IBM DB2 OLAP Server for z/OS

Installation and Administration Guide for z/OS

Version 8.1

SC18-7280-00

IBM DB2 OLAP Server for z/OS

Installation and Administration Guide for z/OS

Version 8.1

SC18-7280-00

Note

Before using this information and the product it supports, be sure to read the information in Appendix D, "Notices", on page 129.

First Edition (February 2003)

This edition applies to version 8.1 of DB2 OLAP Server for z/OS (program number 5655 - H81) and to all subsequent releases and modifications until otherwise indicated in new editions.

Contents

About this book

IBM® DB2 OLAP Server™ for z/OS™, Version 8.1 and IBM DB2® OLAP Integration Server, Version 8.1 are based on products from Hyperion Solutions Corporation. This book was written by IBM and is intended to be used with books and online help written by Hyperion. You will see references to Hyperion and Hyperion's products in the interface and throughout the Hyperion books. The *Installation and Administration Guide for z/OS* book and the relevant Hyperion books are included with the Windows client components for the DB2 OLAP Server for z/OS product on the client CD.

This book combines and summarizes information from the following Hyperion books; therefore, these books are not included in the IBM product:

- *Hyperion Essbase 6.5.1 New Features*
- *Hyperion Essbase 6.5 Installation Guide*
- *Hyperion Essbase 6.5 Installation Checklist*
- *Essbase Integration Services 6.5.1 New Features*
- *Essbase Integration Services 6.5 Installation Guide*

Who should read this book

Read this book if you are a DB2 OLAP Server for z/OS administrator who is responsible for:

- Installing and configuring DB2 OLAP Server.
- Designing and creating OLAP applications and multidimensional databases using DB2 OLAP Server.
- Setting up security for DB2 OLAP Server.
- Maintaining OLAP applications and multidimensional databases that are migrated to or created using DB2 OLAP Server.

As the DB2 OLAP Server administrator, you should have experience in networking, system administration, and HFS file structure, and z/OS UNIX and you should understand the analytical requirements of the users who will use the applications that are created with DB2 OLAP Server.

Publications

This section lists books that are included with DB2 OLAP Server for z/OS and its add-on products. DB2 OLAP Server users can find these books from the **Start** > **Programs** > **IBM DB2 OLAP Server 8.1** > **Documentation** information map. The books are stored in the `x:\ibm\db2olap\docs` directory, where `x:\ibm\db2olap` is the directory in which you installed DB2 OLAP Server client applications.

If you select the **Typical** option during the installation of the client, only a subset of the documentation will be installed. To install all the documentation, choose **Custom** during the installation of the client and select the books you want.

Table 1 lists the publications that are included with DB2 OLAP Server for z/OS.

Table 1. DB2 OLAP Server Publications

Publication Name	Description
Installation and Administration Guide for z/OS	Describes how to install and configure DB2 OLAP Server for z/OS. This book combines the Hyperion installation books with new information from IBM. This book describes performance, API, maintenance, and other configuration issues that are specific to z/OS.
Installation Guide	Explains how to install and configure DB2 OLAP Server on UNIX® and Windows®. This book is included for reference only; you should not need to use this book for DB2 OLAP Server for z/OS.
Quick Path	Summarizes the major tasks of creating OLAP applications using DB2 OLAP Server.
OLAP Miner User's Guide	Explains how to use DB2 OLAP Server Miner, a no-charge feature that combines the IBM data mining technologies with OLAP technologies.
Spreadsheet Add-in User's Guide for Excel	Explains how to use the Spreadsheet Add-in with Microsoft® Excel for Windows to analyze data.
Spreadsheet Add-in User's Guide for 1-2-3®	Explains how to use the Spreadsheet Add-in with Lotus® 1-2-3 for Windows to analyze data.

Table 1. DB2 OLAP Server Publications (continued)

Publication Name	Description
Database Administrator's Guide, Volumes 1, 2, and 3	Provides administrators with strategies and techniques to implement, design, build, and maintain an optimized multidimensional database. Provides instructions for how to design and build a security system. Provides instructions for how to load, calculate, and report your data. Also provides instructions for performing tasks using the Application Manager.
MaxL User's Guide	Describes how to use MaxL, the multidimensional database access language for DB2 OLAP Server. MaxL is a flexible way to automate Hyperion Essbase administration and maintenance tasks.
SQL Interface Guide	Explains how to load data from SQL, relational, and flat-file data sources.
Technical Reference	Provides reference about writing formulas, calculation scripts, report scripts, MaxL statements, and custom-defined macros and functions. It also includes `essbase.cfg` settings and ESSCMD commands.
API Reference	Provides reference information for functions that are available through the Application Programming Interface.
Message Reference	Describes common messages in DB2 OLAP Server and their causes and solutions.
Integration Server Administration Guide	Explains how to use the Administration Manager component of the DB2 OLAP Integration Server.
Integration Server Data Preparation Guide	Explains how to prepare relational data for use with the DB2 OLAP Integration Server.

DB2 OLAP Server publications are also available online at:

`www.ibm.com/software/data/db2/db2olap/library.html`

Several IBM Redbooks™ about DB2 OLAP Server and related topics are available. To view OLAP Redbooks online, visit the IBM Redbook Web site at:

`www.redbooks.ibm.com`

Service and additional support

DB2 OLAP Server for z/OS is an IBM product and is serviced by IBM. The documentation from Hyperion includes references to service from Hyperion; disregard those references.

The Web site for DB2 OLAP Server and its features offers an extensive selection of hints, tips, frequently asked questions, and more information and FixPaks:

`www.ibm.com/software/data/db2/db2olap/support.html`

Part 1. Installing and configuring the server and client

Chapter 1. What's new in Version 8.1

This chapter describes enhancements to DB2 OLAP Server™ and DB2 OLAP Integration Server™ (OIS) since the previous version.

DB2 OLAP Server for z/OS

This section provides an overview of significant changes in DB2 OLAP Server for z/OS, Version 8.1.

OLAP Miner for deviation discovery

DB2 OLAP Server Miner is a no charge feature of DB2 OLAP Server. OLAP Miner combines the IBM data mining technologies with OLAP technologies.

OLAP Miner enables you to examine your OLAP cubes (multidimensional databases) more thoroughly and easily by finding atypical or deviant values automatically. Instead of searching through your data manually to find data values that might be higher or lower than you expected, OLAP Miner can do this work for you. The OLAP Miner algorithm is optimized so that it can be deployed on large OLAP cubes.

You can search specific areas (subcubes) of your cubes by creating deviation detection definitions, which specify the way in which OLAP Miner examines the data that you selected for the subcube. OLAP Miner provides an easy-to-use wizard that helps you create deviation detection definitions. After you create and run a deviation detection definition, OLAP Miner applies an algorithm to the data to find deviations. Then you can view a simple list of deviations or bring up the Deviation Viewer, from which you can see the deviations in the context with other surrounding values. You can also view deviations in a standard spreadsheet application.

Application Manager replaces Administration Manager

The Administration Manager utility is not available in Version 8.1. All the function that was available previously in the Administration Manager is available in the Application Manager.

zFS replaces VSAM datapools

To improve performance and simplify backup and recovery of DB2 OLAP Server for z/OS, multidimensional data is stored in a UNIX System Services file system rather than directly in VSAM data sets. While the Hierarchical File System (HFS) performed poorly compared to the direct VSAM access implemented in DB2 OLAP Server for

z/OS, the use of zFS provides better performance than either HFS or direct VSAM access. The zFS implementation returns the DB2 OLAP Server data to the `$ARBORPATH/app/appName/dbName` directory that allows backup and recovery tools that are developed for other DB2 OLAP Server or Hyperion Essbase platforms to work with DB2 OLAP Server for z/OS.

Relational Storage Manager no longer available

Starting in Version 8.1, the Relational Storage Manager (RSM) is withdrawn from DB2 OLAP Server. Applications created using the RSM in previous versions must be migrated to the Multidimensional Storage Manager (MSM) before installing Version 8.1.

MaxL versus ESSCMD

In this release, both MaxL and ESSCMD are supported. However, the Multidimensional Access Language (MaxL) is quickly becoming the primary linguistic interface for interacting with DB2 OLAP Server. Users are urged to start using MaxL in place of ESSCMD.

LDAP not supported

LDAP is not supported. However, DB2 OLAP Server for z/OS continues to support external authorization through RACF®.

Password change from client

Users can now change their RACF password from the Application Manager login panel, from the Hyperion spreadsheet add-in, and from any client application that allows change of the Essbase password.

The following changes are specific to Release 6.5.1 of Essbase OLAP Server from Hyperion.

New calculation functions

DB2 OLAP Server provides the following new calculation functions:

- Use @XRANGE to return a member set combination of Time and Scenario instead of creating a dimension that combines the two (which creates many more individual members than necessary).
- Use @MOVSUM to modify a data set for smoothing purposes. Apply this function when moving a n-term sum to an input data set. Each term of the set is replaced by a trailing sum of n terms, and the first terms (the n-1 terms) are copies of the input data.
- Use @MOVSUMX to modify a data set for smoothing purposes. This function is similar to @MOVSUM, in that it applies a moving n-term sum to an input data set. Unlike @MOVSUM, @MOVSUMX provides several options that control the value assigned to trailing members, and how to assign values to members that precede the n-term parameter.

Drill-through filter persistence

When you customize a drill-through report in the Spreadsheet Add-in, you can save the drill-through filters that you create in the Select Data Filters dialog box. In addition, you can now add new filters, rename filters, delete filters, and select existing filters that you have previously saved.

Report command LINK

The LINK Report Writer command has been extended to span into dimension levels that are located in the Hybrid Analysis portion of an Essbase cube. For more information about LINK, see "Report Writer Commands: LINK" in the *Technical Reference*. For more information about Hybrid Analysis, see the Database Administrator's Guide, Appendix D.

Parallel calculation correction

Valid values for CALCPARALLEL (or SET CALCPARALLEL) are 1 through 4. The Essbase 6.5.0 documentation incorrectly states 0 through 4.

Excel 97 support

Microsoft Excel 97 support has been reinstated in the Spreadsheet Add-in.

Port statistics

You can enable the DB2 OLAP Server to log, at a specified interval, the number of ports being used. By analyzing the information in the log, you can monitor port utilization and identify a need for more ports before end users are unable to connect. The `essbase.cfg` configuration file now supports an optional setting `PORTUSAGELOGINTERVAL`.

Enhanced security file backup

DB2 OLAP Server now compares the security backup file `essbase.bak` to the security file `essbase.sec` at specified intervals instead of only when OLAP Server starts.

Using Application Manager, you can change the frequency of these comparisons. You can also use a new ESSCMD, MaxL or API command to compare the security backup file `essbase.bak` to the security file `essbase.sec` at any time. DB2 OLAP Server always updates the backup file if it does not match the security file when the two files are compared, regardless of which tool is used to trigger the comparison.

New compression algorithm

In addition to the options provided in previous releases (RLE, bitmap

compression, or no compression), DB2 OLAP Server now supports ZLIB compression. This method is used in packages like PNG, Zip, and gzip.

Calculation and data loading is faster with direct I/O and ZLIB compression than with buffered I/O and ZLIB compression. If data storage is your greatest limiting factor, use ZLIB, but be aware that, under some circumstances, data loads might be up to 10% slower than bitmap compression. However, the size of the database will be significantly smaller when you use ZLIB as your compression technique.

Using Application Manager or new MaxL or API commands, you can select the new ZLIB compression.

Query logging

Query logging provides a way for DB2 OLAP Server administrators to track query patterns of an DB2 OLAP Server database. The query log file tracks all queries performed against the database from the Spreadsheet Add-in. Query logging can track members, generation or level numbers of members belonging to specific generations or levels, and Hybrid Analysis members. Query logging also offers the flexibility to exclude logging of certain dimensions and members belonging to generations or levels. Because the query log file output is an XML document, you can import the log file to any XML-enabled tool to view the log. For details about the query log file structure, refer to `querylog.dtd` in the `ARBORPATH/bin` directory.

To enable query logging, create a query configuration file (distinct from the `essbase.cfg` file) and add to the file the configuration settings that control how query logging is performed.

Improved #MISSING handling with DATACOPY

In previous releases, using DATACOPY on a dense dimension can create blocks populated with #MISSING. This is done deliberately in some instances, because most batch calculations operate only on existing data blocks. Therefore, DATACOPY is also used to ensure that DB2 OLAP Server creates all necessary data blocks prior to batch calculation.

Invalid block header identification and correction

Now you can assess the severity of errors that describe invalid block headers. You can use MaxL or API commands to repair the corruption indicated by the presence of invalid block headers.

Improved exception handling for UNIX platforms

If DB2 OLAP Server shuts down abnormally and cannot restart, DB2 OLAP Server generates an exception log, `.XCP`, to help troubleshoot

the problem. DB2 OLAP Server also creates a CEEDUMP file with additional information about the exception.

Reset database functionality

Previous database reset functionality cleared all data from the database. Now you can optionally clear the database of data and metadata (index files, page files, and outline) and preserve any partition definitions, calculation scripts, load rules, and other associated database objects that you want to keep using new MaxL or API commands.

Outline synchronization for partitioned databases

Outline synchronization for partitioned databases is now available through MaxL, using the **refresh** outline grammar.

Advanced display partition shows more details

When the MaxL advanced keyword is used, the display output generated by display partition contains two new fields of information. The new fields are **time_source_updated** and **time_target_updated**. The times can be compared, enabling you to determine if the outline needs to be synchronized. If the outline needs to be synchronized, use **refresh outline**.

Export-LRO directory clean up

Directories created for linked-reporting objects can be deleted using the MaxL **alter** statement.

Expanded quotation mark usage

The MaxL Shell allows single quotation marks to be used within user or group names. Although single quotation marks are used to separate units of MaxL statements that contain special characters, they can now be used also within user and group names, with back slash used as an escape sequence.

Database export allows read-only access

Database exports allow users to log in and perform read-only operations while the database export proceeds. Instead of disallowing user connections during the entire database export process, the export process now sets the database to read-only mode. The database is restored to the normal state when the export process completes. This eliminates the need to use begin-archive and end-archive utilities before and after performing a database export.

MaxL login enhancement

The MaxL Shell can be invoked using options that prompt users for a user name and password.

MaxL enhanced variable handling

You can use variables as placeholders for any data that is subject to change or to which you refer often. In prior releases, the MaxL Shell

allowed variables to be either positional parameters or environment variables. In version 8.1, the flexibility of positional parameters is increased; also, a new type of variable can be used: locally defined shell variables.

New API calls

- EssResetDatabase() clears all loaded data and resets the outline to be empty in the active database.
- EssLocateIBH() locates invalid block headers within the database. At the end of the locate process, a server-based IBH log file is created that can be used later in EssFixIBH() to fix the errors.
- EssGetIBH() creates a local log file with all index combinations for which blocks contain invalid block headers. The database administrator can use this information to reload the datapoints that were identified as corrupted.
- EssFixIBH() repairs invalid header block corruption in the database. Currently, it removes all the invalid blocks from the database.
- EssGetServerLocaleString() gets the server locale description; for example, English_UnitedStates.US-ASCII@Default.
- EssUpdateBAKFile() compares the security backup file essbase.bak to the security file essbase.sec and overwrites the backup file with the security file if the two files do not match.
- EssOtlRestructure() restructures an outline on the server. This is an asynchronous call. The change for this release is a new RestructType parameter (ESS_DOR_FORCE_ALLDATA) that forces a refresh of all data along with the restructured outline.

The following changes are specific to Release 6.5 of Essbase OLAP Server from Hyperion:

Hybrid Analysis for relational data support

DB2 OLAP Server supports Hybrid Analysis, a method of accessing the lowest level members of an OLAP database from a relational database. This relational stored data is not physically loaded into DB2 OLAP Server. The data is mapped to the appropriate OLAP hierarchies.

Use OIS and the Hybrid Analysis manager to create applications that access relational data using Hybrid Analysis. The manager generates queries dynamically against the relational source, and runs as part of the OLAP Server. For more information about how to use Hybrid Analysis, see these documents:

- *Technical Reference* in the docs directory, in the Report Writer and Configuration Settings sections for information about Hybrid Analysis commands and settings

- OIS online help and Intelligent Help
- Application Manager help: Database Settings, Storage Tab, Access Mode

Parallel calculation

In addition to the standard means of performing a calculation, where each task is performed in sequence or serially, DB2 OLAP Server now supports parallel calculation.

If you enable parallel calculation, DB2 OLAP Server analyzes all the tasks in a calculation pass and breaks them down into subtasks. The subtasks that can run independently of each other are scheduled to run simultaneously on up to four threads, each on a separate CPU.

See the Technical Reference, which entries in the configuration setting and calculation commands sections. You can enable and adjust parallel calculation by adding CALCPARALLEL (and optionally CALCTASKDIMS) to your essbase.cfg configuration file, or you can issue the calculation commands SETCALCPARALLEL (and optionally SET CALCTASKDIMS).

Simulated calculations

Use the ESSCMD command SET MSG ONLY to perform simulated calculations. These simulated calculations can help you to select dense and sparse settings for the dimensions in your outline. See the *Technical Reference* in the docs directory for more information.

Empty outline support in dimension building

DB2 OLAP Server can now build dimensions in empty outline files. When a new database is created, DB2 OLAP Server creates an empty outline file. In previous releases, before building outlines from a data source, users had to add at least one dimension member to the empty outline manually. Now, DB2 OLAP Server no longer requires the manual step.

Substitution variable support in SQL Interface

You can use substitution variables in SQL strings, similar to substitution variable use in report scripts and calculation scripts. For details, see the *SQL Interface Guide*, available in PDF or HTML.

Connection information available

Client API programs can now access information about users currently connected to Essbase. The new function EssListLogins() provides a count of the users logged in to a specified connection and returns information on the connected client names and IP addresses.

Server log enhancements

Messages in the server log dealing with user logins and security changes now include additional details:

- The user name of anyone entering an incorrect password or changing a password
- The IP address of the computer on which a user logs in
- The user name and group name when the user or group is deleted

In addition, DB2 OLAP Server logs additional security activities in the server log, including the name of the user and group being changed and the user performing the change:

- Adding users to groups and removing users from groups
- Granting and revoking database and application access

I/O setting changes

Previously, the configuration setting DIRECTIO controlled the default mode of I/O access at the server level. With the introduction of zFS in place of VSAM datapools, this setting is ignored.

Correct structure alignment

Header files contain new information and structures that enable DB2 OLAP Server to run more quickly and efficiently. You need not do anything for new or upgraded installations, the changes are made automatically. Two header files, `esbapi.h` and `esbotl.h`, are no longer needed, and therefore no longer shipped with Essbase. One new header file, `esstsa.h`, has been added.

New error message documentation

Help for error messages are now available from the Information Map, which you can launch from the **Start** > **Programs** > **IBM DB2 OLAP Server 8.1** > **Documentation** menu.

The following changes are specific to Release 6.2 of Hyperion Essbase OLAP Server.

Parallel data load

DB2 OLAP Server now supports parallel data loading. You can specify the number of data processing threads to be used in parallel in different stages of data load processing. Allocating processing threads across processors on multiple CPUs provides the performance advantages of true parallel operation.

Limits on query duration and time

When users create and execute a report or spreadsheet add-in query, they might unintentionally create a very large query. Some large queries might require too much time to execute or might access too many blocks to run efficiently.

To help administrators, DB2 OLAP Server now provides these new features:

- Administrators can limit the amount of time a query can run before completion.
- Administrators can limit the number of blocks that a query can access.
- Administrators can set these new limits at the server, application, or database level.

This new ability is available using new `essbase.cfg` file settings.

New control of agent-server threads and user logins

Two new configuration settings provide more control over agent activity:

- AGTSVRCONNECTIONS specifies the number of server threads that the OLAP server creates during startup to connect to the agent. This subset of server threads and the agent threads that are controlled by AGENTTHREADS are needed when users connect from an agent to the server to connect to an application and database. These threads are unrelated to the threads that are used to direct client queries, which are specified by SERVERTHREADS or have default specification based on the number of licenses purchased.
- MAXLOGIN specifies the maximum number of users that can simultaneously log in to a single application. This number includes all instances of the same user on the same computer and application. Both the server and agent use this setting. MAXLOGIN is unrelated to threads that are controlled by AGENTTHREADS, AGTSVRCONNECTIONS, or SERVERTHREADS.

Use these settings to match resources to load patterns:

- To support a small number of users, you can reduce the amount of memory that the OLAP server uses by decreasing the value of MAXLOGIN.
- To support a large number of users trying to access the same application simultaneously, you can increase the value of AGTSVRCONNECTIONS and AGENTTHREADS.
- To support many users that issue queries simultaneously, you can increase the value of SERVERTHREADS.

Log delimiters

If you need to use external reporting tools or import log data into an OLAP database, DB2 OLAP Server now provides the ability to specify a delimiter between fields in DB2 OLAP Server log files:

- The `essbase.cfg` configuration file now supports an optional setting: DELIMITEDMSG and DELIMITER. When DELIMITDMSG is set to TRUE, DB2 OLAP Server inserts a tilde (~) between each

field of a message and writes each entry on a single line. If DELIMITER is set to one of three symbols, that symbol is used instead of the tilde.

- Log files contain standardized fields and field ordering. For example, an entry with a date and time stamp uses the stamp as the first field in the message.

New calculation functions

DB2 OLAP Server provides three new calculation functions in this release:

- Use @PRIORS and @NEXTS to skip #MISSING values, zero (0) values, or both, or neither during a calculation. @PRIOR and @NEXT, which do not skip, are still available.
- Use @NAME to pass a member name as a string to another function.
- Use @ALIAS to pass a member alias as a string to another function.

See the *Technical Reference* for more information.

New API functions

DB2 OLAP Server for z/OS, Version 8.1 has two new API functions. One is a list of native and custom-defined calculation functions, and the other is a new function to create a filter.

Export/Import LROs

The ability to export and re-import linked reporting object (LRO) information from a database has been added to improve backup capabilities and calculation performance.

You can use export LRO and import LRO (MaxL) to perform these tasks:

- Export the catalog that maps LROs to data cells, from a database to a single file on the server
- Load a file containing the exported LRO information.

Export of databases larger than 2 GB

Some file management systems do not support ASCII files larger than 2 GB. To avoid exceeding this limit, if DB2 OLAP Server anticipates that an export file will be larger than 2 GB, it breaks the file into two or more export files, as needed. Use the ESSCMD commands, `EXPORT` and `PAREXPORT`, and the MaxL statement, `export`, to export databases. This new feature works the same on all operating systems.

New CALCMODE configuration setting

You can now set CALCMODE to BLOCK or BOTTOMUP by using the configuration setting CALCMODE in the server configuration file `essbase.cfg`, and give it server, application, or database scope instead of using the @CALCMODE function. For more information, see the

configuration settings in *Technical Reference* in the docs directory of your DB2 OLAP Serverclient installation.

Improved functionality

DB2 OLAP Server, Version 8.1 provides these improvements to existing functionality:

- Improved handling of sessions and requests
- Multiple DB2 OLAP Server agents on a single server computer
- Case sensitivity improvement
- Improved add-in support of Excel in browsers
- Member set function support in FIX
- New dimensions sparse by default
- Custom-defined functions and macros
- Attribute association memory use
- Buffered I/O

Improved handling of sessions and requests

System administrators can log out all users of a particular application or database, or log out instances of particular users from a selected scope: an application, a database, or the entire DB2 OLAP Server system. If a user request is active when the administrator tries to log off the user, the administrator can force the user off. Using force safely terminates the request, and then logs off the user.

Additionally, administrators can terminate specific requests that are problematic. For example, if a user loses the connection to OLAP server during a request (for example, a calculation), the abandoned request can cause the application to stop responding to subsequent requests.

