB bar, while modules and some data resides above the 16 MB line, but below the 2 GB bar.

The amount of space needed for the common service area (CSA) below the 16 MB line is less than 40 KB for each Db2 for z/OS subsystem and 24 KB for each IRLM subsystem. High concurrent activity, parallelism, or high contention can require more E/CSA. The amount of 64-bit above the bar common storage needed for each Db2 subsystem is a minimum of 6 GB contiguous controlled by the z/OS HVCOMMON parameter in IEASYSxx.

Db2 12 requires that data sets for the catalog and directory reside on SMS-managed storage. These data sets must belong to an SMS data class that is defined with the extended addressability (EA) attribute. See *prefix*.SDSNSAMP(DSNTIJSS) for a sample SMS environment.

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.

Db2 12 has no mandatory installation requisites.

Note:

- If Db2 12 is installed with IRLM V2R3 into the same SMP/e zone as any version of IMS with IRLM V2R2, IRLM V2R2 will be deleted during the SMP/E installation of IRLM V2R3.
- Installation might require migration to new z/OS releases to be service supported. See the following website for more information: http://http://www-03.ibm.com/systems/z/os/zos/support/index.html

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.

Db2 12 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. These products are specified as PREs or REQs.

Db2 12 has no mandatory operational requisites.

Note:

- New functions are available only after new function is activated unless explicitly stated otherwise in the product documentation. A general exception exists for optimization and virtual storage.
- z/OS Unicode Services and appropriate conversion definitions are required. For additional details on Unicode conversions, please see the *Db2 12 for z/OS Installation and Migration* information, and also *Support for Unicode: Using Conversion Services, SA22-7649.*
- Some of the basic operation of a DBMS is provided by utility functions, such as backup, recovery, reorganization, loading and unloading data, gathering statistics and checking data, indexes, and large objects. Customers should ensure that these functions are provided either by ordering Db2 Utilities Suite for z/OS, V12 or by obtaining equivalent function elsewhere.

Note: Operation might require migration to higher releases of the above products that are service supported. See http://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.

Figure 12 (Page 1 of 2). Target System Conditional Operational Requisites		
Program Number	**Product Name and Minimum VRM/Service Level**	**Function**
5650-ZOS	z/OS V02.01.00 APAR OA40967	2G page for new framesize options in Db2 12 for buffer pool
5650-ZOS	z/OS V02.01.00 (Cryptographic Services Integrated Cryptographics Service Facility (ICSF)). To use Encryption you must have **SCSFMOD0 in LNKLST**	Built-in functions for Encryption and Decryption, and DRDA Data Stream Encryption
5650-ZOS	z/OS V02.01.00 (DFSMS, Security Server/RACF) or higher, plus DFSMS APARs OA47140 and OA41617	DFSMS control block accessing support for NON-VSAM_XTIOT = YES in DEVSUPxx.
5650-ZOS	z/OS V02.01.00 -DFSMShsm -DFSMSdss -FlashCopy V01 -FlashCopy V02 (required for object-level recovery from system-level backup and FlashCopy image copy)	System-level Point-in-Time (PIT) Backup and Recovery function

Figure 12 (Page 2 of 2). Target System Conditional Operational Requisites

Program Number	Product Name and Minimum VRM/Service Level	Function
5650-ZOS	z/OS V02.01.00 (z/OSMF component)	Enable system programmers to more easily manage and administer a mainframe system by simplifying day to day operations and administration of a z/OS system
5650-ZOS	z/OS V02.01.00 (LE in Base Services)	Application Execution: Applications written in high-level programming languages, such as applications or stored procedures written in the C language and using the ODBC or CLI interfaces to Db2
5655-R31 or 5655-R32	IBM SDK for z/OS, Java 2 Technology Edition V6 or higher	Application Execution: Applications or stored procedures written in Java, such as those using the JDBC or SQLJ interfaces to Db2
5655-W65	WebSphere Application Server for z/OS, V8.5.5.5, or higher	Db2 12 for z/OS
5655-R36	WebSphere MQ for z/OS, Version 7.1 or higher	MQListener compatibility with Db2 12 for z/OS
5635-A05	Information Management System (IMS) V14.01.00	Transaction Management
5635-A04	Information Management System (IMS) V13.01.00	Transaction Management
5655-Y04	Customer Information Control System (CICS) Transaction Server for z/OS V05.01.00, V05.02.00 and V5.03.00	Transaction Management
5722-DFJ	Customer Information Control System (CICS) Transaction Server VUE for z/OS V05.01.00, V05.02.00 and V5.03.00	Transaction Management
5655-S97	Customer Information Control System (CICS) Transaction Server for z/OS V04.01.00 and V04.02.00	Transaction Management

Note: Operation might require migration to higher releases of the above products that are service supported. See http://www.ibm.com/support/lifecycle/

5.2.2.3 Optional Program Requirements

This section describes which versions of these associated products are tolerated by Db2 12.

5.2.2.3.1 Connectivity: For database applications that run on Linux, UNIX, or Windows operating systems, customers can use Db2 Connect, and then perform one of the following actions:

- Install the IBM Data Server Driver package and deploy one of the client drivers to access Db2 for z/OS through a Db2 Connect Server.

- Install the IBM Data Server Driver package and deploy one of the client drivers to access Db2 for z/OS directly.

Both of these approaches, direct access or access through the gateway, provide runtime support to access Db2 by applications that use ODBC, CLI, .NET, OLE DB, PHP, Ruby, JDBC, pureQuery, JPA, SQLJ, Python, Perl, and more. These approaches can be used alone or in combination, as needed.

Db2 for z/OS by using one of the client drivers that is provided with the IBM Data Server Package without the use of a Db2 Connect server is recommended for the best performance and availability. To choose the right IBM Client Package for your needs, see the latest version of IBM Db2 V11 for Linux, UNIX and Windows documentation at the IBM Knowledge Center.

The minimum Db2 Connect level required to exploit continuous delivery in Db2 12 is the IBM Data Server Client Packages Version 11.1 Fixpack 2 or higher. It is recommended to use the latest fix pack available when choosing which level.

The IBM Data Server Client Packages Version 11.1 Fixpack 2 or higher provides additional features in support for Db2 12 for z/OS.

- A new client API to provide fast loading from mobile devices
- A new client API to determine the Db2 function level
- Support for continuous delivery
- Support for preserving prepared dynamic statements after a ROLLBACK
- Improved client serviceability aids

Db2 Connect V10.5 with the latest fix pack is the minimum requisite for connections to a Db2 12 for z/OS datasharing group.

Db2 12 for z/OS acting as a server supports DRDA as an open interface allowing access from any client.

Db2 12 for z/OS acting as a client supports the following relational database products:

- IBM Db2 Advanced Enterprise Server Edition for Linux, UNIX, and Windows (V10.5 or higher) (5725-L47)
- IBM Db2 Enterprise Server Edition for Linux, UNIX, and Windows (V9.7 or higher) (5765-F41)
- IBM Db2 Advanced Workgroup Server Edition for Linux, UNIX, and Windows (V10.5 or higher) (5725-L15)
- IBM Db2 Workgroup Server Edition for Linux, UNIX, and Windows (V9.7 or higher) (5765-F35)
- IBM Db2 Developer Edition (V9.7 or higher) (5724-N76)
- Any other DRDA-compliant relational DBMS server

Web connectivity is provided by any of the Db2 Connect clients using one of the IBM Data Server clients or drivers.

For support services, go to the IBM Software website.

5.2.2.3.2 JDBC: Db2 12 supports the following JDBC APIC specification levels:

- JDBC 3.0 API requires any of the following at run time:

    – IBM 31-bit SDK for z/OS, Java Technology Edition, V7 (SDK7) (5655-W43), or higher
    – IBM 64-bit SDK for z/OS, Java Technology Edition, V7 (SDK7) (5655-W44), or higher
    – IBM 31-bit SDK for z/OS, Java Technology Edition, V6 (SDK6) (5655-R31), or higher
    – IBM 64-bit SDK for z/OS, Java Technology Edition, V6 (SDK6) (5655-R32), or higher

- JDBC 4.0 API requires any of the following at runtime:

    – IBM 31-bit SDK for z/OS, Java Technology Edition, V7 (SDK7) (5655-W43), or higher
    – IBM 64-bit SDK for z/OS, Java Technology Edition, V7 (SDK7) (5655-W44), or higher
    – IBM 31-bit SDK for z/OS, Java Technology Edition, V6 (SDK6) (5655-R31), or higher
    – IBM 64-bit SDK for z/OS, Java Technology Edition, V6 (SDK6) (5655-R32), or higher

For more information on SDKs, go to the IT Infrastructure website and the IBM developer kits lifecycle dates website.

The following transaction management products work with Db2 12:

- Information Management System (IMS)
    – IMS V14 (5635-A05)
    – IMS V13 (5635-A04)
- Customer Information Control System (CICS)
    – CICS Transaction Server for z/OS, V5.1, V5.2, and V5.3 (5655-Y04), or higher
    – CICS Transaction Server VUE for z/OS, V5.1, V5.2, and V5.3 (5722-DFJ), or higher
    – CICS Transaction Server for z/OS, V4.1 and V4.2 (5655-S97), or higher

5.2.2.3.3 Development Tools: The following application development tools can be used to build applications for Db2:

- Db2 Configuration Manager for z/OS V4.1, (5697-DAQ)
- IBM Data Studio V04.01 or higher, available from the web at:

    `www.ibm.com/developerworks/downloads/im/data/learn.html`

Note: The recommended no-charge query optimization and service tool for Db2 12 is Data Studio. With Data Studio, Db2 for z/OS customers have a no-charge query serviceability tool for Db2 for z/OS.