Each user session has a unique ID number, which can be displayed and used by the administrator to terminate the current request associated with that session. When the administrator terminates a request, the user session remains active. The improved handling of sessions and requests can be found in any of these areas:

- Application Manager (Security > Connections)
- The MaxL language interface (**alter system kill request** and **alter system logout session**)
- The DB2 OLAP Server Administration Services Console

The improved handling of sessions and requests is also available to API programmers, who can incorporate the following request management functions:

- EssListRequests()

- EssKillRequest()

Case sensitivity improvement

Previous releases of DB2 OLAP Server automatically changed the case of application and database names when they were created: the first letter was converted to uppercase, and other letters were all lowercase. With this release, DB2 OLAP Server creates the database name exactly as it is entered. Some backward compatibility with previous clients is provided:

- If a client prior to version 8.1 (Application Manager for example) is used to create a database or application name, the name is created with the first letter in uppercase and all other letters in lowercase.
- If scripts specify the incorrect case for an application or database name, DB2 OLAP Server searches for different versions of case for that object.

Some error messages have been rewritten to provide clarity. With this release, behavior on NT and UNIX platforms is identical.

Member set function support in FIX

All functions that return a member or set of members are now supported when they occur within FIX statements. Member and member set functions in FIX is also supported for partition definitions and security filters.

New dimensions sparse by default

When you add a dimension to an existing outline, DB2 OLAP Server makes it a sparse dimension. Prior to Version 8.1, DB2 OLAP Server made new dimensions dense by default.

Custom defined functions and macros

Several changes have been made to custom-defined functions (CDF) and custom-defined macros (CDM):

- You no longer need to install the Java™ Virtual Machine (JVM) to create or use CDMs. CDFs still require the JVM.
- DB2 OLAP Server no longer validates function records before completing the creation process. Errors are detected only when an application loads the CDF. Typically this occurs during server startup and when the MaxL **refresh custom definitions** statement is executed. The DB2 OLAP Server agent checks the function for a valid name, but does no other validation. This means that there is no longer a need to start an application in order to create a function.
- You can now use MaxL to create and drop function records without loading or unloading an application.
- The rules for specifying Java classes and methods are now stricter.

- MaxL and Application Manager must be Version 8.1 to create or delete CDFs and CDMs on the Version 8.1 server. For details, see the *Database Administrator's Guide* chapters about CDFs and CDMs.

Attribute association memory use

DB2 OLAP Server has improved memory management for processing attributes requiring less memory. This improvement is most noticeable for applications using many attributes.

Buffered I/O

Version 8.1 supports only buffered I/O.

DB2 OLAP Server, Version 8.1 clients not available for Windows 95

Clients such as Application Manager and the Spreadsheet Add-in for Version 8.1 are not available for Windows 95.

DB2 OLAP Integration Server for z/OS

The following highlights are specific to Release 6.5.1 of Essbase Integration Services from Hyperion:

User-defined tables

In DB2 OLAP Integration Server, Version 8.1, you can create user-defined tables. These virtual tables, which behave as a standard RDBMS view, can be used anywhere a regular RDBMS table or view is used. This feature enables you to create and edit OLAP models without altering your relational schema or modifying the Integration Services generated SQL.

You create a table in the new User-Defined Table Definition window by entering a name for the table and entering its SQL definition. The new table is listed in the left frame of the OLAP model main window.

Drill-through from secondary data sources

With DB2 OLAP Integration Server, you can create and run a drill-through report using both primary and secondary data sources. In previous versions of Integration Services, a system administrator could define primary and secondary data sources from which to load members and data. However, the system administrator could only create drill-through reports from the primary data source.

DB2 OLAP Integration Server enables the OIS system administrator to create a drill-through report that accesses data from the primary data source and to create other drill-through reports that access data from a secondary data source. With this feature, the spreadsheet user can drill through to data from multiple data sources that display on multiple sheets within a single workbook.

Enhanced sSupport for recursive hierarchies

DB2 OLAP Integration Server greatly enhances the support for recursive hierarchies by enabling you to perform the following tasks:

- Use a recursive hierarchy to build an attribute dimension
- Associate attribute members to base dimensions that were built using recursive hierarchies
- Associate attribute members to any level of a recursively built base dimension
- Set the OLAP intersection level of a drill-through report, which includes recursive or parent-child hierarchies, to any level or generation
- Duplicate shared members are now allowed as the default option for a recursive dimension.
- **Move members** is now the default value in the Outline Build tab of the Dimension Properties dialog box. (The default value was formerly **Ignore**.)

Save option in user-defined drill-through report filters

DB2 OLAP Integration Server gives you the option of saving your customized drill-through report filters for later use. After you select and modify a system-generated drill-through report with the Spreadsheet Add-in, you can elect to save the filter and store it in the OLAP Metadata Catalog. Later, you can pick and choose from a list of your customized report filters when performing a drill-through query using the Spreadsheet Add-in.

Replace zeroes with #MISSING option

DB2 OLAP Integration Server, Version 8.1 gives you the option of substituting zero values with the string #MISSING during data loads. This action provides several immediate benefits:

- Fewer input blocks are created during the data load.
- The calculation time required in the OLAP database can be decreased significantly.

During a data load, loading zero values creates blocks in the database. In some scenarios, this can cause unneeded input blocks and hamper performance. DB2 OLAP Integration Server addresses these problems with a search-and-replace option to change zero values to the string #MISSING during the load process.

Protection of changes during disconnects

DB2 OLAP Integration Server prevents the loss of any changes to your OLAP model or metaoutline if you are disconnected from your data source, DB2 OLAP Integration Server, or the OLAP Metadata Catalog. This protection covers all changes that you enter while

editing an OLAP model or metaoutline. If you lose a connection, DB2 OLAP Integration Server lets you reconnect to the source, catalog, or server.

This new feature works only when you start DB2 OLAP Integration Server with the default port (3388).

OLAP model save as and rename commands

DB2 OLAP Integration Server extends the options available when you save an OLAP model. Earlier versions of Integration Services did not keep associated metaoutlines when an OLAP model was saved under a different name. Consequently, you had to rebuild the metaoutlines for the new OLAP model.

The **Save As** command is modified and a new **Rename** command is provided. With these commands, you can choose among the following options when you save an OLAP model:

- Make changes to an OLAP model without losing its associated metaoutlines
- Make changes to an OLAP model without modifying any associated metaoutlines
- Make changes to an OLAP model to create a new model and save the original, unchanged model and metaoutlines

Automatic migration

DB2 OLAP Integration Server for z/OS does not support automatic migration of an OLAP Metadata Catalog. You must run the MCATCRE8 or MCATUPD jobs that are in your SMP library *.*.ADOLPLIB to create or update your OLAP Metadata Catalog.

Rapid display of tables

DB2 OLAP Integration Server displays up to 50,000 tables in the left frame of the OLAP model main window in significantly less time than in previous releases. Earlier versions of Integration Services read all the tables and all the columns to retrieve data. This version reads only the table names and retrieves detailed information later when you expand the tables. This feature enables companies with very large data sources to import source tables rapidly to create OLAP models.

Expanded support of RDBMS data types

DB2 OLAP Integration Server adds several data types to its list of supported RDBMS data types on DB2 and SQL Server. For these databases, the following additional data types are supported:

- DB2: bigint (numeric)
- SQL Server: bigint (numeric), nchar (string), nvarchar (string)

This new feature is not available on DB2 OLAP Integration Server for z/OS because DB2 for z/OS does not support data type BIGINT.

Database reset prior to member loads

DB2 OLAP Integration Server gives you the option of resetting your OLAP database prior to a member load or a member and data load. This feature can significantly reduce the amount of time that is required for the load.

Earlier versions of DB2 OLAP Integration Server provided the option to Delete all members first before a member load or a member and data load. Deleting all members first required that you open the OLAP outline. If the outline was large or if there were drill-through reports in the outline, a significant amount of time was needed to open it. By enabling you to reset the OLAP database prior to the load, DB2 OLAP Integration Server empties the database outline, which eliminates the need to open it before the load can be started.

Cancel button in view sample

In DB2 OLAP Integration Server, the View Sample operation is modified so that you can cancel the operation at any time without exiting from Integration Services or losing any changes that you made to an OLAP model or metaoutline. This feature prevents time-consuming system processing and server disconnects when you access an excessive number of data rows in the relational source.

The following highlights are specific to Release 6.5 of Essbase Integration Services from Hyperion:

Hybrid Analysis

Relational databases can store several terabytes of data. Thus, they have nearly unlimited scalability. Hybrid Analysis, a new function in DB2 OLAP Integration Server, Version 8.1, offers you a method of integrating your OLAP database with a relational database so that you can take advantage of the scalability of the relational database. With Hybrid Analysis, you can support both multidimensional databases and relational databases, operate with almost no limitation on outline sizes, and provide a rapid transfer of data between OLAP databases and relational databases.

How Hybrid Analysis Works:

- Hybrid Analysis integrates an OLAP database with a relational database by allowing a portion of an Essbase multidimensional database to reside in the relational database. This Essbase portion consists of the lowest level members of the dimensions defined for Hybrid Analysis and the associated data of these members.
- Using DB2 OLAP Integration Server Desktop, the data in the relational database is mapped to hierarchies in the Essbase database. Hybrid Analysis thus eliminates the need to load and store members and their data within the OLAP database itself. It is

this feature which combines the efficiency of mass data scalability with the sophisticated data analysis and rapid reporting of DB2 OLAP Server.

Using Hybrid Analysis:

- When using Hybrid Analysis, you create combinations of multidimensional and relational data storages. You define your Hybrid Analysis data storage options through the Integration Services Console at the member level in the metaoutline.
- In the appropriate metaoutline dialog boxes, you perform the tasks necessary for using Hybrid Analysis:
  - Specifying the relational data source for the metaoutline
  - Defining the hierarchy for the applicable dimension
  - Building the metaoutline down to the appropriate level
  - Performing the member and data loads

When you save a metaoutline as Hybrid Analysis-enabled, the console warns you if the metaoutline contains dimensions or transformations that are likely to produce incorrect member names or data values within the Hybrid Analysis data storage.

You query the data from the relational database in much the same manner you query data from an OLAP database, that is, by using reporting tools such as Outline Editor, Essbase Spreadsheet Add-in, Report Writer, and third-party tools.

You can create a Hybrid Analysis storage using the TBC sample application.

The following highlights are specific to Release 6.2 of Essbase Integration Services from Hyperion:

New client console with dynamic Intelligent Help window

DB2 OLAP Integration Server introduces the new DB2 OLAP Integration Server Desktop and companion Intelligent Help window. The new dockable Intelligent Help window contains dynamic links to key program functions to automate the major operations necessary for moving data from a relational database to online analytical processing (OLAP). This convenient new feature provides the following enhanced installation and client component functionality:

- Automatically detects the OLAP model fact table, dimensions, and hierarchies to create an OLAP model
- Automatically detects dimensions and hierarchies in an OLAP model to create a basic metaoutline

Automatic detection of fact table and dimensions

After you click the OLAP Model icon for first-time model creation and log in to the appropriate data source, you can choose to have the OLAP model fact table and all related dimensions created automatically.

A quick-access link to the automatic detection option for creating a fact table is provided in the inline text of the Intelligent Help window (see Intelligent Help on page 19). In addition, a Tools menu option (Tools > Create Fact Table) is available from the OLAP Model main window.

When you select the fact table automatic-detection option using either method, the system displays a Create Fact Table dialog box. This dialog box shows the fact tables detected in the current data source to which you are connected, along with any existing fact tables in the OLAP Metadata Catalog that are present in the current data source. You can select either from a list of fact tables in existing OLAP models or from a list of potential fact table candidates to define the fact table to use. Check boxes in the Create Fact Table dialog box enable you to create the Time and Accounts dimensions automatically. If you prefer, you can create the Time or Accounts dimensions manually at a later time.

For automatic detection of dimensions, you can choose the automatic-detection link in the Intelligent Help window or select Tools > Create Dimensions to initiate the dimension-creation process. The system begins by looking for all tables joined to the fact table with primary-foreign key relationships. Next, it searches for all tables joined to the previously detected tables and adds them to the OLAP model schema. In a database where no primary-foreign key relationships are defined, the system begins by searching for all tables joined to the fact table and then uses the column name and type to determine join keys. If two tables have the same column name and type, the system assumes that the two tables are joined on that column. To reduce the possibility of creating invalid dimensions, the system does not search for join keys in any tables that are not joined to the fact table.

Automatic detection of hierarchies

Like the Create Fact Table and Create Dimensions options, a new option for automatic detection of hierarchies is provided with Version 8.1. Use the automatic-detection link to this option provided in the text of the Intelligent Help window (see Intelligent Help on page 19). Menu commands on the Tools menu in the OLAP Model and OLAP Metaoutline main windows also provide access to this option. From the OLAP Model main window, select Tools > Create Hierarchies;

from the OLAP Metaoutline main window, select Tools > Get Existing Hierarchies. You can choose to create a single hierarchy or multiple hierarchies.

When you select the automatic hierarchy detection option, using either method, DB2 OLAP Integration Server searches for and detects hierarchies that exist in the OLAP Metadata Catalog. The system then displays the detected hierarchies in a hierarchical tree format that includes the dimension name, the hierarchy names, and the associated member names.

Automatic hierarchy detection does not detect any filters contained within the hierarchies. In addition, the system compares the hierarchical structure of the data source with that of the OLAP model dimensions and deletes any invalid columns from the detected hierarchies. For example, if the OLAP model Product dimension contains Category, Family, and SKU columns, but the data source does not contain a Category column, the hierarchy that is returned contains only Family and SKU columns.

Intelligent Help

This feature enhances user convenience and ease of operation. When you open the OLAP Model or OLAP Metaoutline main window to create or modify an OLAP model or a metaoutline, DB2 OLAP Integration Server Console provides a new option known as Intelligent Help to guide you through the process. Intelligent Help is displayed in a separate window that provides numbered procedures, along with links to new automatic detection options and frequently used functions.

Process buttons along the top of the window contain labels for each main group of related tasks. For example, the process buttons for the OLAP Model tasks groups contain the following labels:

- Fact
- Dimension
- Table and Column properties
- Hierarchy
- Finish

The operations that you need to perform to create an OLAP model fall into these main groupings.

Below the task-group process buttons, the Intelligent Help window consists of a right and left frame:

- The left frame lists the major tasks to be performed for each of the process groups.

- The right frame contains detailed, numbered procedures for performing the tasks itemized in the left frame. Links to automatic detection functions and to user interface dialog boxes are provided in this frame, where appropriate.

The Intelligent Help window is a dockable, relocatable window that you can move and resize as you prefer. Integration Services Console displays the Intelligent Help window automatically the first time that you create or open an OLAP model or metaoutline. You can click an icon to undock the Intelligent Help window and move it away from the console. You can click a check box to show or hide the Intelligent Help window at startup, and you can click a Close icon to close the window at any time during a console session.

Both the toolbar and the Tools menu in the OLAP Model and OLAP Metaoutline main windows provide options for selecting Intelligent Help. The system remembers whether the Intelligent Help window was open or closed during your last work session. If the Intelligent Help window is open when you close an OLAP model, the window is displayed automatically when you reopen the model to work on it at a later time.

As always, online help is available to provide in-depth conceptual information and dialog box entry details.

Load optimization

DB2 OLAP Version 8.1 provides five dynamic new load optimization options for improving member and data load performance:

Member load options

- **Use Distinct clause:** If the leaf node of a given dimension should be distinct, you can add the Distinct clause to the Select statement. During a member load, only the distinct combination of columns in the Select statement is returned, resulting in a quicker member load. You might want to use this option, for example, if you have created a Time dimension from the fact table.
- **Use Outer Join:** Using this feature enables you to view all columns in your DB2 OLAP Server database, whether or not the columns between two joined tables are identical.

  The result of a natural (inner) join between two tables includes records where the joined columns match. In any row from Table A in which a join column does not exist in Table B, that row is dropped when data is loaded. In an outer join, however, when an unmatched column is encountered during a data load, the unmatched row is included in the results. The column data of the unmatched portion is replaced with a <NULL> value.

- **Allow Duplicate Shared Members:** Use of this feature enables the same member to be shared multiple times under the same parent, resulting in faster creation of the DB2 OLAP Server outline.

Data load options

- **Remove Extra Joins:** This feature removes extra joins whether or not a surrogate key is used for a data load. If a surrogate key is used in a join, the surrogate key is loaded into DB2 OLAP Server as an alias, and the join is eliminated in the data load.
- **Use User-defined SQL:** This option enables you to use an edited version of the standard SQL generated by DB2 OLAP Integration Server.

  A new OLAP metaoutline SQL Override dialog box displays standard data load Select statements. You can select the statements that you want to edit. The two-frame dialog box shows the current metaoutline in the left frame and three windows in the right frame. The top right-frame window lists the Current Selected SQL and is the window in which you edit Select statements. The center window displays the User-Defined SQL List that you create. The bottom window displays the Standard Data Load SQL generated by DB2 OLAP Integration Server.

  When you have completed editing of standard SQL statements, you can direct the system to use the edited version for a data load by checking the Use User-defined SQL for Data Load option in the OLAP Metaoutline Properties dialog box, Load Optimization tab. For rules and guidelines related to editing the standard data load SQL generated by DB2 OLAP Integration Server, click the Help button in the OLAP Metaoutline SQL Override dialog box.

Sort on alternate column

This feature enables you to sort on a column that resides in the relational data source, but which is not used in the OLAP metaoutline. Sorting on a nondisplayed column is enabled in both recursive builds and generation builds. The dialog boxes that you use to specify ordering and filtering display identical column lists for selection. To prevent multiple selections of the same column, a column that has been selected at any generation of ordering is no longer available for sort selection.

Loading of DB2 OLAP Server properties from database columns

This new feature enables the following DB2 OLAP Server properties to be loaded from database columns in the same way that Consolidation Attributes and UDAs currently are loaded from DB2 OLAP Integration Server into DB2 OLAP Server:

- Two-pass calculation
- Data storage attribute

- Time balance
- Skip type
- Variance reporting
- Formulas

Inclusion of this feature follows the DB2 OLAP Server Administration Services Console model, enabling you to define major DB2 OLAP Server settings from within DB2 OLAP Integration Server. You define these member settings using the metaoutline Member Properties dialog box, Member Info tab. When property values are combined in one database column, you can separate them with a comma or a space (for example: +, Expense, Last, Both). When you use a word to define a property, only the first letter is used during a member load; for example, (O)nly or (E)xpense or (T)wo Pass Calc.

For details on allowable values for properties loaded from database columns, click the Help button in the Member Info tab of the metaoutline Member Properties dialog box.

XML Import/Export

DB2 OLAP Version 8.1 XML Import/Export enables you to import data into and export data from the OLAP Metadata Catalog. You can now quickly transfer OLAP models and metaoutlines from one OLAP Metadata Catalog to another through use of this feature. You can also use an XML-based editor to rename the OLAP model associated with a metaoutline and import the revised data into the OLAP Metadata Catalog. Be sure to use an XML editor that supports UTF 8 UNICODE.

Extensible Markup Language (XML) consists of two parts:

- **Data Type Definition (DTD):** This part describes the allowable structure of XML documents. A DTD defines the major elements within a document, the child elements, and related attributes. It can constrain the pieces of data that occur in a document, the hierarchy of the data that it includes, and the number of times each piece of data occurs. DB2 OLAP Integration Server provides a predefined DTD to ensure that you use the same data format when you create XML documents.
- **XML documents:** This part specifies how to use the tagged markup to indicate the meaning of data, somewhat like a card catalog. In DB2 OLAP Integration Server, the data in an XML document describes the dimensions, members, hierarchies, and settings in OLAP models and metaoutlines. This information is stored in tables in the OLAP Metadata Catalog.

On z/OS, you can use the following XML files from the *OLAP Server library*/Samples/TBCModel on the IFS directory:

- sample_metaoutline.xml
- sample_model.xml
- sample_ha_metaoutline.xml
- sample_ha_model.xml

To use the new XML Import/Export feature, DB2 OLAP Integration Server provides a new dialog box named the XML Import/Export dialog box. Select the **File** > XML Import/Export command from the OLAP Model or OLAP Metaoutline main window to access the dialog box.

You can then select the Import tab and enter the necessary information to open either an OLAP model or metaoutline from an XML file. You can also select the **Export** tab to save an OLAP model or metaoutline as an XML file. Click the **Save As XML File** button, enter an XML file name, and navigate to the directory where you want to save the file.

Incremental update to data

This feature enables you to add to and subtract from DB2 OLAP Server data during member loads and data loads. By default, DB2 OLAP Integration Server updates all dimensions and members. Incremental updating of an existing DB2 OLAP Server outline is faster than updating all dimensions and members. The DB2 OLAP Integration Server Desktop includes an Incremental Update dialog box to use for selecting update options.

For member load, you have the following options:

- Preserve all data (this is the default setting). This preserves all existing data that applies to the changed outline when restructuring occurs.
- Preserve input data. This preserves only those blocks containing data that is loaded.
- Preserve level 0 data. This preserves data only for level zero members.
- Discard all data. This clears all data from the database.

For data load, you have the following options:

- Overwrite (this is the default setting): This replaces the values in the database with the values in the data source.
- Add: This adds values in the data source to the existing values in the database.

- Subtract: This subtracts the values in the data source from the existing values in the database.

For both member and data loads, you have the following Attribute Dimension Restriction options:

- Delete all dimensions (this is the default setting): This deletes all attribute dimensions associated with any base dimension selected for the incremental update.
- No update to existing dimensions: This keeps attribute dimensions unchanged while updating other areas.
- Update existing dimensions: This updates all changes to attributes.

Member load and data load filter options

This feature enables you to limit filters to a member load or a data load, or to apply filters to both member and data loads.

The DB2 OLAP Integration Server Desktop includes a revised DB2 OLAP Server Application and Database dialog box with a simple drop-down list from which to select or deselect filters.

Improved SQL drill-through

This feature takes advantage of the new data load optimizations by including join key optimization in the SQL for drill-through. In join key optimization, the join between a fact table and a dimension table is removed if the join column is the same as the column selected. This results in faster drill-through queries.

Improved access to the server log file

To assist users in analyzing and debugging member and data loads, DB2 OLAP Integration Server now provides two methods of accessing the Server log file:

- During a member or data load, or at any other time, you can select Tools > View Log File to view the Server log file.
- At the completion of a member or data load, a View Log File option button is enabled that you can select to view the Server log file.

In both cases, DB2 OLAP Integration Server retrieves the log data and displays it in the Server Log File window with a date and time stamp for each activity that has occurred during the load. For very large member or data loads, the server retrieves only the last 1 MB of the log file. You can copy the log file and paste it to any text editor, such as Notepad, to print it out for review and analysis.

New sample application

OIS provides a new sample application based on a fictitious company named The Beverage Company (TBC). The TBC sample application demonstrates creating a Measures dimension recursively, using a sort

on an alternate column in the relational data source, and loading metadata from database columns. Additionally, the sample application includes UDAs and Date Time Series data, additional years, new drill-through paths, and a new Time table to demonstrate data load incremental updates.

The TBC sample application includes the following components:

- Sample OLAP Metadata Catalog (TBC_MD)
- Sample data source (TBC)
- Sample OLAP model (TBC Model) and sample OLAP metaoutline (TBC Metaoutline)

For the first time, the sample application OLAP model and OLAP metaoutline are provided in Java-supported XML format.

The DB2 OLAP Integration Server Desktop provides a new Sample Application Setup dialog box that is displayed automatically after installation of DB2 OLAP Integration Server. With the completion of a few simple entries in the dialog box, you can now load the sample application automatically.