5.2.2.3.4 Operational Support: The following programs provide operational support for Db2 12:

- DFSMS features, part of the Systems Management optional feature of z/OS, specifically:

    – DFSMShsm for archiving
    – DFSMSdss for concurrent copy in Utilities

5.2.2.3.5 Programming Languages: The following application development programming languages can be used to build applications for Db2 12:

- **Building applications by using the Db2 precompiler:**

- Assembler
  - High Level Assembler, part of the System Services element of z/OS
- C/C++
  - C/C++ (without Debug Tool), which is an optional priced feature of z/OS
- COBOL (one of the following):
  - Enterprise COBOL for z/OS, V3.4 (5655-G53)
  - Enterprise COBOL for z/OS, V4.1, (5655-S71), or higher
  - Enterprise COBOL for z/OS, V5.1, (5655-W32), or higher
  - Enterprise COBOL for z/OS, V6.1, (5655-EC6)
- Fortran
  - VS Fortran V2.6 (5668-806, 5688-087, 5668-805) Note: New data types and new SQL functions are not supported since DB2 9 for z/OS.
- PL/I
  - Enterprise PL/I for z/OS, V3.9 (5655-H31)
  - Enterprise PL/I for z/OS, V4.1 (5655-W67), or higher

- **Building applications using unsupported compilers:**

  For some COBOL and PL/I compilers that are no longer supported since Version 8, you can use a DSNHPC7 version of the precompiler that allows you to precompile applications that have dependencies on these unsupported compilers, but only use DB2 for z/OS Version 7 SQL.

  The use of DSNHPC7 is as is.

- **Building applications by using the Db2 coprocessor:**

  - C/C++
    - C/C++ (without Debug Tool), which is an optional priced feature of z/OS
  - COBOL (one of the following):
    - Enterprise COBOL for z/OS, V3.4, (5655-G53)
    - Enterprise COBOL for z/OS, V4.1, (5655-S71), or higher
    - Enterprise COBOL for z/OS, V5.1, (5655-W32), or higher
    - Enterprise COBOL for z/OS, V6.1, (5655-EC6)
  - PL/I (one of the following):
    - Enterprise PL/I for z/OS, V3.9 (5655-H31)
    - Enterprise PL/I for z/OS V4.1, (5655-W67), or higher

- **Building applications that are not supported with a precompiler or coprocessor:**

  - Java

    Applications or stored procedures written in Java, such as those using the JDBC or SQLJ interfaces to Db2, require IBM 31-bit SDK for z/OS, Java Technology Edition, V6 (SDK6) (5655-R31), or higher, at run time. Optionally, the following may be used for applications written in Java:

    - IBM 64-Bit SDK for z/OS, Java Technology Edition, V6 (SDK6) (5655-R32), or higher, at run time
    - Note: PIDs 5655-R31 and 5655-R32 are independent products and can coexist on the same z/OS system.

For more information on SDKs, go to the IT Infrastructure website and the IBM developer kits lifecycle dates website.

- REXX

    - z/OS V02.01.00 TSO/E REXX Reference (5650-ZOS)

- SQL Procedure Language

    - Native SQL Procedure Language
    - External SQL Procedure Language, which requires a C language compiler

- APL2 (one of the following):

    - Mainframe APL2 V02.02 (5688-228) (full APL2)
    - APL2 Application Environment (5688-229)

5.2.2.3.6 Query Support: The following query program works with Db2 12:

- IBM Db2 Query Management Facility (QMF) family of products, Version 11 and 12

5.2.2.3.7 Tools Support: The following tools are the minimum level that provide support for Db2 12 for z/OS. For details on any additional requirements, go to the DB2 Tools Compatibility for Db2 12 for z/OS website: http://www.ibm.com/support/docview.wss?uid=swg21972885

IBM Tools for Database Administration and System Management Support, including the following tools:

- Db2 Administration Solution Pack for z/OS, V2.2 (5697-DAQ)
- Db2 Administration Tool for z/OS, V11.2 (5655-DAT), with APAR PI67731, or higher
- Db2 Configuration Manager for z/OS, V4.1 (bundled in the DB2 Admin Solution Pack V2.2 (5697-DAQ))
- Db2 Object Comparison Tool for z/OS, V11.2 (5655-DOC)
- Db2 Query Workload Tuner for z/OS, V5.1 (5655-AB4)
- InfoSphere Guardium Data Encryption for IMS and Db2 Databases, V1.2 (5655-P03)

IBM Tools for Database Application Management, including the following tools:

- IBM Db2 Analytics Accelerator for z/OS, V5.1 (5697-DA5)
- IBM Db2 Analytics Accelerator Loader for z/OS, V2.1 (5639-OLE)
- IBM Application Performance Analyzer for z/OS, V13.1 (5655-Q09)
- IBM Db2 Table Editor for z/OS, V4.5 (5697-G65)
- IBM Debug Tool for z/OS, V13.1 (5655-Q10)
- IBM Fault Analyzer for z/OS, V13.1 (5655-Q11)
- IBM File Manager for z/OS, V13.1 (5655-Q12)