This automated feature enables you to create a functional sample application that is ready to use within minutes. You must set up the database for the OLAP Metadata Catalog and the TBC data source, and define open database connectivity (ODBC) connections beforehand. When setting up ODBC connections, the user name that you use when defining the Data Source Name (DSN) for the data source must be TBC (tbc for Informix®) because the sample tables were created using this name.

DB2 OLAP Integration Server for z/OS does not automatically create the new sample application from the client. You or your DB2 administrator must run the SDATCRE8 job that is in your SPM/E library *.*.SDOLPLIB to create the new sample application.

This section describes features that are unique to DB2 OLAP Server for z/OS, Version 8.1:

Tables filtered by creator ID

On z/OS, the DB2 location name is used by the ODBC interface as the ODBC database name. The DB2 location name refers to a DB2 subsystem and frequently there are many more tables in a DB2 subsystem than in a database on a distributed platform. Since it is difficult for a user to find and manage hundreds or more tables in the OIS OLAP Model window, OIS on z/OS allows the user to list only those tables with creator IDs that match a pattern.

By default, OIS lists only tables that have a specific user ID as the creator ID. To access other tables, the user can append + (plus sign) and SQL pattern-value to the DB2 location name. The pattern-value argument can contain:

- The underscore (_) character, which stands for any single character.
- The percent (%) character, which stands for any sequence of zero or more characters.
- Characters that stand for themselves. Letters must be upper case.

These argument values are used on conceptual LIKE predicates in the WHERE clause. To treat the metadata characters (_ and %) as themselves, an escape character must immediately precede the _ or %. The escape character itself can be specified as part of the pattern by including it twice in succession.

If the user wants to list all the tables in the DB2 subsystem, the pattern-value must be either %% or %_ because a single % is interpreted by DB2 as a request for other information.

Using multiple Metadata Catalogs

As provided in version 7.1 PTF UQ67688, Integration Server users have with two options when logging in to OIS:

- The end user can provide a RACF user ID and password only.
- The end user can provide a RACF user ID and password and a RACF group ID.

Providing a RACF group ID allows multiple end users to access the same metadata catalog while not requiring that end users share a user ID or that the DB2 administrator construct synonyms for the OIS metadata catalog tables for each additional end user. To use this mechanism, the DB2 connection exit routine DSN3@ATH or its equivalent must be installed for the DB2 subsystem. Create the metadata catalog with CREATOR (the schema name) of the RACF group ID.

To provide an even more flexible implementation to allow end users to access their own metadata catalogs, you should apply the APAR PQ58787/PTF UQ67626: ODBC User ID and Password. The DB2 ODBC fix enables Integration Server to use multiple user-owned metadata catalogs in one DB2 subsystem. Without this fix, OIS end users can access only the metadata catalog with CREATOR (the schema name) of the OIS administrator ID or RACF group ID.

Connect to multiple Integration Server processes on a single z/OS LPAR

The login panel of the DB2 OLAP Integration Server Desktop allows a user to connect to multiple Integration Server processes on a single

z/OS LPAR or connect to Integration Server using a TCP/IP port other than the default port (3388). Start OLAP Integration Server with a different port number: `olapisvr -P3333`. On the DB2 OLAP Integration Server Desktop, to connect to OIS with port number 3333, provide the server port number after the server name, separated by a colon, for example, `stplex4a.stl.ibm.com:3333`.

Drill through works only with the default port.

MMM and MONTH functions not supported

DB2 OLAP Integration Server for z/OS does not support MMM and MONTH functions in a DataTime column. When a model or metaoutine is built and used either one of these function, the server will generate a query with a DB2 built-in function MONTHNAME which DB2 on 390 does not support.

These functions are used to represent the MONTH format in date column. MMM will display the three letter month name abbreviation and MONTH will display the full month name. Internally, the server code will generate a query with DB2 built-in function MONTHNAME which DB2 on 390 does not support. For example, if the month uses the MMM function, DB2 OLAP Integration Server generates the following query:

```
SELECT   {fn QUARTER(a.TRANSDATE)},
{fn SUBSTRING({fn MONTHNAME(a.TRANSDATE)}, 1, 3)} FROM TBC.SALES a
```

If the month uses MONTH function, DB2 OLAP Integration Server generates the following query:

```
SELECT   {fn QUARTER(a.TRANSDATE)}, {fn MONTHNAME(a.TRANSDATE)}
FROM TBC.SALES a
```

The following highlights are specific to DB2 OLAP Integration Server, Version 8.1 or Essbase Integration Services Release 6.5:

Tables grouped by data source and owner

With multiple data source connectivity, relational tables are listed, categorized, and ordered by the name of the source or owner and by table type. In the left frame of the OLAP Model main window, tables with the same data source and owner are grouped together.

Verification of formulas

DB2 OLAP Integration Server provides a rapid method of verifying and editing static formulas before using the formulas in DB2 OLAP Server. Formerly, when a static formula was entered in DB2 OLAP Integration Server, the formula was passed directly to DB2 OLAP Server without any verification. This often caused the formula to be rejected by DB2 OLAP Server because of simple errors such as

misspellings or missing semicolons. Verifying the formula beforehand can save you significant amounts of time during member and data loads.

Formula verification takes place in the Formula tab of the Member Properties Dialog Box in the metaoutline. During verification, the cursor stops at the location of each error. After correcting the error, you can either start the verification process at the beginning of the formula or choose to find the next error in the formula.

Chapter 2. Configuring your system before you install the server

This chapter describes how to configure your z/OS UNIX System Services (z/OS UNIX) before you install DB2 OLAP Server for z/OS, Version 8.1. This If you are migrating from a previous version of DB2 OLAP Server, see the user memo for instructions on how to migrate your system.

Use the prerequisite checklist to help you prepare for installation.

Prerequisite checklist

This checklist summarizes the tasks that you must complete before you install DB2 OLAP Server and DB2 OLAP Integration Server. Depending on your working environment, these tasks can be performed by several people, including a RACF administrator, a z/OS UNIX system programmer, an MVS system programmer, and a network administrator.

1. Verify that you have the hardware and software required by DB2 OLAP Server and DB2 OLAP Integration Server. See Chapter 3, “Hardware and software requirements”, on page 49.
2. Determine what OLAP products and features you purchased and are entitled to install by checking your packaging invoice.
3. Define the OLAP administrator ID for DB2 OLAP Server for z/OS, Version 8.1. See “Defining the OLAP administrator user ID” on page 32.
4. Define the OIS administrator ID for DB2 OLAP Integration Server. See “Defining the OIS user ID” on page 32.
5. Configure settings in z/OS UNIX and the IEFUSI MVS installation exit. See “Configuring z/OS UNIX” on page 33.
6. Configure the TCP/IP ports that you want to use. See “Configuring TCP/IP” on page 36.
7. Create, format, and mount the zFS file system. See “Installing and configuring the zFS file system” on page 37.
8. Fill in Table 8 on page 127 for the setup.sh program prompts. See Appendix C, “Setup.sh program prompts”, on page 127.
9. Review the following information:
   - “The file structure of DB2 OLAP Server for z/OS” on page 46
   - “The Program Directory” on page 38
   - “Configuring DB2 OLAP Server directories with the setup.sh program” on page 40

- "Checking compatibility with earlier versions" on page 45

Depending on your working environment, these tasks can be performed by several people, including a RACF administrator, a z/OS UNIX system programmer, an MVS system programmer, and network administrator.

Defining the OLAP administrator user ID

The RACF administrator must define a DB2 OLAP Server administrator user ID and password on the z/OS system. If you have earlier versions of DB2 OLAP Server installed, this ID must:

- Be new and unique
- Have z/OS UNIX authorization
- Not have superuser authority
- Own the OLAP home directory (/u/olap81) and its subdirectories and the/u/olap81/is directory and its subdirectories if this user ID will be used to start DB2 OLAP Integration Server

DB2 OLAP Server runs with the RACF authority of this user ID, and you can set its password to not expire.

For more information on home directories, see "Configuring DB2 OLAP Server directories with the setup.sh program" on page 40.

Defining the OIS user ID

You should use the same DB2 OLAP Server administrator user ID to start DB2 OLAP Integration Server. However, if you define a different user ID for the OIS administrator ID, the ID must:

- Be new and unique
- Not have superuser authority
- own the /is/ directory and its subdirectories
- Have z/OS UNIX authorization

DB2 authorizations for this user ID are discussed in the section on OIS configuration. The OIS administrator ID will need the same .profile customizing as the OLAP server administrator ID.

Examples in this document assume you have one administrator user ID, olap81, and that the home directories are subdirectories of /u/olap81.

All users of DB2 OLAP Integration Server must be identified to RACF with a user ID and password.

Configuring z/OS UNIX

To configure z/OS UNIX for DB2 OLAP Server, you must set specific memory and CPU time values

Setting the MAXCPUTIME and MAXASSIZE parameters

Set the MAXCPUTIME parameter to 2147483647 (2 GB-1) and set the MAXASSIZE parameter to 2147483647 (2 GB-1). You can set these parameters by using either of the following methods:

- Edit the SYS1.PARMLIB member BPXPRMxx parameter MAXCPUTIME or MAXASSIZE to set this value.
- Use the SETOMVS or SET OMVS command to set the parameters.

By default, z/OS UNIX limits the amount of CPU time that is available to a process to 1000 seconds. DB2 OLAP Server and DB2 OLAP Integration Server function as daemon processes that service client requests. If the amount of CPU time is not set to a higher value than the default, an OLAP transaction might fail. This CPU value provides a process with unlimited CPU time, which prevents a long-running OLAP process from timing out.

DB2 OLAP Server should always run in an environment where the maximum amount of virtual storage available is 2 GB. Setting MAXASSIZE to a value less than the maximum value increases the probability that DB2 OLAP Server application processes will run out of memory during data loads, calculations (calcs), or dimension builds. Running with the default of 41943040 (40 MB) will cause the server to fail quickly. For more information about the BPXPRMxx parmlib member, see *UNIX System Services Planning* for your version of z/OS or OS/390.

If you do not want to change the global settings for these values in SYS1.PARMLIB, use the RACF ADDUSER and ALTUSER commands to set the MAXCPUTIME and MAXASSIZE values for the DB2 OLAP Server and DB2 OLAP Integration Server administrator IDs only. For more information about the ADDUSER and ALTUSER commands, see *Security Server (RACF) Command Language Reference*.

Setting region size

If DB2 OLAP Server is started from a TSO/OMVS session, you must specify the maximum region size in the **REGION (KB)** field of the TSO logon panel. This value can be determined by placing a **?** in the field and pressing **Enter**. The system will return the maximum region size value.

If this value is significantly less than 2 GB, DB2 OLAP Server application processes might not be unable to load data or perform calculations. If you start DB2 OLAP Server by using BPXBATCH, specify the maximum possible

region size in the REGION parameter in the JOBCARD or job step EXEC statement. For more information about region size and limits, see *MVS Initialization and Tuning Guide.*

Setting the _CEE_RUNOPTS variable

_CEE_RUNOPTS is a z/OS UNIX Language Environment variable to which you can define run-time options that control the behavior of the C runtime (Language Environment) library functions, on which DB2 OLAP Server is built. To minimize memory allocation failures, export the following variables before you start DB2 OLAP Server:

```
export _CEE_RUNOPTS="HEAP(20M,20M,ANYWHERE,FREE, ,),HEAPPOOLS(ON)"
export _CEE_RUNOPTS="$_CEE_RUNOPTS,STACK(13K,13K,ANYWHERE,FREE)"
```

You can modify the value of 20 MB that is used in the previous example. However, the ANYWHERE,FREE parameters should always be specified because they allow allocation of the heap and stack anywhere in virtual memory. Turning on the HEAPPOOLS parameter enables language environment (LE) to efficiently manage requests for small amounts of memory. See the *Language Environment for OS/390 and VM Programming Reference* for more information about the _CEE_RUNOPTS run-time options that govern memory allocation.

Programming the IEFUSI user exit

Memory should not be limited by the IEFUSI user exit. IBM recommends that you bypass normal IEFUSI processing when the subsystem is OMVS.

DB2 OLAP Server spawns processes for each OLAP application. According to the MVS Installation Exits manual, at the time of the IEFUSI processing, the kernel has not yet propagated the parent's region size to the child. Therefore, IEFUSI has nothing to work with. If IEFUSI modifies the region size of the child process, the kernel will honor that region size, and it will not propagate the region size from parent to child.

This can result in a failure of a fork if the region size is insufficient for the storage requirements of the forked process.

If you must run with the IEFUSI exit, be sure that it correctly handles the region size available to the OMVS address space. The IEFUSI exit should be coded to check for OMVS and should not set the x'80' bit in REGFLAGS for OMVS regions. The REGFLAGS x'80' bit means that you use the values that IEFUSI has set into the region size values. This can cause an inappropriate and unintended region size limit for OMVS; it is often 54 MB, but the value can vary by system.

If your IEFUSI exit has not been updated in several years, it is likely that the OMVS address space runs with a 54 MB region size, even though it looks like

it is not limiting the OMVS region size. When IBM added UNIX (Open Edition, then UNIX System Services), they made OMVS a special case that behaves differently from other region types and documented it as being different. Some customers did not amend their IEFUSI exits that predated the introduction of the OMVS region type and did not implement the change that IBM suggested. The suggestion became a requirement when maintenance caused IEFUSI behavior to limit the OMVS region size to 54 MB. OLAP is likely to require more memory than 54 MB and will fail to execute correctly.

New variables were added to the REGION DSECT in recent years, including REGNAME, which can be used to detect the OMVS region. Here is some sample IEFUSI logic:

```
L   BASENAME,REGNAME            check for region type parm
CLC 0(4,BASENAMEN),=CL4'OMVS'   is it OMVS region?
BE  Return
OI  REGFLAGS,X'80'              SET THAT IEFUSI CONTROLS NON-OMVS REGION
```

You can find more information about the IEFUSI exit in *MVS Installation Exits* and DOC APAR OW38477.

APF authorization and program control

Some DB2 OLAP Server and DB2 OLAP Integration Server modules in the HFS need to be APF authorized or program-controlled or both. After DB2 OLAP Server is installed and after any PTFs are installed for maintenance, these modules must have their extended attributes reset to ensure that they remain APF authorized and program- controlled. To reset the extended attributes, you can submit the DOLEXJCL member in your *.*.SDOLBASE target library or execute the script `/usr/lpp/db2olap/v810/bin/essextattr.sh`.

The Java libraries in the HFS must also be APF authorized and program-controlled, but setting the extended attributes for them must be done only once after you install Java, unless you apply Java maintenance later. DOLEXJCL or `essexattr.sh` will not reset Java libraries' extended attributes. For instructions on setting the extended attributes for Java libraries, see "Setting up Java on z/OS" on page 57.

The C and C++ standard library DLL data set CEE.SCEERUN must be program-controlled. For OS/390 systems only, the OS/390 C++ Open Class library DLL data set CBC.SCLBDLL must also be program-controlled.

You can find information about APF authorization in ″Protecting the System″ in *MVS Programming: Authorized Assembler Services Guide* and in *MVS Initialization and Tuning Reference*.

Configuring TCP/IP

The eNetwork Communications Server IP provides networking support for z/OS UNIX. Check the TCP/IP customizing information to run DB2 OLAP Server for z/OS in a client/server environment. See the *z/OS eNetwork Communications Server: IP Configuration* and *TCP/IP Tutorial and Technical Overview* for a description of TCP/IP concepts and protocols.

Obtaining the IP address and host name

Obtain the IP address and host name of z/OS UNIX at your installation. You can issue the z/OS UNIX command **hostname** to display the fully qualified DNS host name of the local system and the USS command **host a.b.c** to get the IP address for host name `a.b.c`, where `a.b.c` represents the host name that is returned by the **hostname** command. For example, you can enter the following command:

```
$ hostname
a.b.c
$ host a.b.c
EZZ8321I a.b.c has addresses 255.255.255.0
```

When you connect to DB2 OLAP Server from Application Manager, Lotus 1-2-3, MS Excel, or any other OLAP client, use either IP address or hostname.

TCP/IP port

By default, DB2 OLAP Server uses TCP/IP port 1423 and DB2 OLAP Integration Server uses TCP/IP port 1433.

Assign these ports to be used by modifying the port assignment table. This table can be located by reviewing your TCP/IP start procedure. The //PROFILE DD statement in the procedure specifies the data set name of the port assignment table. Ports coded in the table are reserved for use by the identifying address space or task name. You can assign ports 1423 and 1433 to OMVS for the DB2 OLAP Server by adding the port statement.

If TCP/IP port 1423 or 1433 is reserved by another address space, you might see the following error:

```
Unable to bind Host server socket on port [1423]
```

When you get this error, you can issue the z/OS UNIX command **netstat -o** to see the address space that uses port 1423 or 1433.

```
$ netstat -o
MVS TCP/IP onetstat CS V1R4       TCPIP Name: TCPIP    20:43:48
Port# Prot User     Flags    Range       IP Address
----- ---- ----     -----    -----       ----------
01423 TCP  OLAP81    DA
```

You can change the default port used by DB2 OLAP Server by following the instructions in “Maintaining and Automating Hyperion Essbase”, “Running Essbase Servers, Applications, and Databases”, and “Changing Port Default Values” in the *DB2 OLAP Database Administrator's Guide.*

You can change the default port used by DB2 OLAP Integration Server by specifying the `-P`*`portnumber`* parameter when you start DB2 OLAP Integration Server. For example, enter `olapisvr -P3333`. Users then specify the alternate port number when they enter the server name during login. For example, users can enter `stlmvs1:3333`.

Installing and configuring the zFS file system

In DB2 OLAP Server for z/OS, Version 8.1, the zSeries File System (zFS) replaces the VSAM datapools. The zFS file system significantly improves I/O performance. In addition, maintaining the zFS file system is much simpler than maintaining datapools.

See the information about zFS installation and configuration in the *Distributed File Service zFS Administration Guide.*

DB2 OLAP Server uses two distinct directories. The product directory contains the product files that were installed by SMP/E from the product tape. The home directory is created and initialized using the `/usr/lpp/db2olap/v810/bin/setup.sh` script. See Configuring DB2 OLAP Server directories with the setup.sh program for more information on home directories.

The DB2 OLAP Server home directory is defined and formatted as a zFS compatibility mode aggregate and is mounted into zSeries File System (zFS) or Hierarchical File System (HFS). The following procedure creates, formats, and mounts the file system for the DB2 OLAP Server home directory, assuming that you will create a VSAM LDS name `OMVS.COMPAT.DB2OLAP` and mount it on mount point `/u/olap81` where your home directory will be.

1. Create and format the file system. The following JCL creates and formats a VSAM LDS as a compatibility mode aggregate.

```
//USERIDA     JOB, 'Compatibility Mode',
//             CLASS=A,MSGCLASS=X,MSGLEVEL=(1,1)
//DEFINE       EXEC     PGM=IDCAMS
//SYSPRINT    DD       SYSOUT=H
//SYSUDUMP    DD       SYSOUT=H
//AMSDUMP     DD       SYSOUT=H
//DASD0       DD       DISP=OLD,UNIT=3390,VOL=SER=PRV000
//SYSIN       DD       *
                    DEFINE CLUSTER (NAME(OMVS.COMPAT.DB2OLAP)-
                    VOLUMES(PRV000,PRV001)-
                    DATACLASS(EXATTR)-
```

```
                    LINEAR CYL(3336 5) SHAREOPTIONS(2))
/*
//CREATE      EXEC    PGM=IOEAGFMT,REGION=0M,
// PARM='-aggregate OMVS.COMPAT.DB2OLAP -compat -size 600480 -grow 300240'
//SYSPRINT    DD       SYSOUT=H
//STDOUT       DD       SYSOUT=H
//STDERR       DD       SYSOUT=H
//SYSUDUMP    DD       SYSOUT=H
//CEEDUMP     DD       SYSOUT=H
//*
```

2. Mount the zFS file system to the z/OS UNIX hierarchy. Note that /u/olap81 must exist and must be available as a mount point
   - The mount command can be issued from TSO or OMVS:

     ```
     MOUNT FILESYSTEM('OMVS.COMPAT.DB2OLAP') TYPE(ZFS)
     MODE(RDWR) MOUNTPOINT('/u/olap81')
     ```

   - From z/OS UNIX:

     ```
     /usr/sbin/mount -t ZFS -f OMVS.COMPAT.DB2OLAP /u/olap81
     ```

The file system can be automatically mounted at IPL time by placing the USS /usr/sbin/mount command in /etc/rc. In z/OS release 1.3 or later, the TSO Mount command can be placed in SYS1.PARMLIB(BPXPRMxx). The automount facility is also supported. See Chapter 11, “Performance monitoring and tuning”, on page 95 for more information about the zFS parameters.

The Program Directory

The Program Directory is a document that is included with your DB2 OLAP Server for z/OS product tape.

The DB2 OLAP Server for z/OS Program Directory provides instructions for installing the base product, and it assumes that you have a basic knowledge of SMP/E. The Program Directory describes the minimum levels of z/OS and DB2 that are required for all functions of the product and the amount of DASD that is required to install the product. It shows the names of all z/OS libraries and zFS directories that are created during the product installation.

If you follow the instructions in the Program Directory, you will execute JCL that will copy several jobs from the product tape into a library whose name you specify. The library will contain JCL that can be used to create SMP/E zones, allocate SMP/E and OLAP libraries, define DDDEFs, create zFS directories, and RECEIVE, APPLY, and ACCEPT the product from the installation tape. If you want to install DB2 OLAP Server for z/OS directly to the /usr/lpp/db2olap/v810 directory, the jobs DOLISMKD and DOLAPPLY must be executed by a user ID that has z/OS UNIX superuser authority. If you want to install to a different high level directory, the user ID needs authority only to write to the selected directory, and that directory must have been created before these jobs are submitted. IBM recommends that you

assign superuser authority by using the UNIXPRIV class profile SUPERUSER.FILESYS. See *z/OS V1R2.0 UNIX System Services Planning* for details. You can edit the JCL to suit the conventions of your environment. The following jobs are copied from the tape into the JCL library:

- DOLACCEP - standard SMP/E ACCEPT JCL
- DOLALA - optional - allocate and initialize new SMP/E CSI data set
- DOLALB - optional - allocates SMP/E data sets, defines zones and SMP/E DDDEF entries
- DOLALLOC - allocates OLAP Target and Distribution libraries
- DOLAPPLY - standard SMP/E APPLY JCL
- DOLDDDEF - define OLAP DDDEF entries
- DOLISMKD - JCL to execute DOLMKDIR REXX Exec to create HFS directories
- DOLMKDIR - REXX Exec to create HFS directories
- DOLRECEV - standard SMP/E RECEIVE JCL

After you have executed DOLAPPLY to install the DB2 OLAP Server parts into the target libraries, you need to open your *.*.SDOLBASE target library. This library is a copy of the library you copied from the tape. It contains the same members DOLACCEP through DOLRECEV and a new member, DOLEXJCL.

DOLEXJCL resets extended attributes of certain files after the product is installed and after maintenance is applied. This job must be executed after the initial product install and every time maintenance is applied. The user ID that executes DOLEXJCL must have read-access permission to the CLASS(FACILITY) BPX. FILEATTR. PROGCTL profile and CLASS(FACILITY) BPX. FILEATTR. APF profile to have the authority to set extended attributes.

Before you install DB2 OLAP Server for z/OS, review the current Preventive Service Planning (PSP) information.

The SMP/E installation creates the DB2 OLAP Server in z/OS UNIX directory `/usr/lpp/db2olap/v810`. This is the default directory name used by the SMP/E process. You can add your own user-defined path prefix, such as `adminid`. Complete instructions are in the DOLISMKD job.

How OLAP files are named

MVS packaging rules require that all product parts follow a naming convention that uses the first three letters of a part's name to identify the product. The prefix assigned to DB2 OLAP Server for z/OS is ″DOL″. Thus, all OLAP parts are installed into z/OS libraries and HFS directories under their official names, DOLxxxxx. However, since OLAP parts were ported from

Hyperion, their real names do not follow this naming convention. Therefore, the installed OLAP product contains two sets of parts whose contents are identical: a set with the official DOLxxxxx names and a set with the real names. You should never have to concern yourself with the official parts; they exist only because of SMP/E and MVS packaging rules. SMP/E will install both sets of parts.

In the HFS, all DOLxxxxx parts are in `/IBM` subdirectories, for example `usr/lpp/db2olap/bin/IBM`. Nothing is executed from IBM directories; they are used only as SMP/E Target Libraries for DB2 OLAP Server for z/OS.

In z/OS libraries, such as the Target Library *.*.SDOLPLIB, parts are members under both the DOLxxxxxx and real names. For example, the JCL that creates a metadata catalog exists in members MCATCRE8 and DOLMCRE8 in the library *.*. SDOLPLIB. The members are identical, but documentation and service personnel will refer to only the real name, MCATCRE8.

Configuring DB2 OLAP Server directories with the setup.sh program

DB2 OLAP Server uses two distinct directories. The product directory is created by the SMP/E job DOLISMKD and files are copied to these directories by the SMP/E job DOLRECEV. The home directory is created and initialized using the `/usr/lpp/db2olap/v810/bin/setup.sh` script. For more information about these directories, see "The file structure of DB2 OLAP Server for z/OS" on page 46.

The setup.sh program creates the following objects:

- The home directory structure and links between the home directories and the product directories
- A file containing the environment variables which must be exported for use by OLAP server: `essbaseenv.doc`
- The DB2 ODBC initialization file: `$ARBORPATH/bin/dsnaoini`
- The DB2 OLAP Server configuration file: `$ARBORPATH/bin/essbase.cfg`
- The DB2 OLAP Server license file: `$ARBORPATH/bin/license.id`

Because the setup.sh program creates the home subdirectories that should be owned by the OLAP administrator ID, you must log in with the administrator ID to run the program.

Your responses to the setup.sh program prompts are encoded in the `$ARBORPATH/bin/license.id` file and summarized and logged in the `$ARBORPATH/bin/license.log` file. If you want to add or remove options later, you can run the `/usr/lpp/db2olap/v810/bin/LICENSE` program, which will ask questions that allow you to modify your license information.

The setup.sh program creates the home directory structure and creates soft links to certain files and directories in the product directories.

```
$ARBORPATH/api/include -> /usr/lpp/db2olap/v810/api/include
$ARBORPATH/api/lib -> /usr/lpp/db2olap/v810/api/lib
$ARBORPATH/api/redist -> /usr/lpp/db2olap/v810/api/redist
$ARBORPATH/app/_tmpinst -> /usr/lpp/db2olap/v810/app/_tmpinst
$ARBORPATH/bin/ESSSVR -> /usr/lpp/db2olap/v810/bin/ESSSVR
$ARBORPATH/bin/essbase.mdb -> /usr/lpp/db2olap/v810/bin/essbase.mdb
$ARBORPATH/bin/license.msg -> /usr/lpp/db2olap/v810/bin/license.msg
$ARBORPATH/bin/msh.man -> /usr/lpp/db2olap/v810/bin/msh.man
$ARBORPATH/is/locale -> /usr/lpp/db2olap/v810/locale
$ARBORPATH/is/bin/essbase.mdb -> /usr/lpp/db2olap/v810/bin/essbase.mdb
$ARBORPATH/is/bin/impexp.class -> /usr/lpp/db2olap/v810/is/bin/impexp.class
$ARBORPATH/is/bin/impexp.ksh -> /usr/lpp/db2olap/v810/is/bin/impexp.ksh
$ARBORPATH/is/bin/ismesg.mdb -> /usr/lpp/db2olap/v810/is/bin/ismesg.mdb
$ARBORPATH/is/bin/model.dtd -> /usr/lpp/db2olap/v810/is/bin/model.dtd
$ARBORPATH/is/bin/motl.dtd -> /usr/lpp/db2olap/v810/is/bin/motl.dtd
$ARBORPATH/is/bin/olapicmd -> /usr/lpp/db2olap/v810/is/bin/olapicmd
$ARBORPATH/is/bin/olapisvr -> /usr/lpp/db2olap/v810/is/bin/olapisvr
$ARBORPATH/is/jar/hisjapi.jar -> /usr/lpp/db2olap/v810/is/jar/hisjapi.jar
$ARBORPATH/java/essbase.jar -> /usr/lpp/db2olap/v810/java/essbase.jar
$ARBORPATH/java/essdefs.dtd -> /usr/lpp/db2olap/v810/java/essdefs.dtd
$ARBORPATH/java/udf.policy -> /usr/lpp/db2olap/v810/java/udf.policy
```

The following diagram shows how the home directories are linked.

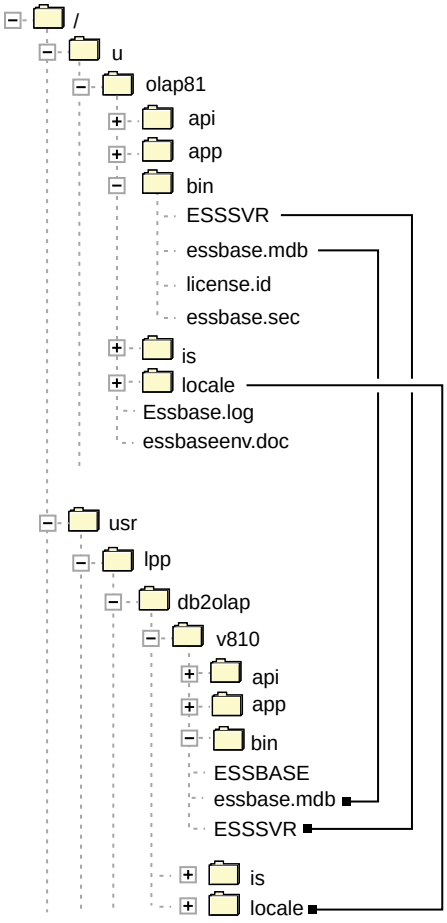

Figure 1. Linked home directories that are created by the setup.sh program

Environment variables

The setup.sh program creates the file `essbaseenv.doc` in the OLAP home directory. This file contains the default settings for environment variables that must be set to run DB2 OLAP Server and DB2 OLAP Integration Server.

Six environment variables specify the language code pages that are used by the client, server, and DB2. To minimize code page translations, the DB2 OLAP Server engine and DB2 OLAP Integration Server internally process data in ASCII and translate to EBCDIC only when they write text files or communicate with DB2 or z/OS. The following language variables control these translations. The settings for these variables for all supported languages are in the user memo.

DB2OLAP_CLIENT_CODESET
The ASCII code page that is used internally by DB2 OLAP Server and DB2 OLAP Integration Server and is the same as the code page used on the Windows client.

DB2OLAP_SERVER_CODESET
The EBCDIC code page used by z/OS. This specifies the encoding of all text files that are stored on the server.

DB2OLAP_DBMS_CODESET
A code page that is used by DB2.

ESSLANG
The language specification that is used by DB2 OLAP Server to display and process language-dependent information.

GC_LANG: Same as ESSLANG
Same as ESSLANG

LC_ALL
The EBCDIC code page that is used by the C/C++ run-time.

The following variables are needed to run DB2 OLAP Server and DB2 OLAP Integration Server:

ARBORPATH
ARBORPATH is the home directory for all files that are created and updated by DB2 OLAP Server during operation. Internally DB2 OLAP Server uses path names based on this variable for all interaction with the file system.

JAVA_HOME
JAVA_HOME is the home directory for the Java executable files.

PATH and LIBPATH
PATH and LIBPATH identify to z/OS UNIX the directories to search for executable files and dynamic link libraries. The `setup.sh` program appends to the current value of each variable the location of the Java executable files and the location of the DB2 OLAP Server and DB2 OLAP Integration Server executable files.

dsnaoini
The name of the DB2 ODBC initialization file that is created by `setup.sh`. See Chapter 6, “Configuring DB2 connectivity”, on page 61 for more information on this file.

_CEE_RUNOPTS
_CEE_RUNOPTS is an environment variable in which you specify options used by the Language Environment (LE) run-time. The options set by the `setup.sh` program increase the default storage allocated to the stack and heap for DB2 OLAP Server. If you

experience problems with memory allocation, you can follow the procedures that are described in the *z/OS Language Environment Programming Reference* in ″Controlling storage allocation″ to tune these variables and other storage variables. Setting both stack and heap run-time options to ANYWHERE rather than BELOW is recommended.

_BPX_SHAREAS

_BPX_SHAREAS is an environment variable that controls whether a process is spawned in the same address space or a new address space. DB2 OLAP Server spawns a new process for each application started. These must be created in new address space for DB2 OLAP Server to function properly.

STEPLIB

The STEPLIB variable enables USS callable services to create or propagate a STEPLIB environment to a new process. The setup.sh program initializes the STEPLIB variable to the data sets needed by the DB2 ODBC/CLI interface. This variable may be eliminated if theses data sets are in the link pack area (LPA) and link list. In addition to the DB2 libraries, CEE.SCEERUN must be available to DB2 OLAP Server. If CEE.SCEERUN is not available, it may be added to the STEPLIB variable. See *z/OS UNIX System Services Planning* for information on making CEE.SCEERUN available.

ISHOME

ISHOME is the home directory for all files that are written by DB2 OLAP Integration Server during operation.

ISLOADINFO

ISLOADINFO is the directory that contains load rule files generated by DB2 OLAP Integration Server.

JDBC_HOME

JDBC_HOME is the location of the DB2 JDBC executable files.

TEMP TEMP identifies a directory where DB2 OLAP Server can create temporary files.

Before you start DB2 OLAP Server, you must export these environment variables. See the installation and configuration instructions in Chapter 4, “Installing and configuring DB2 OLAP Server and DB2 OLAP Integration Server”, on page 53.

Checking compatibility with earlier versions

You should install the version 8.1 OLAP server component with version 8.1 client components. Client components include the Application Manager, Spreadsheet Add-ins for Microsoft Excel and Lotus 1-2-3, and the Runtime Client.

There are limitations when you mix different versions of clients and servers in the same environment:

Newer clients with older servers
Using a client that is newer than the server is not recommended or supported.

Older clients with newer servers
Using a client that is older than the server version is not supported. However, some clients of previous releases might work with the version 8.1 server, although with feature limitations.

Be careful when you modify version 8.1 databases or outlines with earlier releases of Application Manager. If you save a version 8.1 database that contains new version 8.1 features with an earlier release of the Application Manager, the new features might be stripped from the database.

Depending on the service level of an older client, the client might not be able to connect with a newer server. Additionally, the newer server might issue messages that are incorrect in the context of the older client.

One client with many servers
If you need to connect a client to several OLAP servers on different computers or operating systems, you should make them all the same version and service level. Your client should at least be at the same level as the lowest level server. If you experience problems, you might need to use different client computers to match up with the appropriate host, or upgrade all clients and servers to the same service level.

Different versions of clients on the same client system
If you install more than one client component on the same computer, such as the Spreadsheet Add-in and Application Manager, make sure that all of the components are on the same release level. Version 8.1 clients share.dll files whose names are identical to files that are used by earlier client components, but their function might have changed.

IBM components with Hyperion components
IBM does not support mixing OLAP clients and servers from IBM with OLAP clients and servers from Hyperion Solutions. There are some differences in feature mixes, levels, and some issues in licensing

that might cause problems, even though mixing IBM with Hyperion products might appear to work in some situations.

The file structure of DB2 OLAP Server for z/OS

Before you install DB2 OLAP Server, you should understand the file structures that are created during the SMP/E installation and the `setup.sh` program creates.

DB2 OLAP Server runs under the z/OS UNIX component of z/OS and uses the hierarchical file system (HFS) to hold most system and user files in HFS or zFS subdirectories. The multidimensional data that DB2 OLAP Server manages is stored in zFS file systems.

DB2 OLAP Server uses two distinct subdirectory hierarchies. The DB2 OLAP Server system files, including executable files, dynamic link libraries and locale files to support multiple languages, are stored in the OLAP product subdirectory `/usr/lpp/db2olap/v810` by default. User application files, application data, logs, configuration files, and links to system files are stored in the OLAP home subdirectory `/u/olap81` by default and are frequently identified by the environment variable, $ARBORPATH, that points to this subdirectory.

The OLAP product subdirectory should contain only files that are created and maintained by IBM through the product delivery and maintenance process. For ease of maintenance, you should define an HFS or zFS specifically for this purpose. During operation, OLAP server never writes to these subdirectories.

The OLAP home subdirectories should be owned by the user ID that runs the OLAP server process, the OLAP administrator ID. DB2 OLAP Server frequently reads and writes to these directories. Again, for ease of maintenance, you should define a zFS specifically for this purpose.

DB2 OLAP Server objects

The brief descriptions here show how OLAP server objects fit into an overall view of DB2 OLAP Server. The *OLAP Administrator's Guide* contains detailed information about each object and explains how to define them.

Application

In DB2 OLAP Server, an application is a set of OLAP server objects. When you define an application, you give a name to an eventual collection of databases and associated files. A single application, for example, can contain all the data associated with one group or department in your organization. By collecting that data into one application, you can start or stop access to all the data in one operation and grant authorization for access to all the data as a single unit.

Each OLAP server application runs in its own address space and is stored in its own subdirectory in the OLAP home subdirectories: $ARBORPATH/app/*myapp* where *myapp* is your application.

Database

An OLAP server database is a collection of numeric data configured to provide multiple views for users who need to analyze the relationships between data categories. Multidimensional databases consolidate and calculate data to provide different views. Only the database outline, the structure that defines all elements of the database, limits the number of views. With a multidimensional database, users can pivot the data to see information from a different viewpoint, drill down to find more detailed information, or drill up to see an overview.

The outline, data, and other files associated with an OLAP server database are stored in a subdirectory of its application subdirectory: $ARBORPATH/app/*myapp*/*mydb* where *myapp* is your application and *mydb* is your database.

Chapter 3. Hardware and software requirements

This chapter describes the hardware and software that you need to run DB2 OLAP Server on z/OS.

The driving system requires the following hardware and software:

- Any hardware environment that supports the required software
- OS/390 SMP/E Version 2 Release 10 or later

Although there are no specific hardware requirements other than what is required to run the prerequisite software (OS/390 or z/OS and DB2), DB2 OLAP Server for z/OS, Version 8.1 can be resource intensive, especially during the load and calculate phases for OLAP databases larger than trivial examples. For a production environment, you should use the following hardware and software for the target system:

- S/390® G5 or later
- Minimum of two central processors allocated to the logical partition

  To take advantage of the parallel load and calculation features, you should dedicate five or more central processors.
- 2 GB of central storage and 2 GB or more of extended storage for optimal performance
- Fast service time DASD, such as Enterprise Storage Server™ (ESS)
- z/OS Version 1, Release 2 or later, or OS/390 Version 2 Release 10

  If you have OS/390, Version 2.10, you must install PTF UW85090 and PTF UW85093 to create the zFS file system.

Functional requisites

A functional requisite is a product that is not required for the successful installation or basic function of DB2 OLAP Server for z/OS, but it is needed at run time for a specific function of DB2 OLAP Server for z/OS to work. This includes products that are specified as IF REQs. The following table describes what levels of software for DB2 OLAP Server for z/OS are needed to run with other programs, or functions.

Table 2. Minimum software levels needed to run various functions

Minimum VRM/Service Level	Function
DB2 UDB for OS/390, Version 6.1 with PTFs UQ52715 and UQ63281.	DB2

Table 2. Minimum software levels needed to run various functions (continued)

Minimum VRM/Service Level	Function
DB2 UDB for OS/390, Version 7.1 with PTFs UQ55777, UQ63282, and UQ67626	DB2
Java Version 1.3.0 http://www.ibm.com/servers/eserver/zseries/software/java/	Java
Crimson Version 1.1.3 http://xml.apache.org/crimson/index.html	XML parser
JDBC Version 1.2 DB2 UDB for OS/390 and z/OS, Version 7 Application Programming Guide and Reference for Java	JDBC

DASD Storage requirements

DB2 OLAP Server for z/OS, Version 8.1 libraries reside on DASD. You should store data on Enterprise Storage Server (ESS) or the equivalent hardware and software. The following table shows the amount of recommended space for each type of library.

Table 3. The space that is required for different libraries

Library type	Total space required
Target	270 blocks
Distribution	16770 blocks
HFS or zFS	170 MB. One 95 MB HFS for product files (executable files); one 75 MB or more zFS for operational files (application related files). This is the minimum configuration to support sample applications.

Client hardware and software requirements

The system requirements of the Application Manager, the Runtime Client, the Spreadsheet Add-ins for Excel and Lotus 1-2-3, and the DB2 OLAP Integration Server Desktop are described in Table 4.

Table 4. Client requirements for DB2 OLAP Server and DB2 OLAP Integration Server:

Component	Requirement
Microsoft Windows version	• Windows XP • Windows ME • Windows 2000 • Windows NT® 4.0; Service Pack 5 is required by DB2 OLAP Integration Server • Windows 98 The client for DB2 OLAP Server Miner supports Windows 95, Windows 98, Windows ME, Windows XP, Windows NT 4.0, and Windows 2000. Windows NT 3.5.1 is not supported
Microsoft Excel version	Excel 2000, Excel XP
Lotus 1-2-3 version	Lotus 1-2-3 97, plus 9.7, 9.6 and 9.5
Microprocessor	Pentium® or better or equivalent
Display	Resolution of at least 640 x 480 (800 x 600 or more recommended)
RAM	• 16 MB for DB2 OLAP Server Spreadsheet Add-in and Application Manager • 32 MB for the Runtime Client • 64 MB for the DB2 OLAP Integration Server Desktop
Disk space	• 24 MB for Application Manager • 18 MB for the Spreadsheet Add-in for Lotus 1-2-3 • 17 MB for the Spreadsheet Add-in for Excel • 9 MB for the Runtime Client • 45 MB for the DB2 OLAP Integration Server Desktop • 75 MB for the documentation, if you install all of it
Network protocol	TCP/IP

API client hardware and software requirements

The system requirements of the API client development platforms on Windows and z/OS platforms are described in Table 7.

Table 5. API client development platforms

Platform	Supported versions
Windows version	• Windows XP on Pentium or better, or equivalent computers • Windows ME on Pentium or better, or equivalent computers • Windows NT 4.0 on Pentium or better, or equivalent computers • Windows 2000 on Pentium or better, or equivalent computers
z/OS and OS/390 versions	• z/OS version 1.2 or later on G5 or better • OS/390 version 2.10
RAM	• 64 MB RAM (128 or more MB recommended) for Windows 2000, Windows NT, or Windows 98 • Physical memory: 64 MB (256 MB recommended) for z/OS Swap space: At least two times the amount of physical memory is recommended when physical memory is less than 0.5 GB. Contact your system administrator or hardware vendor for optimum swap configuration.
Disk Space	• 15 MB for 32-bit DB2 OLAP Server API on Windows XP, Windows 2000, Windows NT, on Pentium • 10 MB for z/OS

Chapter 4. Installing and configuring DB2 OLAP Server and DB2 OLAP Integration Server

Similar to most z/OS and OS/390 products, DB2 OLAP Server for z/OS is installed and maintained using SMP/E (System Modification Program/Extended). Instructions for installing the server components are in the Program Directory that was included with the product tape. After you install the server by using SMP/E, configure the server component of DB2 OLAP Server and DB2 OLAP Integration Server by following the instructions in this chapter.

After you complete the SMP/E installation, run the setup.sh program to configure the server. One question that the setup.sh program asks is whether you want to install DB2 OLAP Integration Server. If you install DB2 OLAP Integration Server, the setup.sh program sets up the appropriate environment variables and creates the directory structure.

If you do not install DB2 OLAP Integration Server when you install DB2 OLAP Server, you can install it later by running the `/usr/lpp/db2olap/v810/bin/oisinst` program.

Before you install DB2 OLAP Server, ensure that you complete the prerequisite tasks in Chapter 2, "Configuring your system before you install the server", on page 31. Also, if you have DB2 OLAP Server for OS/390, Version 7.1 or earlier installed, see the instructions for migrating in the user memo before you start the installation.

To install and configure the DB2 OLAP Server and DB2 OLAP Integration Server:

1. Follow the instructions in the Program Directory to install the server by using SMP/E. If another group in your company is assigned the SMP/E installation, verify with them that the installation is complete. For general information about the Program Directory, see "The Program Directory" on page 38.
2. Open a z/OS UNIX shell with your OLAP administrator user ID. See "Defining the OLAP administrator user ID" on page 32 if you need to create the OLAP administrator user ID.
3. Change the current directory to point to the product directory: `/usr/lpp/db2olap/v810/bin`.

4. Configure the server by running the setup.sh program from the product directory. Enter the following command: `./setup.sh`. See Appendix C, "Setup.sh program prompts", on page 127 for the list of prompts.

   You can install DB2 OLAP Integration Server later by running the `/usr/lpp/db2olap/v810/bin/oisinst` program.

5. Export the environment variables by adding the command `. /u/olap81/essbaseenv.doc` to the .profile file of the OLAP administrator user ID.
6. Optional: Install Java for both DB2 OLAP Server and DB2 OLAP Integration Server. See Chapter 5, "Installing and configuring Java", on page 57.
7. Optional: Configure DB2 to use DB2 OLAP Integration Server or SQL Interface. Follow the instructions inChapter 6, "Configuring DB2 connectivity", on page 61.
8. Optional: Create Metadata Catalogs if you installed DB2 OLAP Integration Server. See Chapter 8, "Creating OLAP Metadata Catalogs for DB2 OLAP Integration Server", on page 73.
9. Install the client components. See "Installing DB2 OLAP Server and DB2 OLAP Integration Server clients" on page 66. See "Setting up client installation from a network file server" on page 68 if you want to install Windows clients on a LAN (local area network) so that your users can download and install them without the product CD.
10. Optional: Install DB2 OLAP Server Miner. See "Installing DB2 OLAP Server Miner on Windows" on page 67.
11. Optional: Set up the sample applications. See Chapter 9, "Setting up the sample applications", on page 77.

    Successfully setting up sample applications and loading data into the sample databases verifies that your installation was successful.
12. Log off the z/OS UNIX shell. Then log on again with the OLAP administrator user ID so that the new settings in the .profile file will take effect.
13. Start DB2 OLAP Server in the foreground. See "Starting DB2 OLAP Server for the first time".

Starting DB2 OLAP Server for the first time

Starting DB2 OLAP Server for first time adds the OLAP administrator user ID and company name to the `essbase.sec` file.

To start DB2 OLAP Server for the first time:

1. Log on to z/OS UNIX from a TSO session or a Telnet session. You must log on with the OLAP administrator ID the first time you start DB2 OLAP

Server. Ensure that you run the `.profile` file that was created during installation and stored in the DB2 OLAP Server home directory (`/u/olap81`).

2. Start the DB2 OLAP Server in the foreground by entering `ESSBASE`.
3. Enter your company name at the next prompt.
4. Enter `Yes` if the company name and DB2 OLAP Server administrator ID is correct. You can run DB2 OLAP Server only with the user ID that is displayed.

After you complete these steps, you should see the message:

```
Waiting for Client Requests...
```

You can now stop DB2 OLAP Server and start it in background mode, in foreground mode, or as a batch job. For information about starting and stopping DB2 OLAP Server, see "Starting and stopping DB2 OLAP Server and DB2 OLAP Integration Server" on page 93.

Chapter 5. Installing and configuring Java

This chapter describes how to enable DB2 OLAP Server and DB2 OLAP Integration Server to work with the Java Runtime Environment (JRE), the Java API for XML Parsing (JAXP), an XML parser, and JDBC.