IBM Tools for Performance Management, including the following tools:

- Db2 Management Solution Pack for z/OS, V1.1 (5655-MSP)
- Db2 Performance Solution Pack for z/OS, V1.4 (5655-E74)
- Db2 Query Monitor for z/OS, V3.2 (5655-V42)
- Db2 SQL Performance Analyzer for z/OS, V5.1 (5697-W51)
- IBM Tivoli OMEGAMON XE for Db2 Performance Expert on z/OS, V5.4 (5655-W37)

- IBM Tivoli OMEGAMON XE for Db2 Performance Monitor on z/OS, V5.4 (5655-W38)

IBM Tools for Replication Management, including the following tools:

- IBM InfoSphere Data Replication for Db2 for z/OS, V10.2.1 (5655-DRP), with APAR PI49204

IBM Tools for Utilities Management, including the following tools:

- Db2 Utilities Solution Pack for z/OS, V3.1 (5697-USP)
- Db2 Extended Utilities Suite for z/OS, V1.1 (5655-EUS)
- Db2 Automation Tool for z/OS, V4.2 (5655-E37)
- Db2 Cloning Tool for z/OS, V3.2 (5655-N15)
- Db2 High Performance Unload for z/OS, V4.3 (5655-AA1)
- Db2 Sort for z/OS, V2.1 (5655-AA9)
- Db2 Utilities Enhancement Tool for z/OS, V2.2 (5655-T58)
- Db2 Utilities Suite for z/OS, V12.1 (5770-AF4)

Note: Operation might require migration to higher releases of the above products that are service supported. See http://www.ibm.com/support/lifecycle/

5.2.2.3.8 Compatibility: Db2 12 for z/OS is upwardly compatible with earlier releases of DB2 for z/OS. Migration with full fallback protection is available for clients who are running on Db2 11 for z/OS. Existing clients should ensure that they are successfully running on Db2 11 for z/OS (in new-function mode) before migrating to Db2 12 for z/OS. Fallback SPE APAR PI33871 must be applied.

APAR PI69143 extends APPLCOMPAT to support controlling the use of new Db2 12 function for DDL and DCL (GRANT, REVOKE, TRANSFER) in DB2 12. Application of this APAR is required prior to starting Db2, to ensure that objects created with Db2 12 dependent capability or function are properly recorded in the Db2 catalog.

Clients should also use FIX CATEGORIES IBM.Migrate-Fallback.Db2.V12 and IBM.Coexistence.DB2.SYSPLEXDataSharing to identify and apply fixes that enable prior releases of Db2 to migrate to or fallback from Db2 12 for z/OS and fixes that enable Db2 11 to co-exist when in data sharing mode, respectively.

For more information on FIXCAT, go to the IBM Fix Category Values and Descriptions website.

5.2.2.4 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.

Db2 12 has no toleration/coexistence requisites.

5.2.2.5 Incompatibility (Negative) Requisites

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

Db2 12 has no negative requisites.

5.2.3 DASD Storage Requirements

Db2 12 libraries can reside on all supported DASD types.

Figure 13 lists the total space that is required for each type of library.

Figure 13. Total DASD Space Required by Db2 12		
Library Type	**Total Space Required in 3390 Trks**	**File System Description**
Target	12459 tracks	
Distribution	12800 tracks	
File System(s)	150 tracks	usr/lpp/db2c10/base/
	380 tracks	usr/lpp/db2c10/jdbc/
	20 tracks	usr/lpp/db2c10/mql/
	50 tracks	usr/lpp/db2c10/worf/

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 6.1.7, "Allocate SMP/E Target and Distribution Libraries" on page 39.

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 must be a PDS, except for ADSNLOAD, ADSNLOD2, SDSNLOAD, and SDSNLOD2, which must be PDSEs. Note: DSNALLOC, the Db2-supplied Sample job to allocate target and distribution libraries and define SMP/E DDDEFS, assumes that your local default for the DSNTYPE JCL parameter is PDS.

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 be in the LPA, but they are not required to be in the LPA.
- These data sets can be in the LNKLST.
- These data sets are required to be APF-authorized:
  - SDSNEXIT
  - SDSNLINK
  - SDSNLOAD
  - SDXRRESL
- Db2 12 requires that the SMPLTS data set must be a PDSE. If your existing SMPLTS is a PDS, you will need to allocate a new PDSE and copy your existing SMPLTS into it and then change the SMPLTS DDDEF entry to indicate the new PDSE data set.

The following table provides an estimate of the storage needed in the SMP/E data sets for Db2 12. You must add the estimates to those of any other programs and service that you install to determine the total additional storage requirements.

If the table indicates that the SMPLTS data set must be a PDSE and your existing SMPLTS is a PDS, you must allocate a new PDSE and copy your SMPLTS into it; then change the SMPLTS DDDEF entry to indicate the new PDSE data set.

Figure 14. Storage Requirements for SMP/E Data Sets						
Library DDNAME	T Y P E	O R G	R E C F M	L R E C L	No. of 3390 Trks	No. of DIR Blks
SMPLTS	U	PDSE	U	0	1560	N/A
SMPMTS	E	PDS	FB	80	15	60
SMPPTS	E	PDS	FB	80	3765	300
SMPSCDS	E	PDS	FB	80	975	300
SMPSTS	E	PDS	FB	80	75	150

The following figures describe the target and distribution libraries and file system paths required to install Db2 12. The storage requirements of Db2 12 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 15 (Page 1 of 2). Storage Requirements for Db2 12 Target Libraries								
Library DDNAME	Member Type	Target Volume	T Y P E	O R G	R E C F M	L R E C L	No. of 3390 Trks	No. of DIR Blks
SDSNBASE	Sample	Any	S	PDS	FB	80	10	4
SDSNCHDR	Data	Any	S	PDS	FB	80	25	4
SDSNCLST	CLIST	Any	S	PDS	FB	80	190	6
SDSNDBRM	Macro	Any	S	PDS	FB	80	119	40
SDSNEXIT	Data	Any	S	PDS	U	0	6	30
SDSNIVPD	Data	Any	S	PDS	VB	8188	588	6
SDSNLINK	LMOD	Any	S	PDS	U	0	4	5
SDSNLOAD	LMOD	Any	S	PDSE	U	0	6399	N/A
SDSNLOD2	LMOD	Any	S	PDSE	U	0	501	N/A
SDSNMACS	Macro	Any	S	PDS	FB	80	276	14

Library DDNAME	Member Type	Target Volume	TYPE	ORG	RECFM	LRECL	No. of 3390 Trks	No. of DIR Blks
SDSNPFPE	Panel	Any	S	PDS	FB	80	16	7
SDSNPFPK	Panel	Any	S	PDS	FB	80	49	46
SDSNSAMP	Sample	Any	S	PDS	FB	80	4205	220
SDSNSPFM	Message	Any	S	PDS	FB	80	3	6
SDSNSPFP	Panel	Any	S	PDS	FB	80	31	10
SDSNSPFS	SKEL	Any	S	PDS	FB	80	2	2
SDSNSPFT	Table	Any	S	PDS	FB	80	2	2
SDXRRESL	LMOD	Any	S	PDS	U	0	29	8
SDXRSAMP	Sample	Any	S	PDS	FB	80	4	3

Figure 15 (Page 2 of 2). Storage Requirements for Db2 12 Target Libraries

The following types of data sets are created during the Db2 12 installation process. The sizes are based upon user preferences:

- CATALOG
- DIRECTORY
- LOG

DDNAME	TYPE	Path Name
SDSNAHFS	N	/usr/lpp/db2c10/base/IBM/
SDSNABIN	N	/usr/lpp/db2c10/base/bin/IBM/
SDSNACLS	N	/usr/lpp/db2c10/base/classes/IBM/
SDSNALIB	N	/usr/lpp/db2c10/base/lib/IBM/
SDSNASMP	N	/usr/lpp/db2c10/base/samples/IBM/
SDSNJBIN	N	/usr/lpp/db2c10/jdbc/bin/IBM/
SDSNJCLS	N	/usr/lpp/db2c10/jdbc/classes/IBM/
SDSNJCC	N	/usr/lpp/db2c10/jdbc/IBM/
SDSNJLIB	N	/usr/lpp/db2c10/jdbc/lib/IBM/
SDSNJSMP	N	/usr/lpp/db2c10/jdbc/samples/IBM/

Figure 16 (Page 1 of 2). Db2 12 File System Paths

DDNAME	TYPE	Path Name
SDSNMQLS	N	/usr/lpp/db2c10/mql/IBM/
SDSNWORF	N	/usr/lpp/db2c10/worf/IBM/
SDSNWLIB	N	/usr/lpp/db2c10/worf/lib/IBM/
SDSNWSCH	N	/usr/lpp/db2c10/worf/schemas/IBM/
SDSNWTLB	N	/usr/lpp/db2c10/worf/tools/lib/IBM/

Figure 16 (Page 2 of 2). Db2 12 File System Paths

Figure 17. Storage Requirements for Db2 12 Distribution Libraries

Library DDNAME	TYPE	ORG	RECFM	LRECL	No. of 3390 Trks	No. of DIR Blks
ADSNBASE	U	PDS	FB	80	10	4
ADSNDKF	S	PDS	FB	80	47	75
ADSNENU	S	PDS	FB	80	17	8
ADSNHFS	U	PDS	VB	255	438	6
ADSNIVPD	S	PDS	VB	8188	551	6
ADSNLOAD	S	PDSE	U	0	6182	N/A
ADSNLOD2	S	PDSE	U	0	301	N/A
ADSNMACS	S	PDS	FB	80	5205	220
ADXRLOAD	S	PDS	U	0	45	35
ADXRSAMP	S	PDS	FB	80	4	3

5.3 FMIDs Deleted

Installing Db2 12 might result in the deletion of other FMIDs. To see which FMIDs will be deleted, examine the ++VER statement in the SMPMCS of the product.