DB2 OLAP Server for z/OS, Version 8.1 requires Java for custom-defined functions. DB2 OLAP Integration Server requires Java for the metaoutline and model export/import utility.

The JRE, JAXP, XML parser, and JDBC must be installed on the computers that run the server component. After the Java components are installed on your system, use the Java Development Kit (JDK) to create custom-defined functions. A JDK is not supplied with DB2 OLAP Server or DB2 OLAP Integration Server.

Setting up Java on z/OS

To enable Java to work with both DB2 OLAP Server and DB2 OLAP Integration Server on z/OS:

1. Install the Java Runtime Environment (JRE). If Java 1.3 is not currently installed, download Java 1.3 from the IBM Java Web site. See www.ibm.com/servers/eserver/zseries/software/java.
2. All Java libraries must be APF authorized and program-controlled. You must authorize the Java libraries because DB2 OLAP Server runs as an APF authorized program. The Java libraries must also be program-controlled because DB2 OLAP Server must communicate with RACF. You must ensure that all Java libraries located in `$JAVA_HOME/bin` and `$JAVA_HOME/bin/classic` are APF authorized and program-controlled because some Java libraries are loaded when you start a DB2 OLAP Server application and database. To make the libraries APF authorized and program-controlled, enter the following command:

   ```
   extattr +ap $JAVA_HOME/bin/*.so $JAVA_HOME/bin/classic/*.so
   ```

3. Set the following environment variables for the user ID that will run DB2 OLAP Server:

   ```
   JAVA_HOME=/usr/lpp/java/J1.3
   PATH=$PATH:$JAVA_HOME/bin:$JAVA_HOME/bin/classic
   LIBPATH=$LIBPATH:$JAVA_HOME/bin:$JAVA_HOME/bin/classic:$JAVA_HOME/lib
   ```

   If these environment variables do not already exist, they are specified in `$ARBORPATH/essbaseenv.doc` by the `setup.sh` program.

4. Install the Java API for XML parser (JAXP). An XML parser is not supplied with DB2 OLAP Server and DB2 OLAP Integration Server, so you must download a parser from an appropriate Web site. DB2 OLAP Integration Server uses an XML parser called Crimson, which can be downloaded free of charge from the Apache XML Project Web site: xml.apache.org. You must install Crimson, release 1.1.3 or later, which includes JAXP. Earlier Crimson releases, such as version 1.1.2 beta 2, do not include JAXP. If you use an earlier release, you must install JAXP separately. You can download JAXP from Sun Microsystems. To install the XML parser Crimson, follow these steps:
   a. Download the Crimson distribution from the Apache Web site: xml.apache.org
   b. Extract the archive.
   c. Copy the `crimson.jar` to your `$JAVA_HOME/lib/ext` directory. Java 1.3 is automatically directed to the jar archives that are stored in `$JAVA_HOME/lib/ext`. See your Java documentation for more information.

Configuring DB2 OLAP Server to use JRE

To configure DB2 OLAP Server to use the JRE:

1. Set the JVMMODULELOCATION parameter. This parameter is set in the `essbase.cfg` file by the `setup.sh` program so that you can designate a specific installation of the JRE to use with DB2 OLAP Server. This setting is useful if you have multiple versions of Java installed on the machine that is running the OLAP server component. To set the JVMMODULELOCATION parameter, you must specify the full path and file name of the Java Virtual Machine (JVM) library, for example, `$JAVA_HOME/bin/classic/libjvm.so`.

   To set JVMMODULELOCATION, open the `$ARBORPATH/bin/essbase.cfg` file and add the following setting:

   `JVMMODULELOCATION` *`path to java virtual machine library`*

   For example, you can enter the following parameter:

   `JVMMODULELOCATION /usr/lpp/java/J1.3/bin/classic/libjvm.so`

2. Optional: Set JVM startup options. If DB2 OLAP Server does not work with Java after you set up Java on z/OS, you might need to set startup options for the Java Virtual Machine (JVM). You can make DB2 OLAP Server use specific JVM startup options when it loads the JVM by setting the environment variables ESS_JVM_OPTION1 through ESS_JVM_OPTION9 in your `essbase.cfg` file.

Verifying that JRE is installed correctly

To verify that the installation is successful:

1. Start DB2 OLAP Server.

2. Start any one of the sample applications that is provided with DB2 OLAP Server or create a new application. See Chapter 9, “Setting up the sample applications”, on page 77 if you want to use a sample application.
3. Verify that the application started correctly by viewing the server output. You can find this output in the server console or in the output file that you specified in your JCL for DD STDOUT. The following text is from sample output:

   ```
   [JVM] IBM Corporation [1.3.1]
   [JVM] Classic VM [1.3.1]
   [JVM] z/OS OS/390 [01.04.00]
   [JVM] Installing Java security manager
   ```

4. Verify that the application started correctly by looking in your application log. Your application log will contain a message like the following message:

   ```
   [Sat Jun 15 14:48:37 2002]Local/Demo///Info(1200480)
   Loaded and initialized JVM module
   ```

JDBC

JDBC is used by the import/export utility of DB2 OLAP Integration Server. You can find JDBC installation and setup instructions in the JDBC and SQLJ Administration chapter in *DB2 UDB for OS/390 and z/OS Version 7 Application Programming Guide and Reference for Java.*

You can test the connection between DB2 and DB2 OLAP Server by using the JDBCtest.java test program. To compile and execute the JDBCtest.java program:

1. Verify that Java and JDBC are installed.
2. Set `JDBC_HOME` directory to the directory that contains the DB2 JDBC installation, for example `/usr/lpp/db2/db2710`.
3. Compile the JDBCtest.java program by entering:

   ```
   javac $ARBORPATH/java/JDBCtest.java
   ```

4. Execute the JDBCtest program by entering the following command on one line:

   ```
   java -classpath $ARBORPATH/java:$JDBC_HOME/classes/db2sqljclasses.zip
   JDBCtest DSNX
   ```

   The classpath must contain the path of the `db2sqljclasses.zip` file and the directory of the `JDBCtest.class` that was created in the command shown in step 4. If they are listed in the CLASSPATH environment variable, they do not need to be entered at the command line.

If the JDBCtest program runs successfully, you will output similar to the following text:

```
jdbc:db2os390:DSNX
COM.ibm.db2os390.sqlj.jdbc.DB2SQLJConnection@7ab9e7ab[pCONN=1c9b3d88]

 product name:DSN07010

 product version:07.01.0000

 driver name:DSNAJDBC

 driver major version:1

 driver minor version:0
```

See the JDBC and SQLJ Administration chapter in *DB2 UDB for OS/390 and z/OS, Version 7 Application Programming Guide and Reference for Java* to resolve JDBC installation and setup problems.

Chapter 6. Configuring DB2 connectivity

If you want to use either DB2 OLAP Integration Server, SQL interface, or Hybrid Analysis, you must configure DB2 to connect with DB2 OLAP Server.

Configuring Resource Recovery Services

DB2 OLAP Integration Server and hybrid analysis need the z/OS resource recovery services (RRS) component to be activated and to work with DB2 for z/OS.

Resource recovery consists of protocols and programming interfaces that allow an application program to consistently change to multiple protected resources that are managed by multiple resource managers. z/OS includes services that, when requested, can coordinate changes to one or more protected resources managed by a resource manager. The RRS ensures that all changes are made or none of them are made.

Neither DB2 OLAP Server nor DB2 OLAP Integration Server use the RRS protocols directly. However each program maintains independent threads of DB2 work on behalf of different users. DB2 for z/OS and RRS separate each user's work.

For information on configuring RRS, see *MVS Setting Up a Sysplex*.

Configuring DB2 for z/OS for DB2 OLAP Server and DB2 OLAP Integration Server

Before starting OLAP Integration Server, follow these steps to configure the DB2 environment on your system. No connection is made to DB2 until a user logs on to the Integration Server Desktop or attempts to read data using the SQL interface.

Checking DB2 parameters in DSNZPARM

Ensure that the following two parameters are set as shown in your DSNZPARM:

- CACHEDYN=YES
- MAXKEEPD=5000

If they are not set, you must modify these two parameters in the job DSNTIJUZ in the *.*.SDSNSAMP data set. Stop the DB2 subsystem, run this job, and restart DB2.

Ensure that your system is at the correct PTF level that is needed on DB2 for z/OS. For software and hardware requirements, see Chapter 3, “Hardware and software requirements”, on page 49.

Be sure that the code pages for DB2 for z/OS, DB2 OLAP Server, and DB2 OLAP Server client applications are appropriate for your language. See the user memo for a list of code page values.

Enabling the DB2 ODBC interface

DB2 Open Database Connectivity (ODBC) is callable SQL interface that is used by DB2 products. It is a C and C++ application programming interface for relational database access, and it uses function calls to pass dynamic SQL statements as function arguments. DB2 ODBC is based on the Microsoft® Open Database Connectivity (ODBC) specification, and the X/Open Call Level Interface specification.

On DB2 for z/OS, DB2 ODBC support is implemented as a CLI/ODBC driver that is loaded at run-time into the application address space.

DB2 OLAP Server for z/OS uses ODBC to communicate with DB2 for z/OS. You must set up the ODBC environment for your operating system and make sure that the ODBC works with DB2 OLAP Server for z/OS.

To enable the DB2 ODBC interface:

1. Ensure that ODBC modules are restored in your DB2 library. ODBC modules are shipped on separate tapes from the DB2 base code.
2. Check the `dsnaoini` file in the `$ARBORPATH/bin` directory. Ensure that the MVSDEFAULTSSID value is the subsystem ID of DB2 to connect.

For more information, see the DB2 *ODBC Guide and Reference*.

The setup.sh program automatically creates the `dsnaoini` file, which is an ODBC initialization file. The settings in this file allow the Recoverable Resource Manager to make multiple concurrent connections using ODBC. If you plan to use the SQL Interface, the MVSDEFAULTSSID parameter must be set with the ID of the DB2 subsystem that contains the DB2 OLAP Integration Server metadata catalog or your source data. Here is a sample `dsnaoini` configuration file:

```
[COMMON]
MULTICONTEXT=1
CONNECTTYPE=1
MVSDEFAULTSSID=DBH1
[DBH1]
MVSATTACHTYPE=RRSAF
```

Testing the connectivity between DB2 and DB2 OLAP Server

To ensure that the connectivity between DB2 OLAP Server and DB2 works correctly, DB2 OLAP Server provides a test program called CLITEST.

To run CLITEST:

1. Log on to the z/OS UNIX system using the OLAP administrator user ID by using a Telnet session or the OMVS command from TSO.
2. Check the `dsnaoini` file in the `$ARBORPATH/bin` directory. Ensure that the MVSDEFAULTSSID value is the subsystem ID of DB2 to connect.
3. Ensure that the DB2 subsystem and RRS are started.
4. Execute the CLITEST test in the directory `/usr/lpp/db2olap/v810/bin`.

You are prompted to enter your database name, which is the DB2 location name for the DB2 subsystem identified in the ODBC initialization file.

Here is a sample of the output from the CLITEST program:

```
/u/olap81 >CLITEST
**** Entering CLITEST.

Please enter database location name: STPLEX4A_DSN7
SQLAllocEnv was successful.

SQLAllocConnect was successful.

SQLConnect was successful.

SQLGetInfo was successful.

Multiple connection support is enabled.

The following data sources are available:
ALIAS NAME                      Comment(Description)
------------------------------------------------------
STPLEX4A_DSN7
STPLEX4A_DSN6
OLP7
DB7A
SAMPLE

SQLDriverConnect to STPLEX4A_DSN7 was successful.

**** CLITEST succeeded.

**** Exiting CLITEST.
```

The list of data sources displayed by CLITEST are the contents of the DB2 catalog table SYSIBM.LOCATIONS.

If you see the message `The module DSNAOCLI was not found`, check that the DB2 CLI modules are specified in the $STEPLIB environment variable or in the link list. You might need to execute the profile file (.profile) in the DB2 OLAP Server home directory: `/u/olap81`. Then, run CLITEST again.

If you get a message, such as `The module DSNAOCLI was not found`, execute the profile file (.profile) in the DB2 OLAP Server home directory `/u/olap81`. Then run CLITEST again.

Chapter 7. Installing clients on Windows

This chapter describes how to install the Windows client components for DB2 OLAP Server for z/OS and DB2 OLAP Integration Server for z/OS.

Before you install clients

Before you install clients, determine if you want to install IBM DB2 OLAP Server Miner. See Chapter 1, “What’s new in Version 8.1”, on page 3 for more information about OLAP Miner. Determine if you need to place the installation files for the client components on a network so that your users can install the clients without having a CD-ROM. For more information, see“Setting up client installation from a network file server” on page 68.

Make sure that you consider the following important changes about how clients are installed in version 8.1.

Do not install in a directory whose name includes blanks

If you install version 8.1 on a Windows computer on which you have an earlier version of DB2 OLAP Server, and if you accepted the default installation directory name when you installed the earlier version, some functions in version 8.1 might fail. In earlier versions, the default installation directory name contained blanks, which causes the failure. Additionally, other functions might produce unpredictable results if the name of the installation directory contains underscores, dashes, or other special characters. If you install DB2 OLAP Server for z/OS, Version 8.1 as a first-time installation, you are prompted for an installation directory. The new default directory for version 8.1 has the correct naming scheme, but if you choose to store DB2 OLAP Server in a different directory, it is strongly recommended that your directory name does not contain blanks, underscores, dashes, or other special characters.

If you install version 8.1 to a different directory than your version 7.1 installation, remember to update your environment settings to point to the new installation directory.

The Relational Storage Manager is not available in version 8.1

The Relational Storage Manager (RSM) is withdrawn from version 8.1. If you upgrade from DB2 OLAP Server, Version 7.1 or earlier and you have applications that use the RSM, you must migrate them to the Multidimensional Storage Manager (MSM). See the user memo for information about migration.

During installation, you are asked what edition and options you purchased. This information is used to build a license key for DB2 OLAP Server.

Installing DB2 OLAP Server and DB2 OLAP Integration Server clients

To install and set up Windows clients for DB2 OLAP Server:

1. Insert the DB2 OLAP Server CD into the CD-ROM drive to start the installation program. If the program does not start automatically, you can run `setup.exe` from the root directory.
2. Click **Next**. To cancel installation at any time, click **Cancel**. To display Help at any time, press F1.
3. Press **Accept** to accept the Software License Agreement.
4. On the Select Installation Options panel, make sure that **Client** and **z/OS Enabled** are selected, and click **Next**.
5. Select the language that you want and click **Next**.
6. On the Choose Destination Location panel, enter the drive and directory where you would like to install the clients for DB2 OLAP Server, and click **Next**. If you install the OLAP clients on a network, the network drives will be displayed in the Drive drop-down menu. IBM strongly recommends that you install the clients for DB2 OLAP Server for z/OS to a new separate directory. Do not install to directory in which a product other than DB2 OLAP Server for z/OS is installed.
7. On the Select Installation Type panel, you must select **Custom** to enable and install DB2 OLAP Integration Server, other client components, and documentation. If you select the **Typical** or **Compact** options, DB2 OLAP Server installs only a subset of the documentation. To install all the documentation, choose **Custom** and select the books that you want.
8. On the Select Components panel, select the clients and documentation that you want to install. Expand the tree views for **Client and Server Documentation** and **Integration Server Documents** to see which books you can install.

   If you want to install OLAP Miner, you must expand the tree views for the **Client Components** and select **API Runtime**. Click **Next**.
9. Enter a name for the folder into which the clients are installed, or accept the default. Click **Next**.
10. Click **Next** to start copying the files to your computer. You might need to restart your computer after the files are copied.

Network protocol files

Network protocol files implement the TCP/IP protocol that you select when you install OLAP client software. The client software (for example, Essbase Spreadsheet Add-in) is installed with a separate `essnet.dll`. Network protocol files reside in the `bin` directory with the DB2 OLAP Server program files.

Installing DB2 OLAP Server Miner on Windows

DB2 OLAP Server Miner, also called OLAP Miner, is a feature of DB2 OLAP Server that applies a sophisticated data mining algorithm called Deviation Detection to the data stored in OLAP cubes. The algorithm scans slices of cubes and identifies values that deviate from the norm. The results of a data mining run can be used by the business analyst to focus on the interesting or surprising values in context of the source OLAP cube. You can still use the usual slice, dice, and drill operations to explore the data, but now you let the values discovered by OLAP Miner drive your analysis. See the *OLAP Miner User's Guide* for information about what OLAP Miner can do for you.

OLAP Miner requires the DB2 OLAP Server API to be installed on the Windows computer on which you install the OLAP Miner server. Java is a requirement for OLAP Miner.

OLAP Miner has server and client components that run on Windows only. You can install the OLAP Miner client on the same computer as the OLAP Miner server or on another computer.

To install OLAP Miner on Windows:

1. Insert the DB2 OLAP Server client installation CD into your CD-ROM drive.
2. Find the `OLAP_Miner\win32` directory on the CD.
3. Run the `setup.exe` file to begin the installation program.
4. The installation program prompts you for the following information:
   - If you install the OLAP Miner server, you need
     - The alias name of the OLAP server that you will use for OLAP Miner.
     - The host address (or IP address) of the server component of DB2 OLAP Server. The address is added to the `bin\omclient.cfg` file.
   - If you install the OLAP Miner client, you need the host address (or IP address) of the Windows computer on which the OLAP Miner server is installed.

You can set up a silent installation so that your users do not have to type responses to the prompts of the installation program. To set up a silent installation:

1. Record your responses to the OLAP Miner installation program prompts. To record your responses, run the following command:

   ```
   setup.exe -r
   ```

   This will record your responses to the installation prompts into a file called `setup.iss`, which is stored in the main Windows directory. On

Windows NT and Windows 2000 the file is stored in `c:\WINNT`, and on Windows 98, the file is stored in `C:\Windows`.

2. Copy the `setup.iss` file into a temporary directory on the computer on which you install OLAP Miner.
3. To run the silent installation, run the `setup.exe` command by using the `–s` parameter (for silent installation) and the `–f1` parameter, which indicates the location of the `setup.iss` file. For example, if you store the `setup.iss` file in the C:\TEMP directory, enter the following command:

   ```
   setup.exe -s -f1C:\TEMP\setup.iss
   ```

Setting up client installation from a network file server

With DB2 OLAP Server, Version 8.1 you can installing the OLAP client components from a shared network file server. The alternative is to install them locally, one at a time, directly from the CD.

Installing OLAP clients over a network has the following advantages over locally installed clients:

- The users in your enterprise can all use the same level of client.
- You can deploy clients to larger numbers of users at the same time, which is often faster than passing a CD from user to user.
- You can apply FixPaks to the common client code and have your users upgrade together.
- The network clients take up less disk space than locally installed clients.

Although network clients offer the same function as locally installed clients, there are important difference between them:

Locally installed clients
: Locally installed clients are installed directly from the CD. They include all the client executable files. The installation program adds Start menu shortcuts, updates the Windows registry, and updates environment variables. Because client operations are completely local and do not load or interpret code over a network, local clients might offer better performance than network clients.

Network clients
: Network clients are installed from a file server. They do not include any executable files, and therefore take up less room and store fewer files than locally installed clients. The installation program adds **Start** menu shortcuts, updates the Windows registry, and updates environment variables. Network clients all use the same language and connect to the server using the same network protocol.

The network client feature installs clients of DB2 OLAP Server and OIS. OLAP Miner clients are not enabled for network installation; they must be installed directly from the CD.

There are two major steps in setting up a network installation, and they are performed by two different users:

1. The system administrator runs the DB2 OLAP Server installation program to load the client image onto the file server. The computer from which the system administrator does this is called the image owner computer. The client image consists of executable files plus a second installation program that your network client users can run to install the network clients. See "Loading the client image onto the network".
2. The network client users install the network clients by running the second installation program. See "Installing the clients from the network" on page 70.

Loading the client image onto the network

The instructions in this section are intended for the system administrator, who loads the common client image onto the network.

Before you begin, you need to designate one client computer as the client image owner, and decide which user ID you will use to load the client image:

- The image owner computer should not be one that is likely to be removed from the system. If the image owner computer crashes or is removed from the system, the network client users can continue running the clients, but the system administrator must take extra steps to apply FixPaks. See "Maintaining the common clients" on page 71 for more information.
- The user ID with which the image owner computer accesses the file server must have administrator authority and read/write privileges on the file server.

To load the client image onto the network:

1. Connect to the file server. Whatever drive letter you assign will be the same drive letter that the network client users must use when they connect to the file server. For example, if you designate the file server as the `p:` drive, the network client users have to connect the file server as their `p:` drive.
2. Insert the DB2 OLAP Server CD into the CD drive on the computer that you designate as the client image owner computer. If the installation program does not start automatically, run the `setup.exe` file in the `\Win32` directory of the CD.
3. On the IBM DB2 OLAP Server Setup panel, click **Next**.
4. On the Software License Agreement panel, read the licence terms. If you accept them, click **Accept**.

5. On the Select Installation Options screen, select **Client** and **Store executables on network**, and then click **Next**.
6. Select the language you want and click **Next**.
7. On the Choose Destination Location screen, select the drive letter of the file server from the **Drive** box.
8. In the **Directory** field, either accept the default value or click **Browse** to select a different path name. Click **Next**.
9. On the Select Installation Type panel, select either **Typical**, **Compact**, or **Custom**. You must select **Custom** to install the clients for OIS.

   It is recommend that you select **Custom** so you can select which online books are installed with the network client. If you choose **Typical** or **Compact**, the installation program only installs a small subset of the documentation.

   If you selected **Custom**, the Select Components panel appears. Open the Client and Server Documentation item in the tree view and select the documentation you want to make available to the network client users. It is recommended that you select all the documentation the network client users will need.

   Click **Next**.
10. On the Select Folder panel, either accept the default name of the folder or enter a new one. Click **Next**.
11. On the Start Copying Files panel, click **Next**. The network client image is copied to the file server.

The next step is to inform the network client users how they can install the network clients. They need the following information:

- The drive letter that you selected when loading the client image onto the file server. The network client users must select the same drive letter when they connect to the file server.
- The directory on the file server that contains the installation program for the network clients.
- The path of the Windows clients for DB2 OLAP Server. The path is set in the ARBORPATH variable.

The next section, “Installing the clients from the network”, describes how this information is used when installing the network clients.

Installing the clients from the network

The instructions for installing clients from the network are in the `netinst.htm` file, which is in the same directory as the client image installation file. Ensure your users can access these directions.

Maintaining the common clients

IBM FixPaks for DB2 OLAP Server can apply service upgrades to the client image stored on the file server.

The following steps describe how to to apply FixPaks for common clients:

1. The system administrator logs on to the image owner computer.
2. The system administrator connects to the file server using the same user ID under which the common client image was originally loaded onto the file server.
3. The system administrator runs the FixPak installation program.
4. The network client users connect to the file server and run the updated `netinst.exe` file to apply the FixPak to their computers. If there are new client products in the client image, then they will be added to the your computer. If clients were removed from the file server, then they will be removed from your computer.

If the image owner computer crashes or is removed from the system, the network client users can continue running the clients. However, the system administrator cannot apply FixPaks without first taking the following steps:

1. Designate a new client image owner computer.
2. Remove the common client image from the file server.
3. Reinstall the original network client image from the new client image owner computer.
4. Apply the FixPak as described in this section.

Adding additional client software later

If you install DB2 OLAP Server for z/OS and later want to add more features, select one of the following methods:

- Select **Modify Component or License Information** from the **Start → Programs → IBM DB2 OLAP Server 8.1 - z/OS** menu.
- Run the `SETUP.EXE` program either from the root directory or from the CD-ROM.
- Use the Windows Add/Remove Software utility, which is available from the Control Panel.

Configuring the Spreadsheet Add-ins

If you have Microsoft Excel or Lotus 1-2-3 on your Windows computer when you install the Spreadsheet Add-in clients, the DB2 OLAP Server client installation program automatically configures your spreadsheet program with the Spreadsheet Add-ins.

But if you reverse the order of installation (installing DB2 OLAP Server clients and then installing a spreadsheet program), you must configure your Spreadsheet program manually. To configure a spreadsheet program manually:

- From the **Start → Programs → IBM DB2 OLAP Server 8.1 - z/OS** menu, select **Modify Component or License Information**.
- Select **Modify** on the Maintenance panel and click **Next**.
- On the Modify Entry panel, click **Configure Spreadsheet Add-in** and click **Next**.

The installation program configures your spreadsheet program with the Spreadsheet Add-in.

Chapter 8. Creating OLAP Metadata Catalogs for DB2 OLAP Integration Server

An OLAP Metadata Catalog is a DB2 database that contains 33 tables in which DB2 OLAP Integration Server stores OLAP models and metaoutlines.

You can have more than one OLAP Metadata Catalog and, by using the XML Import/Export utility, you can move OLAP models and metaoutlines from one OLAP Metadata Catalog to another.

Before you run DB2 OLAP Integration Server, you must create an OLAP Metadata Catalog to store the OLAP models that you create and the metaoutlines that you build from the OLAP models.

If you want to use the sample application to learn DB2 OLAP Integration Server, go to Chapter 9, "Setting up the sample applications", on page 77. The sample application has its own relational data source, OLAP Metadata Catalog, OLAP model, and metaoutline. Return to this chapter when you are ready to use a relational data source to build OLAP models and metaoutlines.

This chapter describes what to consider before you create an OLAP Metadata Catalog in DB2.

Before you create OLAP Metadata Catalogs

Before you start DB2 OLAP Integration Server, you must create the set of DB2 tables that contain DB2 OLAP Integration Server data, the Metadata Catalog. Sample JCL to create the Metadata Catalog is located in hlq.SDOLPLIB(MCATCRE8). It contains DDL to define a storage group, database and tablespace to contain the Metadata Catalog and SQL DDL to define all the tables in the Metadata Catalog. You must modify the JCL to meet the conventions of your environment. You must have DB2 SYSADM authority to run all the SQL in this job. Your DB2 database administrator can change the storage group, database, or tablespace names to meet any local conventions. You cannot change the table names.

DB2 OLAP Integration Server uses the DB2 creator ID for the tables in the Metadata Catalog to support multiple Metadata Catalogs. Depending on the version of DB2 and whether DB2 ODBC APAR PQ58787 / PTF UQ67626 is applied, DB2 OLAP Integration Server provides users with two options when logging in to DB2 OLAP Integration Server:

- The end user can provide a RACF user ID and password only.

- The end user can provide a RACF user ID and password and a RACF group ID. The RACF group ID is entered in the **OLAP Metadata Catalog** field following the DB2 location name and separated by a colon.

Providing a RACF group ID allows multiple end users to access the same Metadata Catalog and does not require that these users share a user ID or that the DB2 administrator construct synonyms for the DB2 OLAP Integration Server Metadata Catalog tables for each additional end user. To use this mechanism, the DB2 connection exit routine DSN3@ATH or its equivalent must be installed for the DB2 subsystem. Create the Metadata Catalog with CREATOR (the schema name) of the RACF group ID.

To provide a flexible implementation to allow end users to access their own Metadata Catalogs, you should apply the DB2 ODBC APAR PQ58787 / PTF UQ67626. DB2 OLAP Integration Server does not require that the DB2 ODBC APAR fix PQ58787 be installed to use DB2 OLAP Integration Server. However, the DB2 ODBC fix enables DB2 OLAP Integration Server to use multiple user-owned Metadata Catalogs in one DB2 subsystem. Without this fix, DB2 OLAP Integration Server end users can access only the Metadata Catalog with CREATOR (the schema name) of the DB2 OLAP Integration Server administrator ID or RACF group ID.

Without DB2 ODBC APAR PQ58787 / PTF UQ67626 , you can select:

- DB2 OLAP Integration Server administrator ID Metadata Catalog
- RACF group Metadata Catalog

With DB2 ODBC APAR PQ58787 / PTF UQ6762, you can select:

- Group Metadata Catalog
- User owned Metadata Catalog

The DB2 ODBC APAR PQ58787 / PTF UQ6762 is available for DB2 Version 7 only. Use the following table to determine the options that are available with PTF UQ6762.

Table 6. Metadata Catalog options that are available with PTF UQ6762

PTF UQ6762	DB2 Version 6	DB2 Version 7	Group name specified	Metadata Catalog
No	Yes		No	OIS administrator ID
No	Yes		Yes	group specified at login
No		Yes	No	OIS administrator ID
No		Yes	Yes	group specified at login
Yes		Yes	No	user specified at login
Yes		Yes	Yes	group specified at login

Configuring data sources for DB2 OLAP Integration Server

To create OLAP models or build metaoutlines, you must connect DB2 OLAP Integration Server to both an OLAP Metadata Catalog and a relational data source. To make these connections, you must first specify your DB2 subsystem in your dsnaoini file. This is done only on the computer that runs DB2 OLAP Integration Server.

You need to set your STEPLIB environment variable to point to your DB2 load libraries that match the DB2 subsystem that you specify in your dsnaoini file.

Accessing alternate data sources by using DB2 OLAP Integration Server

When you connect to DB2 OLAP Integration Server, you must indicate what Metadata Catalog to use and what tables to include as the data source. On the distributed platforms, the user provides an ODBC database name as the data source, and DB2 OLAP Integration Server displays all the tables in the database in the left-hand column of the OLAP Model window.

On z/OS, the DB2 location name is used by the ODBC interface as the ″ODBC database″ name. The DB2 location name refers to a DB2 subsystem, and frequently there are many more tables in a DB2 subsystem than in a database on a distributed platform. Since it is difficult for a user to find and manage hundreds or more tables in the DB2 OLAP Integration Server OLAP Model window, DB2 OLAP Integration Server on z/OS allows the user to list only those tables with creator IDs that match a pattern.

By default, DB2 OLAP Integration Server lists only tables that have a specific user ID as the creator ID. When using DB2 for OS/390, Version 6.1 or DB2 for OS/390, Version 7.1 without APAR PQ58787/PTF UQ67626 applied, the default creator ID is the user ID used to start DB2 OLAP Integration Server. When using DB2 for OS/390, Version 7.1 with APAR PQ58787/PTF UQ67626 applied, the default creator ID is the user ID specified in the Data Source window.

To access other tables, the user can append ″+″ (plus sign) and SQL pattern-value to the DB2 location name. The pattern-value argument can contain:

- The underscore (_) character, which stands for any single character.
- The percent (%) character, which stands for any sequence of zero or more characters.
- Characters that stand for themselves. Letters must be upper case.

These argument values are used on conceptual LIKE predicates in the WHERE clause. To treat the metadata characters (_ and %) as themselves, an escape character must immediately precede the _ or %. The escape character itself can be specified as part of the pattern by including it twice in succession.

If the user wants to list all the tables in the DB2 subsystem, the pattern-value must be either %% or %_ because a single % is interpreted by DB2 as a request for other information.

Although all tables that meet the naming pattern will be listed, the user can use only those tables to which the DB2 OLAP Integration Server administrator user ID has READ authority.

For example, to list all tables with a creator ID starting TB, enter the DB2 location ID, followed by +TB%. The DB2 location ID is what DB2 on OS/390 uses as a database name. The OLAP Model window displays all tables with creator IDs that start with TB.

Chapter 9. Setting up the sample applications

This chapter describes how to set up the sample applications for DB2 OLAP Server and DB2 OLAP Integration Server.

DB2 OLAP Server offers four sample applications. These sample applications are based on The Beverage Company (TBC), a fictional company that manufactures and sells soft drinks.

- The main application used in the documentation is called Sample. It contains three databases: Basic, Interntl, and Xchgrate. The latter two contain specific features that correspond to the currency conversion option.
- The second application, called Demo, contains one database, Basic, which is referred to in the *Technical Reference*.
- The third application, called Samppart, is the first of two applications designed to show the features of Partitioning. Samppart contains a Company database that is the target of a partitioned database.
- The fourth application, called Sampeast, is the second of two applications designed for Partitioning. Sampeast contains an East database that is the source of data for a partitioned database.

DB2 OLAP Integration Server offers a sample application that contains these features:

- A database for a fictitious company called The Beverage Company (TBC)
- A sample OLAP model and metaoutline created from the TBC database
- A Hybrid Analysis-enabled OLAP model and metaoutline
- A special OLAP Metadata Catalog to store the sample OLAP models and metaoutlines and any additional OLAP models and metaoutlines that you create using the sample data

Setting up samples for DB2 OLAP Server

This section describes how to set up the sample applications for DB2 OLAP Server. First you must create the samples.

To create sample applications:

1. Log on to the z/OS UNIX system with the OLAP administrator user ID by using a Telnet session or the OMVS command from TSO.
2. Execute the program by entering the following command: `SAMPLE`.
3. Respond to the prompts for server hostname, OLAP administrator user ID, and password.

Loading the sample databases for DB2 OLAP Server

To prepare the sample databases, you must load data into them. Each of the sample databases has a corresponding data load file.

Table 7 shows the sample applications, the databases that are contained within them, and their corresponding data load files:

Table 7. Sample databases and data load files

Application	Database	Data load file
Sample	Basic	Calcdat
	Interntl	Currcalc
	Xchgrate	Rates
Demo	Basic	Data
Samppart	Company	Calccomp
Sampeast	East	Calceast

To load data into the sample databases, select an application and database and the corresponding data load file from Table 7 and complete these steps.

1. Open Application Manager.
2. Connect to the server on which the application is installed.
3. From the Applications list box, select one of the applications.
4. From the Databases list box, select one of the databases.
5. From the Database drop-down menu, select **Database** > **Load Data**. The Data Load dialog box is displayed. The Data Load dialog box is described in detail in the Application Manager online help, and in the *Database Administrator's Guide*.
6. Click the **Find** button above the **Data files** list box to locate a data file to load. The Open Server Data File Objects dialog box is displayed.
7. Ensure that **List Objects of Type** is **Text files**.
8. From the **Objects** list box, select a data load file.
9. Click **OK** to close the dialog box. DB2 OLAP Server updates the Data Load dialog box to display the file you selected.
10. Click **OK** to load the selected file. The data file is a fully calculated data set. It may take several minutes to load, and then the Data Load Completed dialog box is displayed.
11. Click **Close**.

Providing user access to the sample applications

DB2 OLAP Server provides a comprehensive security system for a secure multiple user environment. By default, the sample applications are created

with a security access level of None, which means that no user can connect to the sample databases unless the user is defined as a supervisor.

The OLAP administrator user ID (OLAP admin ID), automatically has supervisor privilege. Therefore, the OLAP admin ID can make the sample applications available to other users.

To provide all users with Write access to the sample databases, repeat the following procedure for each database.

1. Log on using the OLAP admin ID account.
2. Open the Application Manager.
3. Connect to the server on which the application for which you want to provide access is installed.
4. From the Applications list box, select the application.
5. Select **Application** > **Settings**. The Application Settings dialog box is displayed.
6. From the **Minimum Database Access** group, select the **Write** option and click **OK** to save the setting. DB2 OLAP Server closes the dialog box and returns you to the Application Manager window.

You can also use Administration Services to perform this task, using the Application Properties window. See the Administration Services Online Help for more information.

The applications are now ready for use. If you want to use the Partitioning applications, follow the instructions in "Setting the environment for the partitioning sample applications". If you do not want to use the Partitioning applications, your next step might be to create the appropriate user names to be able to log on to DB2 OLAP Server. See "Authorizing users for DB2 OLAP Server" on page 92 for information about user IDs and defining the user IDs to DB2 OLAP Server.

Setting the environment for the partitioning sample applications

DB2 OLAP Server includes two sample applications and databases that show the features of Partitioning:

- Samppart, Company
- Sampeast, East

These applications and databases include partition definitions that are stored in `.ddb` files. The `.ddb` files define the map between member combinations in the target database, Company, and the source database, East. The *Database Administrator's Guide* describes Partitioning, member combinations, and the differences between target and source databases.

For these applications to work in your environment, you need to match or change the information contained in the `.ddb` files.

To use the applications:

1. Create a user ID that:
   - is defined to RACF
   - is defined on both the source and target OLAP servers
   - has designer level authorization to the source and target OLAP databases

   These actions are necessary because the sample partitions use this user ID to transfer data between the Company database and the East database.
2. Change the server name that is embedded in the applications.

   Do not edit the `.ddb` files to change this information. Instead, complete the steps in the following sections: "Creating the partition user" describes how to create the required user name, so that your users can use these applications. "Changing embedded server names in the sample partition definitions" on page 81 describes how to change the embedded server name to your server name.

Creating the partition user

You must designate a RACF user ID to be the partition user before you work with the Samppart and Sampeast applications. The partition user must have Application Designer access to both applications.

To create the Partition user:

1. Select an existing RACF user ID, such as the DB2 OLAP Server administrator user ID.
2. Open the Application Manager.
3. Using a user name that is a supervisor or that has Create/Delete Users, Groups privilege, connect to the server on which the Samppart and Sampeast applications are installed.
4. Click **Security** > **Users/Groups**. The User/Group Security dialog box opens.
5. Click **New User**. The New User dialog box opens.
6. In the **Username** text box, type in the RACF user ID. Be sure to use all lower case letters.
7. In the **Password** text box, type a password. DB2 OLAP Server displays asterisks in the place of the characters you type. Type the password again in the **Confirm Password** text box.
8. Click **App Access**. DB2 OLAP Server displays the User/Group Application Access dialog box.

9. From the **Applications** list box, select Sampeast and click App Designer in the Access group.
10. Select Samppart from the **Applications** list box, then click App Designer in the Access group.
11. Click **OK** to return to the New User dialog box.
12. Click **OK** to return to the User/Group Security dialog box.
13. Click **Close**.

You can also use Administration Services to perform this task, using the User Properties window. See the online help for Administration Services for more information.

Changing embedded server names in the sample partition definitions

The following steps change the embedded server name in the partition definition files (.ddb) to your server name. The .ddb files shipped with Samppart and Sampeast are based on the server name of stplex4b.stl.ibm.com.

To change the host name in the Samppart Company .ddb file, follow these instructions:

1. In the Application Manager window, select the **Samppart** application and **Company** database.
2. From the **Database** drop down menu, select **Partition Manager**. If the Partition Manager dialog box does not open, you might not have purchased and installed Partitioning. Contact your DB2 OLAP Server system administrator.
3. Under the **Source Cube** heading, select the first definition entry, stplex4b.stl.ibm.com:SampEast: East.
4. Click **Edit**. The Dangling Remote Reference dialog box opens. Because you are not connected to a server named **stplex4b.stl.ibm.com**, DB2 OLAP Server warns you before it allows you to edit the definition.
5. Click **Advanced**. The Fix Dangling Partition Reference dialog box opens.
6. In the **Action** group, select **Correct the invalid partition reference.**
7. In the **Server** text box in the **Reconnect** group, replace **stplex4b.stl.ibm.com** with your host name.
8. Click **Apply**. DB2 OLAP Server displays the Partition Manager dialog box.
9. Under the Source Cube heading, select the second definition entry, stplex4b.stl.ibm.com:SampEast:East.
10. Repeat 4 through 8.
11. Under the Target Cube heading, select the only sample definition entry, stplex4b.stl.ibm.com: Sampeast: East.
12. Repeat 4 through 8.

13. Select **Partition** > **Close** to return to the Application Manager window.

To change the host name in the Sampeast East `.ddb`:

1. In the Application Manager window, select the `Sampeast` application and `East` database.
2. From the **Database** drop down menu, select **Partition Manager**. The Partition Manager dialog box opens.
3. Under the **Source Cube** heading, select the only the definition entry, `stplex4b.stl.ibm.com: Samppart: Company`.
4. Click **Edit**. The Dangling Remote Reference dialog box opens. Because you are not connected to a server named **stplex4b.stl.ibm.com**, DB2 OLAP Server warns you before it allows you to edit the definition.
5. Click **Advanced**. The Fix Dangling Partition Reference dialog box opens.
6. In the **Action** group, select **Correct the invalid partition reference**.
7. In the **Server** text box in the **Reconnect** group, replace **stplex4b.stl.ibm.com** with your host name.
8. Click **Apply**. The Partition Manager dialog box opens.
9. Under the Target Cube heading, select the first definition entry, `stplex4b.stl.ibm.com: Samppart: Company`.
10. Repeat steps 4 through 8.
11. Under the Target Cube heading, select the second definition entry, `stplex4b.stl.ibm.com: Sampeast: East`.
12. Repeat steps 4 through 8.
13. Select **Partition** –> **Close** to return to the Application Manager window.

Changing embedded partition user name in the sample partition definitions

The following steps change the embedded partition user name in the partition definition files (`.ddb`) to your selected partition user name. The `.ddb` files shipped with Samppart and Sampeast are based on the partition user name of `olapusr`.

To change the user name and password in the Samppart Company `.ddb` file and Sampeast East `.ddb` file:

1. In the Application Manager window, select the Sampeast application and East database.
2. From the **Database** drop down menu, select **Partition Manager**. The Partition Manager dialog box opens.
3. Under the Source Cube heading, select the only definition entry, `<your hostname>: Samppart: Company`.
4. Click **Edit**. The Partition Wizard dialog box opens and is set on the **Connect** tab.

5. Click the **Admin** tab.
6. Change the Username **olapusr** and Password ******** to the partition user name and password for both the Data Source and Target.
7. Click **Close**.
8. Select **Save to Servers** and click **OK**.

   Selecting **Save to Servers** changes the user name and password of the partition user name in the Samppart Company and Sampeast East `.ddb` files.
9. Under the Target Cube heading, select the first definition entry, `<your hostname>: Samppart: Company`.
10. Repeat 4 on page 82 through 9.
11. Under the Target Cube heading, select the second definition entry, `<your hostname>: Samppart: Company`.
12. Repeat 4 on page 82 through 9.
13. Click **Partition –> Close** to return to Application Manager.

To verify that the user name and password are changed and to validate the partition definition:

1. In the Application Manager window, select the Samppart application and Company database.
2. From the **Database** drop down menu, select **Partition Manager**. The Partition Manager dialog box opens.
3. Under the Source Cube heading, select the first definition entry, `<your hostname>: Samppart: Company`.
4. Click **Edit**. The Partition Wizard dialog box opens and is set on the **Connect** tab.
5. Click the **Admin** tab.
6. Verify that the Username and Password match your partition user name and password for both the Data Source and Target.
7. Click the **Validate** tab.
8. The following message appears: `Warning: Not yet validated in this session!`.
9. Click the **Validate** tab.
10. The message changes to `...Validating...` and then to `Validated` when the validation process completes.
11. Click **Close**.
12. Repeat 2 through 7 for both the second definition under Source Cube, and for the only definition under Target Cube.

Loading Data into Samppart and Sampeast

After setting up the environment for the Samppart and Sampeast databases, you need to load data into each database. This topic shows you how to load the Samppart Company database.

1. Open the Application Manager.
2. Connect to the server on which Samppart is installed.
3. From the **Applications** list box, select Samppart.
4. From the **Databases** list box, select Company.
5. From the **Database** drop-down list, select **Load Data**. The Data Load dialog box is displayed.
6. From above the Data files list box, click the **Find** button. The Open Server Data File Objects dialog box is displayed.
7. Ensure that **List Objects of Type** is **Text files**.
8. From the Objects list box, select `CALCCOMP`.
9. Click **OK** to close the dialog box.
10. Click **OK** to load the selected file.
11. Click **Close**.

Repeat for the Sampeast application, East database, and calceast data file.

Samples for DB2 OLAP Integration Server

The procedures in this section assume that you know how to create a database by using a relational database management system (RDBMS) and that you installed the required database client software. The procedures assume that you know how to execute JCL to create tables and load them with data.

Setting up the sample application involves two main tasks:

1. Create two relational databases: one for the data in the TBC sample application and one for the OLAP Metadata Catalog database. This is a manual task that you must perform before setting up the sample application.
2. Create tables in each of these databases and load data into them by using the JCL that is provided with DB2 OLAP Integration Server.

After you set up the sample application, the OLAP Metadata Catalog contains an OLAP model (TBC Model) and a metaoutline (TBC Metaoutline) based on data in the sample TBC relational data source.

If you installed the sample application from a previous release of DB2 OLAP Integration Server, you should back up and preserve your existing sample

database, OLAP Metadata Catalog, and the OLAP models and metaoutlines that OLAP Metadata Catalog contains. You can then upgrade your existing catalog so that it is compatible with the current release of the software. However, you cannot store newly-created OLAP models and metaoutlines in your previous catalog.

This section tells you what to consider before and after you set up the sample application. This section describes the JCL that you must run to create and load the TBC database and the OLAP Metadata Catalog.

The procedures in this section assume that you know how to create a database by using a relational database management system (RDBMS) and that you installed the required database client software. The procedures assume that you know how to execute JCL create tables and load them with data. For information on these topics, see the documentation for the RDBMS that you use.

About the DB2 OLAP Integration Server samples

DB2 OLAP Integration Server provides a sample database based on a fictitious company named The Beverage Company (TBC) and includes the following components:

- Sample OLAP Metadata Catalog
- Sample data source (TBC)
- Sample OLAP model (TBC Model) and sample OLAP metaoutline (TBC Metaoutline)
- Additional sample data that demonstrates Hybrid Analysis functionality.
- Additional sample Hybrid Analysis-enabled OLAP model (HA TBC Model) and sample Hybrid Analysis-enabled OLAP metaoutline (HA TBC Metaoutline)

The sample OLAP models and metaoutlines are provided as XML files, supported by Java. The sample application demonstrates how to create a Measures dimension recursively, using a sort on an alternate column in the relational data source. It also shows how to load metadata from database columns. Additionally, the sample application includes UDAs and Date Time Series data, additional years, drill-through paths, and a Time table to demonstrate data load incremental updates.

For DB2 users, the sample application also provides sample data, a sample OLAP model, and a sample OLAP metaoutline that demonstrate Hybrid Analysis functionality.

Setting up the sample application

Before you set up the sample application, ensure that DB2 is installed. When you set up the sample application, you must use a system on which the server component of DB2 OLAP Integration Server and DB2 are both installed.

To use DB2 OLAP Integration Server, you need to execute JCL to create a Metadata Catalog specifically for the Sample data and to set up the Sample application. Read the instructions in each job to ensure that you entered all the information that is required to run the job.

Create the OLAP metadata catalog by submitting the MCATCRE8 member of the *.*.SDOLPLIB target library. This job contains the DDL to define a storage group, database, and table space that will contain the Metadata Catalog and the tables in the catalog.

To set up the Sample application, create the table space and tables, load data into the source tables, and load data into the metadata catalog by using the following steps:

1. Create the tablespace, database, and tables.

   Submit the SDATCRE8 member of the *.*.SDOLPLIB target library. This job creates DB2 OLAP Integration Server Server (DB2 OLAP Integration Server) sample source data to use with the DB2 OLAP Integration Server Samples. It contains the DDL to create a table space to contain the source tables. Before you submit this job, you must have successfully executed the MCATCRE8 job.

2. Load data into source tables.

   Submit the LOADSDAT member of the *.*.SDOLPLIB target library. This job loads the DB2 OLAP Integration Server sample source data to use with the sample model. It uses the DB2LOAD utility to load the data tables.

3. Edit the sample XML files in the directory where you installed the client, for example, `c:\ibm\db2olap\is\sample\tbcmodel`. Change all occurrences of *TBC* to the creator ID of the DB2 OLAP Integration Server sample tables in your SDATCRE8 member of the *.*.SDOLPLIB target library.