If you do not want to delete these FMIDs at this time, install Db2 12 into separate SMP/E target and distribution zones.

Note: These FMIDs are not automatically deleted from the Global Zone. If you want to delete these FMIDs from the Global Zone, use the SMP/E REJECT NOFMID DELETEFMID command. See the SMP/E Commands book for details.

5.4 Special Considerations

APAR PI69143 extends APPLCOMPAT to support controlling the use of new Db2 12 function for DDL and DCL (GRANT, REVOKE, TRANSFER) in Db2 12. Application of this APAR is required prior to starting Db2, to ensure that objects created with Db2 12 dependent capability or function are properly recorded in the DB2 catalog.

5.5 Migration, Fallback, and Remigration

Db2 12 is upwardly compatible with earlier releases of Db2 for z/OS. Migration with full fallback protection is available for customers running on Db2 11 for z/OS. Existing customers should ensure they are successfully running on Db2 11 for z/OS (NFM) before migrating to Db2 12.

Fallback SPE APAR PI33871, must be applied.

Customers should use Fix Categories to check for migration fallback/co-existence maintenance.

- IBM.Migrate-Fallback.DB2.V12

    Fixes that allow prior releases of Db2 to migrate to or fall back from Db2 12 for z/OS.

- IBM.Coexistence.DB2.SYSPLEXDataSharing

    Fixes that enable Db2 releases to coexist when in data sharing mode.

For more information on FIXCAT go to:

`http://www.ibm.com/systems/z/os/zos/features/smpe/fix-category.html`

For more information on Db2 12 changes for migration, deprecated functions, and functions that Db2 12 no longer supports, search IBM Knowledge Center for "What's changed in Db2 12".

6.0 Installation Instructions

This chapter describes the installation method and the step-by-step procedures to install and to activate the functions of Db2 12.

Please note the following points:

- If you want to install Db2 12 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 Db2 12

6.1.1 SMP/E Considerations for Installing Db2 12

Use the SMP/E RECEIVE, APPLY, and ACCEPT commands to install this release of Db2 12.

6.1.2 SMP/E Options Subentry Values

The recommended values for certain SMP/E CSI subentries are shown in Figure 18. 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.

Figure 18. SMP/E Options Subentry Values		
Subentry	**Value**	**Comment**
DSSPACE	400,400,1200	3390 DASD Tracks
PEMAX	SMP/E Default	IBM recommends using the SMP/E default for PEMAX.
UTILITY	IEWBLINK	Program Binder must be used for installation of **Db2 12 JDBC/SQLJ**

6.1.3 SMP/E CALLLIBS Processing

Db2 12 uses the CALLLIBS function provided in SMP/E to resolve external references during installation. When Db2 12 is installed, ensure that DDDEFs exist for the following libraries:

- CSSLIB
- LINKLIB
- SCEEBIND
- SCEEBND2
- SCEECPP
- SCEELIB
- SCEELKED
- SCEELKEX
- SCLBCPP
- SCSFMOD0

Note: CALLLIBS uses the previous DDDEFs only to resolve the link-edit for Db2 12. These data sets are not updated during the installation of Db2 12.

6.1.4 Sample Jobs

The following sample installation jobs are provided as part of the product to help you install Db2 12:

Figure 19. Sample Installation Jobs			
Job Name	**Job Type**	**Description**	**RELFILE**
DSNTIJAA	SMP/E	Sample job to create the CSI and allocate the SMP/E control data sets **(Optional)**	IBM.HDBCC10.F3
DSNRECV1	RECEIVE	Sample RECEIVE job for Db2	IBM.HDBCC10.F3
DSNRECV2	RECEIVE	Sample RECEIVE job for IRLM	IBM.HDBCC10.F3
DSNRECV3	RECEIVE	Sample RECEIVE job for JDBC/SQLJ and ODBC	IBM.HDBCC10.F3
DSNRECV4	RECEIVE	Sample RECEIVE job for Db2 Kanji Panels (available in the Japanese feature)	IBM.HDBCC10.F3
DSNALLOC	ALLOCATE	Sample job to allocate target and distribution libraries	IBM.HDBCC10.F3
DSNASMKD	MKDIR	Sample job to invoke the supplied DSNAMKDR EXEC to allocate file system paths for Db2 base	IBM.HDBCC10.F3
DSNLSMKD	MKDIR	Sample job to invoke the supplied DSNLMKDR EXEC to allocate file system paths for MQListener	IBM.HDBCC10.F3
DSNWSMKD	MKDIR	Sample job to invoke the supplied DSNWMKDR EXEC to allocate file system paths for WORF	IBM.HDBCC10.F3
DSNISMKD	MKDIR	Sample job to invoke the supplied DSNMKDIR EXEC to allocate file system paths for JDBC/SQLJ	IBM.HDBCC10.F3
DSNDDEF1	DDDEF	Sample job to define SMP/E DDDEFs	IBM.HDBCC10.F3
DSNTIJUD	SMP/E	Clean up job **(Optional)**	IBM.HDBCC10.F3
DSNAPPL1	APPLY	Sample APPLY job	IBM.HDBCC10.F3
DSNACEP1	ACCEPT	Sample ACCEPT job	IBM.HDBCC10.F3