4. Load sample data into the OLAP Metadata Catalog by using the XML Import/Export utility in the DB2 OLAP Integration Server Desktop.

   a. Click **File —> XML Import/Export —> Open XML File**.

   b. Browse for the directory where you installed the client, for example, `c:\ibm\db2olap\is\sample\tbcmodel`.

   c. Select `sample_model.xml`. Then click **Import to Catalog**.

   d. Repeat 4b and 4c to import the sample metaoutline. You need to import the`sample_metaoutline.xml` file.

After you set up the sample application

You must connect to DB2 from the DB2 OLAP Integration Server Desktop to create, modify, and store TBC OLAP models and TBC metaoutlines. To make these connections, each subsystem must be specified in your `/u/olap81/bin/dsnaoini` file.

When you connect to the DB2 OLAP Integration Server Desktop, you can view TBC columns, tables, OLAP models, and metaoutlines. For more information, see "Viewing TBC tables, columns, OLAP models, and metaoutlines".

Viewing TBC tables, columns, OLAP models, and metaoutlines

After you set up the sample application and specify your DB2 subsystem in your dsnaonin file, you can view TBC tables, columns, OLAP models, and metaoutlines.

1. Start DB2 OLAP Integration Server and the DB2 OLAP Integration Server Desktop
2. In a blank DB2 OLAP Integration Server Desktop window, select **Connections** > **OLAP Metadata Catalog** > **Connect**, and connect to the OLAP Metadata Catalog.
3. In the **New** tab, double-click the **OLAP Model** icon.
4. In the Data Source dialog box, connect to your DB2 subsystem where you created the TBC sample.

To see the OLAP model (TBC Model) in the right frame of the DB2 OLAP Integration Server Desktop:

1. Start DB2 OLAP Integration Server and the DB2 OLAP Integration Server Desktop
2. If the Login dialog box is not already open, in a blank DB2 OLAP Integration Server Desktop window, select **Connections** > **OLAP Metadata Catalog** > **Connect**.
3. Connect to the OLAP Metadata Catalog.
4. Click the **Existing** tab, select `TBC Model`, and click **Open**.

   DB2: To view the Hybrid Analysis-enabled OLAP model, select `HA TBC Model`.
5. In the Data Source dialog box, connect to the DB2 subsystem where you created the TBC sample database.

To see the metaoutline (TBC Metaoutline) in the right frame of the DB2 OLAP Integration Server Desktop:

1. Start DB2 OLAP Integration Server and the DB2 OLAP Integration Server Desktop.

2. If the Login dialog box is not already displayed, in a blank DB2 OLAP Integration Server Desktop window, select **Connections** > **OLAP Metadata Catalog** > **Connect**.
3. Connect to the OLAP Metadata Catalog.
4. Click the **Existing** tab, then click the plus symbol (+) to the left of `TBC Model` to expand the view, and select `TBC Metaoutline`.

   DB2: To view the Hybrid Analysis-enabled metaoutline, click the plus symbol (+) to the left of `HA TBC Model` to expand the view, and select `HA TBC Metaoutline`.
5. Click **Open**. The Data Source dialog box opens.
6. In the Data Source dialog box, connect to the DB2 subsystem where you created the TBC sample database.

Part 2. Administration

Chapter 10. DB2 OLAP Server operations and utilities

Instructions for developing DB2 OLAP Server applications and DB2 OLAP Integration Server models and metaoutlines are provided in the manuals that are in the docs directory of the DB2 OLAP Server client. The activities that are unique to the z/OS environment are described in this chapter.

DB2 OLAP Server configuration utilities

DB2 OLAP Server provides several utilities to confirm that the z/OS, UNIX System Services, and DB2 configurations meet the requirements for DB2 OLAP Server operation.

CLITEST
Confirms the connection to DB2 for z/OS through the ODBC interface. See "Testing the connectivity between DB2 and DB2 OLAP Server" on page 63.

JDBCtest.java
Confirms the connection to DB2 for z/OS through the JDBC interface

MEMCHECK
Tells you how much memory is available after all OLAP loaded dll files and the cache sizes are checked. DB2 OLAP Server spawns a z/OS UNIX process whenever an application is activated. ESSSVR, the executable file that runs in that process, has substantial memory requirements, which if not met, can severely decrease performance of the server, or even prevent ESSSVR from starting. MEMCHECK is a stand-alone program that can be used to determine if enough memory will be available for the ESSSVR executable file to start. See the user memo for more information about using MEMCHECK.

PWDTEST
Confirms the connection to the security manager (RACF). See "Authorizing users for DB2 OLAP Server" on page 92 for more information.

SAMPLE
Creates the SAMPLE OLAP applications

Authorizing users for DB2 OLAP Server

All DB2 OLAP Server and DB2 OLAP Integration Server users must be authorized to read or update the data that they use. DB2 OLAP Server provides mechanisms to protect your data from unauthorized access from the server level to the level of an individual cell in a multidimensional database. You can find more information about the DB2 OLAP Server security system is in the ″Designing and Building a Security System″ section of the *DB2 OLAP Server Database Administrator's Guide.*

In the z/OS environment, DB2 OLAP Server uses the z/OS security manager (RACF) or an equivalent product to maintain the passwords for DB2 OLAP Server users. Each user must be defined to the security manager with a password. User IDs and passwords can follow any conventions or restrictions of your environment.

For a user to use DB2 OLAP Server, you must add the user's RACF user ID to the list of users in DB2 OLAP Server by using Application Manager or the MaxL or ESSCMD interface. When you add a user ID to DB2 OLAP Server, you must provide a password, which is ignored. The only password that is used by DB2 OLAP Server is the user ID's RACF password. Do not select the option **User must change password at next login**. Use the option that is provided by RACF, not DB2 OLAP Server, for this function to change your password.

DB2 OLAP Server does not recognize RACF groups. If you want to use groups to encompass all your user IDs, you can create OLAP groups by using the DB2 OLAP Server security system.

You can confirm the connection between the z/OS security manager and DB2 OLAP Server by using the PWDTEST program. To use PWDTEST:

1. Start the z/OS UNIX shell from a TSO or Telnet session by using the DB2 OLAP Server administrator ID.
2. Enter `PWDTEST`.
3. Answer the prompts for the user ID and password.

The most common configuration error that PWDTEST encounters is that some module used by PWDTEST and DB2 OLAP Server is not defined as *program controlled*. The job *.*.SDOLPLIB(DOLEXJCL) sets the program control extended attributes for DB2 OLAP Server modules. See the *z/OS Security Server RACF Security Administrator's Guide* for more information.

Authorizing users for DB2 OLAP Integration Server

DB2 OLAP Integration Server uses elements of the z/OS security manager and DB2 authorization mechanisms to ensure that users are authorized to access to your data. Each user must be defined to the security manager with a password. User IDs and passwords can follow any conventions or restrictions of your environment. When a user logs in, DB2 OLAP Integration Server confirms that the user ID and password are accepted by RACF.

Each DB2 OLAP Integration Server user must have DELETE privileges for the selected Metadata Catalog tables and have SELECT privileges on the source data and the DB2 catalog.

To allow multiple users to share a Metadata Catalog, the DB2 administrator can create a Metadata Catalog by using a RACF group ID as the creator ID of the Metadata Catalog. All users of the Metadata Catalog and the DB2 OLAP Integration Server administrator ID must be members of the RACF group. The DB2 connection exit routine DSN3@ATH or its equivalent must be enabled for the DB2 subsystem.

If DB2 PTF UQ67626 was installed, the DB2 administrator can create a Metadata Catalog by using the user's ID as the creator ID of the Metadata Catalog tables. Only that individual user can access the Metadata Catalog. To share a model or metaoutline with other users, the user must use the DB2 OLAP Integration Server export/import function to export the Metadata Catalog to a file that other users can import. If DB2 PTF UQ67626 was not installed, users who log in without providing a RACF group name share the Metadata Catalog that is owned by the DB2 OLAP Integration Server administrator ID.

The DB2 OLAP Integration Server administrator ID must have DELETE privileges for all Metadata Catalog tables and SELECT privileges on all source data and the DB2 catalog.

Starting and stopping DB2 OLAP Server and DB2 OLAP Integration Server

You can start the server in three ways:

- In a foreground mode:
  - Start the z/OS UNIX shell from a TSO session or from a Telnet session.
  - Start DB2 OLAP Server by entering `ESSBASE`.
  - Start DB2 OLAP Integration Server by entering `olapisvr`.

    This mode is required the first time you start DB2 OLAP Server. You must log on with the OLAP Administrator ID the first time you start DB2 OLAP Server. You can stop either server by entering `exit` in the server window.

- In a background mode: Use z/OS UNIX from a TSO session or from a Telnet session to start DB2 OLAP Server. The session is prompted after the server has started.
- As a batch job:

  The DOLOPJCL member in your *.*.SDOLPLIB target library contains sample JCL that can be used to start DB2 OLAP Server as a batch job. It can also be used to start DB2 OLAP Integration Server on its default port or on a port that the user determines. Instructions are included within the job.

  The `/usr/lpp/db2olap/v810/samples` directory contains sample scripts to start and stop DB2 OLAP Server and DB2 OLAP Integration Server and to run loads, calculations, and reports. The scripts are written to be executed from a batch job so that the user ID and password information can be passed to the scripts, but you can alter the scripts to suit your own needs. Sample JCL to start these scripts is in the DOLSCRIP member of your *.*.SDOLPLIB target library.

Chapter 11. Performance monitoring and tuning

This chapter describes the performance impacts that zFS has on the DB2 OLAP Server for z/OS on zSeries and the performance tools that you need to monitor the overall performance of the DB2 OLAP Server workload. This chapter also highlights the key performance features in DB2 OLAP Server for z/OS, Version 8.1 that significantly enhance the performance of the load and calculation of OLAP cubes.

Tuning zFS and DB2 OLAP Server

zFS has a number of system configurations and file system mount options that affect DB2 OLAP Server performance. Monitoring and tuning these settings is necessary to ensure optimal performance.

Measure the load and calculation of your cubes:

Measure the load and calculation of your cubes with and without the NOREADAHEAD parameter on the .pag. and .ind. file system's mount command to understand the impact that this option has on the performance of your cubes.

By default, the zFS file systems are mounted without the NOREADAHEAD option. zFS will attempt to determine if a file's access pattern is sequential or random and decides if read-ahead should be performed for that file. For random file access, read-ahead can degrade performance. To ensure that zFS never performs read-ahead for any file system, you can disable read-ahead for that file system by specifying the NOREADAHEAD option for the MOUNT command.

For example, from TSO ISPF Command Shell, enter the following command:

```
MOUNT FILESYSTEM('DB2OLAP.PAG') -
MOUNTPOINT('/u/ARBOR/zfspag') TYPE(ZFS) MODE(RDWR) -
PARM('NOREADAHEAD')
```

Monitor the following zFS caches to ensure a high cache hit ratio:

Allocate at least 2 GB of real memory to DB2 OLAP Server. Currently, the zFS address space is restricted to 2 GB of total storage. Restrict total zFS cache storage to approximately 1.5 GB.

Increase the user file cache:

The default value of the zFS user file cache is 256 MB. Consider increasing the size of this cache if your workload experiences a cache-hit ratio of less than 80%. A cache hit ratio of over 90% usually provides good performance. To monitor your cache hit ratio, issue the command `f zfs, query, all` from the z/OS console and see the zFS Query Report User File (VM) Caching System Statistics section of the generated output as shown in "zFS query reports" on page 98 for zFS Query Report User File (VM) Caching System Statistics.

Increase the metadata cache:

The default value of the zFS metadata cache is 32 MB. This cache size can be increased by using an optional metadata backing cache. A cache hit ratio of 90%+ is essential. See "zFS query reports" on page 98 for zFS Query Report User File (VM) Caching System Statistics.

Increase log file cache:

Make the cache large enough so that log file I/O waits do not occur too frequently compared with log file I/O rates. See "zFS query reports" on page 98 for zFS Query Report User File (VM) Caching System Statistics.

Use fixed storage:

By default, zFS does not fix pages in any of the caches. You can permanently fix a page for the user file cache, metadata cache, and log file cache by including the fixed option in the IOEFSPRM file. The IOEFSPRM file contains the processing options for the ZFS PFS and the definitions of the multifile system aggregates. If file system performance is critical and there is enough real memory to support it, using the fixed option might help. See *Distributed File Service zSeries File System Administration* for examples.

The following processing options, which include the fixed option, can help performance:

- user_cache: Specifies the size, in bytes, of the cache that is used to contain file data. You can also specify a fixed option, which indicates that the pages are permanently fixed for performance. Note that the fixed option reserves real storage for usage by zFS only.
  - Default Value: 256 MB
  - Expected Value: A positive number. A `K` or `M` can be appended to the value to mean kilobytes or megabytes, respectively.
  - Example: `user_cache_size=64M,fixed`
- meta_cache_size: Specifies the size of the cache used to contain metadata. You can also specify a fixed option, which indicates that the pages are permanently fixed for performance. Note that the fixed option reserves real storage for usage by zFS only.

  - Default Value: 32 MB
  - Expected Value: A positive number. A `K` or `M` can be appended to the value to mean kilobytes or megabytes, respectively.
  - Example: `meta_cache_size=64M,fixed`
- log_cache_size: Specifies the size of the cache that is used to contain buffers for log file pages. You can also specify a fixed option, which indicates that the pages are permanently fixed for performance. Note that the fixed option reserves real storage for usage by zFS only.
  - Default Value: 64 MB
  - Expected Value: A positive number. A `K` or `M` can be appended to the value to mean kilobytes or megabytes, respectively.
  - Example: `log_cache_size=32M,fixed`

Balance I/O:

zFS operator MODIFY ZFS,QUERY,ALL commands provide reports that show I/O rates per aggregate, and file system request rates per aggregate and per file system. Use this information and the DASD performance information from RMF or other performance products similar to RMF to balance I/O among your DASD devices. For example, the QUERY output can be used to show which file systems can be moved to different DASD devices to achieve a better balance among disks.

Monitor zFS data set extension:

You can monitor how full your zFS aggregate is by using the AGGRFULL parameter on the **MOUNT** command for a file system or by globally specifying the AGGRFULL option in IOEFSPRM. You can manually extend the aggregate with the `zfsadm` **GROW** command during your maintenance window.

Starting from z/OS release 1.4, a zFS aggregate can be dynamically extended when it is full by using the AGGRGROW parameter on the **MOUNT** command for a file system or by globally specifying the AGGRGROW option in IOEFSPRM. The dynamic extension of an aggregate is possible only if the VSAM LDS has secondary allocation specified when it is defined. You might experience longer elapsed time for load and calc processing when the extension occurs because the newly allocated space for the zFS aggregate must be formatted. However, if the extension is successful, an operation that cannot complete due to the aggregate being full will be redriven transparently to the application. See the *z/OS Distributed File Service zSeries File System Administration* for information and syntax.

zFS query reports

You can monitor zFS performance with the **MODIFY ZFS,QUERY,{all | settings | storage | threads}**command. The following report shows the sample output of the **MODIFY ZFS,QUERY,ALL** command:

```
zFS Kernel USS PFS Calls
        ------------------------
Operation              Count          Avg Time
---------          ----------        ----------
zfs_opens                735             0.008
zfs_closes               735             0.074
zfs_reads           44810192             0.038
zfs_writes          59295944             0.016
zfs_ioctls                 0             0.000
zfs_getattrs            4826             0.007
zfs_setattrs             252             0.073
zfs_accesses            3615             0.008
zfs_lookups             1288             1.511
zfs_creates               93             0.334
zfs_removes               92           373.970
zfs_links                  0             0.000
zfs_renames                4             0.272
zfs_mkdirs                69             1.580
zfs_rmdirs                68             0.650
zfs_readdirs               0             0.000
zfs_symlinks               0             0.000
zfs_readlinks            475             0.000
zfs_fsyncs             62848            19.242
zfs_truncs                 0             0.000
zfs_lockctls               0             0.000
zfs_audits                 0             0.000
zfs_inactives            518             0.034
zfs_recoverys              0             0.000
---------          ----------        ----------
*TOTALS*           104181754             0.037

Number of service threads: 10 (stacksize=24K)
Requests: 34    Queued: 0 (0.0%)
User File (VM) Caching System Statistics
                  ---------------------------------------

External Requests:
------------------
Reads       44810192     Fsyncs         62848     Opens            397
Writes      59295944     Setattrs         253     Unmaps            92
Asy Reads    8279116     Getattrs        4954     Schedules        29
356
Flushes             0

File System Reads:
------------------
Reads Faulted      972447     (Fault Ratio  2.17%)
Writes Faulted      40518     (Fault Ratio  0.07%)
Read Waits            394     (Wait Ratio  0.00%)
```

```
Total Reads       1109027

File System Writes:
-------------------
Scheduled Writes        944698     Sync  Waits       229726
Error Writes                 0     Error Waits            0
Scheduled deletes            0
Page Reclaim Writes      33789     Reclaim Waits      11097
Write Waits               1021     (Wait Ratio  0.00%)

File Management: (File struct size=160)
---------------------------------------
Max Files:         8192     Allocated:         8192
Lookups        397     Hits          298 (Hit Ratio   75.06%)

Page Management (Segment Size = 64K) (Page Size = 4K) (DS=N)
-----------------------------------------------------
Total Pages      131072     Free                 28
Steal Invocations     202005     Waits for Reclaim           0

                              zFS Vnode Op Counts

Vnode Op                        Count   Vnode Op 385
Count
------------------------  ----------   ------------------------ 386
----------
efs_hold                           0   efs_readdir 387
475
efs_rele                           0   efs_create 388
93
efs_inactive                       0   efs_remove 389
92
efs_getattr                     5857   efs_rename 390
4
efs_setattr                      252   efs_mkdir 391
69
efs_access                      4350   efs_rmdir 392
68
efs_lookup                      1456   efs_link 393
0
efs_getvolume                      0   efs_symlink 394
0
efs_getlength                      0   efs_readlink 395
0
efs_afsfid                         3   efs_rdwr 396
0
efs_fid                            0   efs_fsync 397
32902
efs_vmread                   1109027   efs_waitIO 398
1074456
efs_vmwrite                   978487   efs_cancelIO 399
6815
efs_clrsetid                     202   efs_audit 400
0
efs_atime                  104106136   efs_vmblkinfo 401
```

```
2387986
Total zFS Vnode Ops  109708730

                         LFS Vnode Cache Statistics

Vnodes      Requests     Hits    Ratio  Allocates   Deletes
---------- ---------- ---------- ----- ---------- ----------
     16384      24778      24766 100.0%        162        160

LFS Vnode structure size: 296 bytes
SAF Access Cache Requests:          0   hits:    0 (hit ratio 412
0.0%)

                        Metadata Caching Statistics

Buffers    (K bytes)  Requests     Hits    Ratio  Updates
---------- --------- ---------- ---------- ----- ----------
      4096     32768   20133498   16989523 84.4%   17214094

                         Directory Cache Statistics

Dir Blocks (K bytes)  Requests     Hits    Ratio  Deletes
---------- --------- ---------- ---------- ----- ----------
       128      1024       2054       1976 96.2%         68

                       Transaction Cache Statistics

Transactions started:    1509581    Lookups on tran:   24337216  EC
428
Merges:          0
Allocated Transactions:       2583  (Act=         0, Pend=       0,
429
Comp=       916, Free=      1667)

                 I/O Summary By Type
                 -------------------

Count       Waits       Cancels     Merges      Type
----------  ----------  ----------  ----------  ----------
      4904         766           0           0  File System Metadata
    155267       36970           0       12866  Log File
   2090530     1258217         830       28160  User File Data

                 I/O Summary By Circumstance
                 ---------------------------

Count       Waits       Cancels     Merges      Circumstance
----------  ----------  ----------  ----------  ------------
      3651        3651           0           0  Metadata cache read
   1109027     1013356           0          50  User file cache direct
447
read
         4           4           0           0  Log file read
         0           0           0           0  Metadata cache async 449
delete write
```

```
         0           0           0           0  Metadata cache async 450
write
        93           1           0           0  Metadata cache lazy 451
write
         0           0           0           0  Metadata cache sync 452
delete write
         0           0           0           0  Metadata cache sync 453
write
    978394      241844         830       28110  User File cache direct
454
write
         0           0           0           0  Metadata cache file 455
sync write
      4269         131           0           0  Metadata cache sync 456
daemon write
         0           0           0           0  Metadata cache 457
aggregate detach write
         0           0           0           0  Metadata cache buffer
458
block reclaim write
         0           0           0           0  Metadata cache buffer
459
allocation write
         0           0           0           0  Metadata cache file 460
system quiesce write
         0           0           0           0  Metadata cache log 461
file full write
    155263       36966           0       12866  Log file write
         0           0           0           0  Metadata cache 463
shutdown write

                    zFS I/O by Currently Attached Aggregate

DASD   PAV
VOLSER IOs Mode       Reads     K bytes      Writes     K bytes 468
Dataset Name
------ --- ----  ----------  ----------  ----------  ---------- 469
------------
DSN0C3   1  R/W         198        1580           0           0 470
DB2OLAP.DATAFILE
DSN0B0   2  R/W     1001542    10136048      848206    31126572 471
DB2OLAP.PAGSMSF
DSN0B4   2  R/W      110802      976880      131224     5593664 472
DB2OLAP.INDSMSF
DSN0B2   2  R/W          82         648      116791     2375136 473
DB2OLAP.EXPORT
------           ----------  ----------  ----------  ----------
     4              1112624    11115156     1096221    39095372 475
*TOTALS*
Total number of waits for I/O:    1295953
Average I/O wait time:              1.326 (msecs)

                                    Locking Statistics
```

```
Untimed sleeps:          9   Timed Sleeps:      12163   Wakeups: 484
8

Total waits for locks:                            332
Average lock wait time:         70.220 (msecs)

Total monitored sleeps:                             0
Average monitored sleep time:          0.000 (msecs)
               Top 15 Most Higly Contended Locks
  Thread      Async       Spin
   Wait       Disp.       Resol.     Pct.    Description
----------  ----------  ----------   -----   --------------
         0        3142           0   50.2%   Cache Services 496
association main lock
         0        2782           0   44.4%   Volser I/O queue lock
       275           0           1    4.4%   Vnode-cache access lock
        35           0           1    0.6%   Log system map lock
        17           0           0    0.3%   Async IO event lock
         3           0           0    0.0%   Anode bitmap allocation 501
handle lock
         1           0           1    0.0%   Metadata-cache buffer 502
lock          1           0           0    0.0%   User-cache file lock
         0           0           0    0.0%   Async IO device lock
         0           0           0    0.0%   Async IO set free list 505
lock
         0           0           0    0.0%   Asnc IO event free list 506
lock
         0           0           0    0.0%   Async global device lock
         0           0           0    0.0%   LVM global lock
         0           0           0    0.0%   OSI Global process lock
         0           0           0    0.0%   Main volume syscall lock

Total lock contention of all kinds:       6259

               Top 5 Most Common Thread Sleeps

Thread Wait     Pct.      Description
-----------     -----     -----------
          0     0.0%     OSI cache item cleanup wait
          0     0.0%     Directory Cache Buffer Wait
          0     0.0%     User file cache Page Wait
          0     0.0%     User file cache File Wait
          0     0.0%     User file cache Page Reclaim Wait

                          OSI Storage Statistics
                          ----------------------

Current allocated storage size: 12509 (12K) (0M)
Number of storage allocations: 13759
Number of storage frees: 13710
                          MVS Obtained Storage Statistics
                          -------------------------------

Current allocated storage size above 16M line: 0 (0K) (0M)
Number of storage allocations above 16M line: 0
```

```
Number of storage frees above 16M line: 0

Current allocated storage size below 16M line: 0 (0K) (0M)
Number of storage allocations below 16M line: 0
Number of storage frees below 16M line: 0

               TCB Owned Storage
               -----------------
Lock storage allocations: 0
Lock storage allocated:   0
Non-lock storage allocations: 159580
Non-lock storage allocated:   6760643

               TCB Owned SP 230, Key 8 Storage
               -----------------
Total storage requests: 68323
Total allocation requests: 68309
Total free requests: 14

Total storage allocated:   664434069 (648861K) (634M)
Total storage freed:   74048 (72K) (0M)
Total storage in use:   664360021 (648789K) (634M)
File System Name                              Aggr #  Flg  Operations
--------------------------------------------  ------  ---  ----------
DB2OLAP.PAGSMSF                               100001  AM    103471039

DB2OLAP.INDSMSF                               100003  AM       592406

DB2OLAP.EXPORT                                100005  AM       117794

IOEZ00025I zFS kernel: MODIFY command - QUERY,ALL completed 566
```

Monitoring DB2 OLAP Server workload

To monitor the DB2 OLAP Server workload, you can first collect short-term data by using RMF Monitor III reports or other equivalent performance products to monitor the system status and to resolve performance problems. RMF Monitor III reports show how resource-intensive jobs are that use the processor, the DASD devices, and the storage. These reports also provide information about delays, response times, and execution velocity. You can monitor all of these activities to diagnose and resolve performance problems.