You can access the sample installation jobs by performing an SMP/E RECEIVE (refer to 6.1.6, "Perform SMP/E RECEIVE" on page 39) then copy the jobs from the RELFILES to a work data set for editing and submission. See Figure 19 to find the appropriate relfile data set.

You can also copy the sample installation jobs from the tape or product files by submitting the following job. Depending on your distribution medium, use either the //TAPEIN or the //FILEIN DD statement and comment out or delete the other statement. 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=*
//TAPEIN   DD DSN=IBM.HDBCC10.F3,UNIT=tunit,
//         VOL=SER=volser,LABEL=(x,SL),
//         DISP=(OLD,KEEP)
//FILEIN   DD DSN=IBM.HDBCC10.F3,UNIT=SYSALLDA,DISP=SHR,
//         VOL=SER=filevol
//OUT      DD DSNAME=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=xxxxIN,OUTDD=OUT
/*
```

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

TAPEIN:
> **tunit** is the unit value that matches the product package.
>
> **volser** is the volume serial that matches the product package.
>
> **x** is the tape file number that indicates the location of the data set name on the tape.
>
> See the documentation that is provided by CBPDO for the location of IBM.HDBCC10.F3 on the tape.

FILEIN:
> **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.

SYSIN:
> **xxxxIN** is either TAPEIN or FILEIN depending on your input DD statement.

6.1.4.1 Special Considerations

- Db2 12 and IRLM V02.03.00 are assumed to be installed into the same zones. If this is not the case you will need to modify jobs DSNALLOC, DSNDDEF1 and DSNAPPL1.

- Recompile your existing Validation Exit Routines to pick up the updated version of the macro DSNDRVAL. No logic change is required. Although it is optional to recompile your Validation Exit Routine, it is recommended.

6.1.5 Allocate CSI and SMP/E Control data sets

Edit and submit **optional** sample job DSNTIJAA to create the desired CSI for Db2 12. Please note this job allocates some data sets in **PDSE** format. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a condition code of 0 if the job runs correctly.

6.1.6 Perform SMP/E RECEIVE

If you have obtained Db2 12 as part of a CBPDO, use the RCVPDO job in the CBPDO RIMLIB data set to receive the Db2 12 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 DSNRECV1 to perform SMP/E RECEIVE for the mandatory Db2 FMIDs for Db2 12. Consult the instructions in the sample job for more information.

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

You can also choose to edit and submit sample job DSNRECV2 to perform SMP/E RECEIVE for IRLM V02.03.00. Consult the instructions in the sample job for more information.

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

You can also choose to edit and submit sample job DSNRECV3 to perform SMP/E RECEIVE for optional FMIDs for Db2 12. Consult the instructions in the sample job for more information.

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

You can also choose to edit and submit sample job DSNRECV4 to perform the SMP/E RECEIVE for the Db2 Kanji FMID for Db2 12. This FMID is delivered with the Db2 Japanese feature. If you did not order the Db2 Japanese feature, then you may wish to comment out FMID JDBCC11 from the SMP/e DSNAPPL1 and DSNACEP1 jobs.

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

6.1.7 Allocate SMP/E Target and Distribution Libraries

Edit and submit sample job DSNALLOC to allocate the SMP/E target and distribution libraries for Db2 12. Consult the instructions in the sample job for more information.

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

6.1.8 Allocate File System Paths

The target system HFS or zFS data set must be mounted on the driving system when running the sample DSNASMKD 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 Db2 12 into a file system that is zFS.

If you plan to install Db2 12 into a new HFS or zFS file system, you must create the mountpoint and mount the new file system to the driving system for Db2 12.

The recommended mountpoint is */usr/lpp/db2c10*.

Edit and submit sample job DSNASMKD to allocate the HFS or zFS paths for Db2 12. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a condition code of 0 if the job runs correctly.

Edit and submit sample job DSNLSMKD to allocate the HFS or zFS paths for Db2 12 (MQListener). Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a condition code of 0 if the job runs correctly.

Edit and submit sample job DSNWSMKD to allocate the HFS or zFS paths for Db2 12 (WORF). Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a condition code of 0 if the job runs correctly.

Edit and submit sample job DSNISMKD to allocate the HFS or zFS paths for Db2 12 (JDBC/SQLJ). Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a condition code of 0 if the job runs correctly.

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.

6.1.9 Create DDDEF Entries

Edit and submit sample job DSNDDEF1 to create DDDEF entries for the SMP/E target and distribution libraries for Db2 12. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a condition code of 0 if the job runs correctly.

6.1.10 Perform SMP/E APPLY

1. Ensure that you have the latest HOLDDATA; then edit and submit sample job DSNAPPL1 to perform an SMP/E APPLY CHECK for Db2 12. Consult the instructions in the sample job for more information.

   Perform an SMP/E APPLY CHECK for Db2 12.

   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 HOLDs 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.

Note: JDBCC11 is only deliverable with the Db2 Japanese feature. If you are not installing the Db2 Japanese feature then you may wish to comment out FMID JDBCC11 from the SMP/E DSNAPPL1 job.

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.

6.1.11 Perform SMP/E ACCEPT

Edit and submit sample job DSNACEP1 to perform an SMP/E ACCEPT CHECK for Db2 12. Consult the instructions in the sample job for more information.

Perform an SMP/E ACCEPT CHECK for Db2 12.

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.

Note: JDBCC11 is only deliverable with the Db2 Japanese feature. If you are not installing the Db2 Japanese feature then you may wish to comment out FMID JDBCC11 from the SMP/E DSNACEP1 job.

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.

6.1.12 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 Db2 12, 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.

6.1.13 Cleaning Up Obsolete Data Sets, Paths, and DDDEFs

The following data sets, which were allocated and used by previous releases of this product, are no longer used in this release. You can delete these obsolete data sets after you delete the previous release from your system.

- There are no obsolete datasets from Db2 11 for z/OS to delete.

The following file system paths, which were created and used by previous releases of this product, are no longer used in this release. You can delete these obsolete file system paths after you delete the previous release from your system.

- /usr/lpp/db2b10/base/IBM/
- /usr/lpp/db2b10/base/bin/IBM/
- /usr/lpp/db2b10/base/classes/IBM/
- /usr/lpp/db2b10/base/lib/IBM/
- /usr/lpp/db2b10/base/samples/IBM/
- /usr/lpp/db2b10/jdbc/bin/IBM/
- /usr/lpp/db2b10/jdbc/classes/IBM/
- /usr/lpp/db2b10/jdbc/IBM/
- /usr/lpp/db2b10/jdbc/lib/IBM/
- /usr/lpp/db2b10/jdbc/samples/IBM/

- /usr/lpp/db2b10/mql/IBM/
- /usr/lpp/db2b10/worf/IBM/
- /usr/lpp/db2b10/worf/lib/IBM/
- /usr/lpp/db2b10/worf/schemas/IBM/
- /usr/lpp/db2b10/worf/tools/lib/IBM/

The following DDDEF entries, which were created and used by previous releases of this product, are no longer used in this release. You can delete these obsolete DDDEF entries after you delete the previous release from your system.

- There are no obsolete DDDEFs from Db2 11 for z/OS to delete.

6.2 Activating Db2 12

The Db2 12 Installation and Migration information contains the necessary details to customize and use Db2 12.

6.2.1 Set Up Controls for English Panel Selection

Each of the display language control techniques described below is a way to set or change the current allocation of the DDNAMES.

6.2.1.1 Logon Procedures

To switch languages, you need only change the data set allocation currently in effect under the standard ISPF panel library DDNAME. A user's logon procedure can allocate DDNAME ISPPLIB to select the current display language. Following is an example from a logon procedure:

```
//*   THIS VERSION DISPLAYS ENGLISH PANELS */
//ISPPLIB  DD DSN=DSNC10.SDSNSPFP,DISP=SHR     ENGLISH
//         DD DSN=DSNC10.SDSNPFPE,DISP=SHR     ENGLISH
```

6.2.1.2 Language-switching CLISTs

An ordinary CLIST can be used (outside of ISPF) to free and reallocate ISPPLIB. Following is an example of a CLIST:

```
PROC O LANGUAGE(E)        /* Execute this CLIST outside of ISPF  */
FREE DD(ISPPLIB)
WRITE Do you want English or Japanese panels:  Enter E or J.
READ &LANGUAGE
IF &LANGUAGE = E +
   THEN ALLOC DD(ISPPLIB) DS('DSNC10.SDSNSPFP' 'DSNC10.SDSNPFPE') +
        SHR    /* English  */
   ELSE ALLOC DD(ISPPLIB) DS('DSNC10.SDSNSPFP' 'DSNC10.SDSNPFPK') +
        SHR    /* Japanese */
```

Some users allocate the ISPF panel library from their DEFAULT CLIST. Allocation of DDNAME ISPPLIB controls the current language just as it does for the LOGON procedure.

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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