If you are unfamiliar with RMF, see the *RMF Performance Management Guide*, *RMF Report Analysis*, and *RMF User's Guide* for more information. The *RMF Performance Management Guide* describes how to monitor processor activity, I/O activity, and storage activity. This book can help you diagnose and resolve these performance issues.

DB2 OLAP Server for z/OS, Version 8.1 performance features

DB2 OLAP Server for z/OS, Version 8.1 uses parallel threads to improve performance and throughput of load and calculation operations. You can specify up to 4 parallel threads for calculation and up to 16 parallel threads for loads. You need to specify the correct number of parallel threads for your database to best optimize load and calculation performance. Running too many parallel threads for a load and calculation can consume a lot of system resources and degrade performance because of the overhead in thread preparation.

Consider setting the number of parallel threads to one fewer than the number of available processors. This reserves one processor for use by the operating system or by the Essbase process for performing background writes of changed blocks from the caches.

By default, parallelism is disabled for load and calculation. Many other settings can affect the performance of parallel load and calculation processing. The *DB2 OLAP Server Database Administrator's Guide* and the *Hyperion Essbase Technical Reference* provide information about requirements and instructions for monitoring parallel load and calculation.

Processing parallel load

You can specify the number of parallel threads to be used at different stages in data load processing depending on the number of processors that is available on your system. Allocating processing threads across processors on multiple CPUs provides the performance advantages of true parallel operation.

DB2 OLAP Server provides three configuration settings: DLTHREADSPREPARE, DLTHREADSWRITE, and DLSINGLETHREADPERSTAGE. With these settings in the `essbase.cfg` file, you can tune processor usage during load at the server level, application level, or database level.

When you enable parallel load processing by using the DLTHREADSWRITE setting, you might need to increase the OLAP data cache size because each thread that is specified by the DLTHREADSWRITE setting uses an area in the data cache equal to the size of an expanded block. The additional amount of storage that is required for the data cache depends on the size of the block and the number of threads that you plan to run in parallel.

See ″Optimizing Data Loads″ in the *DB2 OLAP Server Database Administrator's Guide* for information about managing and monitoring parallel load for optimal performance.

Processing parallel calculation

You can specify the number of parallel threads to be used for parallel calculation if you have multiple processors that are configured on your system. If you enable parallel calculation, DB2 OLAP Server analyzes all the tasks in a calculation pass and breaks them down into subtasks. The subtasks that can run independently are scheduled to run simultaneously on up to four threads. Each subtask runs on a separate processor.

DB2 OLAP Server provides the CALCPARALLEL setting that enables you to specify parallelism at the server level, application level, or database level. You can optimize parallel calculation with the CALTASKDIMS setting. This setting increases the number of sparse dimensions that are used to identify tasks for parallel calculation.

Parallel calculation might not improve performance if there is high sparsity in the data model. Before you enable parallel calculation, you must ensure that you meet all the requirements to get the full benefit of parallel calculation. These requirements are in the *DB2 OLAP Server Technical Reference*.

See ″Optimizing Calculations″ in the *DB2 OLAP Server Database Administrator's Guide* for information about managing and monitoring parallel calculation.

Configuring I/O

Proper I/O configuration and database layout are the primary factors that affect DB2 OLAP Server performance. To minimize I/O bottlenecks, follow these recommendations:

- Dedicate a set of DASD devices for the OLAP workloads, and dedicate four or more I/O channels to this set of devices.

  The number of simultaneous loads and calculations that can execute within a specific period is significantly affected by the number of I/O channels that are available.
- Use a separate VSAM data set that is formatted as a zFS file system for the .pag and .ind files in each database.
- Allocate VSAM data sets to separate DASD devices.

For optimal performance, use the latest storage technology, such as ESS with FICON(TM) channel or an equivalent product, to take advantage of the DASD devices' Parallel Access Volumes (PAV) feature and channel speed.

Allocating the OLAP database page and index files

The OLAP database page (.pag) and index (.ind) files are defined and formatted as zFS compatibility mode aggregates and are mounted in the z/OS UNIX hierarchy zSeries File System (zFS) or Hierarchical File System (HFS).

The following instructions assume that you will create a VSAM LDS name OMVS.COMPAT.DB2OLAP.ZFSCUBE and mount it on mount point /u/olap81/zfscube where your .pag and .ind files are located. To create, format, and mount the file system for the page and index files:

1. Create and format VSAM LDS 'OMVS.COMPAT.DB2OLAP.ZFSCUBE' as a compatibility mode aggregate.
2. Mount the new zFS file system. Ensure that the mount point exists by entering the following path:

   ```
   . /usr/sbin/mount -t ZFS -f OMVS.COMPAT.DB2OLAP.ZFSCUBE /u/olap81/zfscube
   ```

3. Use the Application Manager or ESSCMD **setdbstateitem 23** to direct the .pag and .ind files to the newly defined zFS aggregate.

   ```
   setdbstateitem 23 "app" "db" 1 "/u/olap81/zfscube" 0 3 0
   ```

If the zFS aggregate is not mounted on this mount point, the **setdbstateitem** command directs the .pag and .ind files to an HFS file system, and you will experience poor performance for loads, calculations, and queries.

Chapter 12. API changes for DB2 OLAP Server for z/OS

This chapter provides information about building, compiling, and linking API programs that are specific to z/OS. For API information that is not related to z/OS, see the *API Reference*.

This chapter describes the following items that are specific to DB2 OLAP Server for z/OS:

- Supported compilers and linkers
- Supported platforms
- API libraries that are needed to link or run the main APIs, outline APIs, and grid APIs for z/OS
- Files that are needed in API programs
- A sample makefile
- C API sample programs

This chapter also describes the following concepts:

- Why ASCII string and IEEE numeric data conversions are necessary
- How to convert string data
- How to convert numeric data
- Sample string and numeric data conversion program

String and numeric data conversions

To build an application program on z/OS, you need to understand how string data and numeric data are converted. As an API developer on DB2 OLAP Server for z/OS, Version 8.1 you must send to and receive from the DB2 OLAP Server ASCII strings and IEEE floating point format data. This is true for all client operating systems, including z/OS and Microsoft Windows.

This section explains why the string and numeric conversions are necessary and how to convert string and numeric data.

Why ASCII string and IEEE numeric data conversions are necessary

DB2 OLAP Server sends to and receives from all its clients, including API clients, strings in ASCII character format and numeric data in IEEE floating point format.

DB2 OLAP Server internally manipulates strings in ASCII character format and numeric data in 370 floating point format. When the server receives data

from a client, it converts numeric data from IEEE floating point format to 370 floating point format in order to process the data. The server converts ASCII character format strings to EBCDIC only when it stores information to a file on z/OS. You can view this information with a file editor.

When the server sends data to a client, such as an API client, it sends ASCII character strings and numeric data in IEEE floating point format, which it converts from its internal 370 floating point format.

Thus, API developers for DB2 OLAP Server are required to send data to the server in ASCII strings and IEEE floating point format. Conversely, API developers will receive character data in ASCII character format, and numeric data in IEEE floating point format.

Converting string data

All string data sent to and from DB2 OLAP Server must be in ASCII character format.

There is a potential conflict for API developers who develop applications on the z/OS. Application code originally developed in Microsoft Windows, when the code is compiled and built on z/OS, will create strings and character constants in an EBCDIC codeset. Therefore, programs that function as if they are working with ASCII codesets might have problems, particularly when you work with DBCS codesets. For example, if your code relies on using '\r' as a token delimiter, your code will not function.

This problem is resolved by using a LIBASCII library, which automatically converts the strings for the API developer. Support for this utility is provided in the file `ascii_a.h`, which is shipped in the `../api/include` directory. API developers can port code to z/OS largely unchanged with respect to character and string manipulation by following these steps:

1. Include the `ascii_a.h` file in the source file.
2. Define the variable __STRING_CODE_SET__ in the compile step by entering the following command:

   ```
   --D__STRING_CODE_SET__="ISO8859-1"
   ```

3. Link your application with `libascii.x`.
4. Include `ascii_a.h` as the last file in the application's #include files list. If this convention is not followed, the conversions generate unexpected results.

Converting numeric data

All numeric data sent to and from DB2 OLAP Server must be in IEEE floating point format.

API client applications running on z/OS are required to perform conversions at the point where numeric data is sent and received. API functions are provided to perform the numeric data conversions.

Numeric data sent to the server must be converted from 370 floating point format to IEEE floating point format. Use the function GridAPIConvertToIEEE, prototyped in `essgapi.h`, to convert numeric data sent to the server:

GridAPIConvertToIEEE((ESS_DOUBLE_T) sourceDouble, (ESS_PDOUBLE_T) pTargetDouble)

Numeric data received from the server must be converted from IEEE floating format to 370 floating point format so that the API client can process the data. Use the function GridAPISwapAndConvertFromIEEE to convert numeric data received from the server:

```
GridAPISwapAndConvertFromIEEE((ESS_DOUBLE_T) sourceDouble,
(ESS_PDOUBLE_T) pTargetDouble)
```

Building an application program on z/OS

Four sample programs and one sample make file are shipped with DB2 OLAP Server for z/OS.

Prerequisites:

Before you build an application program, ensure that you meet the following requirements:

- Compiler and linker: IBM z/OS C/C++ Compiler, Version 2.10
- Operating system: IBM z/OS, Version 2.10 or later

You need the following dynamic library files to link or run the main, outline, and grid APIs for z/OS.

- essdvrq.x
- esssd.x
- esssvrdm.x
- libadcalS.x
- libadcfw.S.x
- libaddbS.x
- libascii.x
- libessapiS.x
- libesscslS.x (Grid)
- libessglobS.x

- libessnetS.x
- libessotlS.x
- libessshrS.x
- libessutlS.x
- libglobalcS.x
- essbase.mdb (binary message file)

To use the Essbase API in a C program on z/OS, you must include the file `ascii_a.h` in the appropriate source modules. Always include this file after all header files.

Building a program on z/OS

This section provides information that you need to compile and link an application program using the Essbase API on z/OS. The example is based on the sample program `cs1.c` in your `$ARBORPATH/api/samples` directory.

z/OS Sample Make File:

```
################################################################
#
# Commands
#
################################################################
LINK = c++
CC = c++
WORKDIR = .

################################################################
#
# Compiler and linker flags
#
################################################################
# To build optimized, set environment variable AD_OPTIM=ON
ifeq ($(AD_OPTIM), ON)
COPTIM = -O -DNDEBUG
CNOOPTIM = -0 -DNDEBUG
LOPTIM =
else
COPTIM = -g
CNOOPTIM = -g
LOPTIM = -g
endif

INCPATH =  -I/usr/include -I.

CCUSTOM = -Wc,dll,langlvl"(EXTENDED)",longname,exportall,gonumber

CFLAGS390 = -c $(COPTIM) -DAD_UNIX -DAD_CURRENCY_ON \
            -DAD_42B -DAD_TMG_ORION -DAD_ESM_ORION \
            -D_ALL_SOURCE -D_OPEN_THREADS \
```

```
            -DAD_ESM_SEM_OBJECT \
            -DAD_ESM_EVENT_SYNC -DAD_STRUCT_ALIGN_8B -DEACC -DLL_APP_STARTUP \
            -DUNISCAPE $(CCUSTOM) \
            -D__STRING_CODE_SET__="ISO8859-1" -D__MVSLA__ -DOS390

API_CFLAGS = $(CFLAGS390) $(INCPATH) -DAD_SERVER -DAPI_390

LCUSTOM = -Wl,dll

LIBS =

API_LFLAGS = $(LOPTIM) $(LCUSTOM) $(LIBS)

################################################################
#
# Dependency rules
#
################################################################

cs1.o:      cs1.c
                $(CC) $(API_CFLAGS) cs1.c

################################################################
#
# Executable
#
################################################################

CS1: cs1.o
     $(LINK) $(API_LFLAGS) -o $(WORKDIR)/$@ -L.  \
     cs1.o \
     libessotlS.x libessshrS.x libessnetS.x libessutlS.x libesscslS.x\
     libessapiS.x esssd.x mdsm.x essdvrq.x esssvrdm.x \
     libglobalcS.x libessglobS.x libascii.x
```

The following sample programs for the z/OS platform are shipped with the z/OS API directory and are in `$ARBORPATH/api/samples`.

cs1.c Used for testing the Main API and describing the logic of the API.

cs2.c Performs initialization and login, and queries the active application and database. It then manipulates the user list, adding, renaming, and deleting a new user.

cs3.c Shows the sequence of function calls that are expected by the DB2 OLAP Server, and it shows the syntax of API function calls in an working program.

convert.c
Demonstrates how to perform string and numeric data using conversion APIs.

sample.mak
Demonstrates how to compile and link an application program.

Part 3. Appendixes

Appendix A. Troubleshooting

Use this appendix to help you diagnose and resolve problems with the server component of DB2 OLAP Server for z/OS.

Problem: What is Abend S047?:

The system abend S047 occurs when DB2 OLAP Server or an application is started.

Solution: Set proper extended attributes. Run the essextattr.sh script in the bin directory under the OLAP product subdirectory or submit the DOLEXJCL member from your *.* SDOLPLIB target library.

Problem: Why do OLAP applications fail to start or why can they not be created:

OLAP applications will not start or cannot be created. The following error message appears in the server console window, but no error is logged in the application log file ($ARBORPATH/app/*appname*/*appname.log*).

```
Version 8.1 (6.5.1 11-07-02)

CEE3501S The module libwrappers.so was not found.
From compile unit /u/sovbld/hm131s/hm131s-20020207/src/jvm/sov/ci/ci.c at
entry point __dllstaticinit at compile unit offset +000007F0 at
entry offset +000007F0 at address 20C083E0.

[Wed Nov 20 15:17:49 2002]Local/ESSBASE0///Error(1052003)
Timed out reading from server

[Wed Nov 20 15:17:49 2002]Local/ESSBASE0///Error(1054001)
Cannot load application Demo with error number [1052003] - see server log file
```

Solution: The most likely reason for this problem is the server environment setup. Is there a setting for JVMMODULELOCATION in your $ARBORPATH/essbase.cfg file? Make sure that the LIBPATH and PATH environment variables contain the following Java directory entries:

```
PATH:    $JAVA_HOME/bin:$JAVA_HOME/bin/classic
LIBPATH: $JAVA_HOME/bin:$JAVA_HOME/bin/classic:$JAVA_HOME/lib
```

where $JAVA_HOME refers to the directory where Java is installed on your system, for example, /usr/lpp/java/J1.3.

Problem: Why is there an OIS login username/password error?:

For DB2 OLAP Integration Server to work properly, DB2 load libraries and some Language Environment libraries must be program-controlled. If they are not program-controlled, the following error will appear:

```
Username and/or password error: 'EDC5111I Permission denied.'.
```

Solution: For DB2 OLAP Integration Server to work properly, the following libraries must be program- controlled:

```
CBC.SCLBDLL
CEE.SCEERUN
DSN710.SDSNEXIT or DSN610.SDSNEXIT
DSN710.SDSNLOAD or DSN610.SDSNLOAD
```

Problem: **Why does DB2 OLAP Server not start:**

Solution: This problem might occur for several reasons. Verify that:

- No dangling applications remain from a previous instance of DB2 OLAP Server. Enter `ps -ef` to see a list of running processes, and use the **kill** command to delete any running ESSSVR processes.
- The specified port is not in use by another process. If no port is specified in the `essbase.cfg` file, then the default port 1423 is used. To change the port, modify the AGENTPORT setting in `essbase.cfg`. For more information about this setting, see ″Essbase Configuration File Settings (`essbase.cfg`)″ in the *Technical Reference*.
- The proper extended attributes are set. To set them, run the script `essextattr.sh` in the bin directory under the OLAP product subdirectory.
- The ESSBASE program in the bin directory of the product subdirectory has the proper execution permission. Enter `ls -l ESSBASE` to check the setting. The fourth permission bit must be labeled `x`, as shown in the the following string:

  ```
  -rwx------   1 DB2OLAP  #0GID    2772992 Nov 20 10:41 ESSBASE
  ```

  If the permission bit is not labeled `x`, enter `chmod +x ESSBASE` to change the file property.
-

If you installed maintenance, check the PTF and check that all the HOLD ACTION instructions were followed. If the problem continues, check the z/OS monitor console log for error messages.

Problem: **Where are the samples?:**

Solution: You can find the samples in the following locations:

- DB2 OLAP Server sample applications:`$ARBORPATH/app`.

  You can enter `SAMPLE` to create these applications.

- DB2 OLAP Integration Server samples: `usr/lpp/db2olap/v810/is/samples`.

  If you do not find the samples in the server directory, you can find them in the client directory: `x:\ibm\db2olap\IS\Samples\tbcmodel` where x is the drive where you installed the client. You can import the samples from the client to the server by clicking **File —> XML Import/Export** on the DB2 OLAP Integration Server Desktop.
- API samples: `usr/lpp/db2olap/v810/api/samples`

Problem: Why does unreadable data appear?:

Solution: The unreadable data might be due to a language conversion problem. Ask your system programmer to verify that all the OLAP settings are valid for your client and the server, and that the proper code pages are set on the computer where DB2 OLAP Server is running. If DB2 is involved in the operation, verify that the DB2 language settings are appropriate.

Problem: What RACF requirements does OLAP have?:

Solution: DB2 OLAP Server uses RACF for user authentication. All DB2 OLAP Server users must be defined as users to RACF and have a password.

DB2 OLAP Integration Server (OIS) also uses RACF for user authentication. In addition, if users share a Metadata Catalog, each OIS user and the OIS administrator user ID must be a member of the RACF group that identifies the metadata catalog.

Problem: What z/OS UNIX authorizations/permissions requirements does OLAP have?:

Solution: You must define a DB2 OLAP Server administrator user ID. This user ID must own the DB2 OLAP Server home directory, which is identified by the $ARBORPATH environment variable, and be able to create, update and delete files in this directory and its subdirectories. If you use a different user ID for the DB2 OLAP Integration Server administrator ID, this user ID must own the DB2 OLAP Integration Server subdirectories of the DB2 OLAP Server home directory, which is identified by environment variable $ISHOME.

Problem: Does OLAP have any MVS - APF authorizations requirements?:

Solution: DB2 OLAP Server and DB2 OLAP Integration Server run in APF authorized address spaces. DB2 OLAP Server and DB2 OLAP Integration Server executable files reside in the `/usr/lpp/db2olap/v81/bin` and `/usr/lpp/db2olap/v81/is/bin` directories. In z/OS UNIX, an executable file is identified as APF authorized by the `+a` extended attribute. The `+a` extended

attribute is set by the DOLEXJCL job which must be executed when DB2 OLAP Server is installed and after any maintenance is applied.

Because the Java Virtual Machine is loaded into the DB2 OLAP Server or DB2 OLAP Integration Server address space, you must set the +a extended attribute on the Java executable files also. Extended attributes are set by using the **extattr** command.

Problem: Does DB2 OLAP Server have MVS program control requirements?:

Solution: DB2 OLAP Server and DB2 OLAP Integration Server run in program-controlled address spaces. DB2 OLAP Server and DB2 OLAP Integration Server executable files reside in the /usr/lpp/db2olap/v81/bin and /usr/lpp/db2olap/v81/is/bin directories. In z/OS UNIX, an executable file is identified as program-controlled by the +p extended attribute. The +p extended attribute is set by the DOLEXJCL job which must be executed when DB2 OLAP Server is installed and after any maintenance is applied.

Because the Java Virtual Machine is loaded into the DB2 OLAP Server or DB2 OLAP Integration Server address space, you must set the +p extended attribute on the Java executable files also. Extended attributes are set by using the **extattr** command.

Problem: Does OLAP require use of super user IDs?:

DB2 OLAP Server does not require use of super user IDs. The DB2 OLAP Server administrator user ID specifically cannot have UID=0. Depending on what directories are used for the DB2 OLAP Server product directories, the user ID that is used to install and apply maintenance to DB2 OLAP Server might need the superuser ability to write to /usr/lpp/ directories. This user ID must have read authorization to the BPX.FILEATTR.APF and BPX.FILEATTR.PGMCTL xxxxx of the FACILITY class.

Problem: Where do I find error messages?:

Solution: Messages that are received by the Application are written in the Application log, which is in the$ARBORPATH/app/*appname*/*appname*.log directory. Messages that are received by the Server are displayed in the Server window or the SYSOUT and/or SYSERR files defined in the started task, or written to the server log, which is the $ARBORPATH/Essbase.log file.

Problem: Where do I find CEEDUMPs?:

Solution: If DB2 OLAP Server shuts down abnormally and cannot restart, the server for releases version 8.1 and later, creates a CEEDUMP file with

information about the exception, in addition to generating an exception log, .XCP, to help troubleshoot the problem.

The location of the CEEDUMP file depends on the type of abnormal shutdown:

- If the application or database shuts down abnormally, the CEEDUMP file is in `$ARBORPATH/app/Sample/ESSSVR.date`. The location of the CEEDUMP file is also specified in the application log. For example, if the Sample application shut down abnormally, the CEEDUMP file is in `$ARBORPATH/app/Sample/ESSSVR.Wed_Jun_10_22_49_33_2002/CEEDUMP` .
- If OLAP Server shut down abnormally, the CEEDUMP file is in `$ARBORPATH/ESSBASE.date`. The location of the CEEDUMP file is also specified in the server log. For example, if DB2 OLAP Server shut down abnormally, the core file is`$ARBORPATH/ESSBASE.Wed_Jun_10_22_49_33_2002/CEEDUMP`.

If DB2 OLAP Server is shut down incorrectly, such as by killing the process, the `ESSBASE.date` and `ESSSRV.date` directories exist, but they are empty. You can remove the empty directories.

Problem: Why can I not stop OLAP?:

Solution: Users and administrators can run into instances in which they cannot stop DB2 OLAP Server. For example, if a user loses the connection to the DB2 OLAP Server during a request (for example, a calculation), the abandoned request might cause the application to stop responding to subsequent requests and cause the application to hang. This hanging prevents the application / database from being stopped or from other maintenance from taking place (such as restructures), until the process completes. Sometimes these processes are waiting to communicate back to the user. However, the user has lost her or his connection.

In DB2 OLAP Server, applications can be stopped by:

- Using Application Manager to force off a user or terminate a connection to an application, database or server, (Security > Connections)
- Using the MaxL language interface to force off a user or terminate a connection to an application, database or server (Alter System Kill Request and Alter System Logout Session)
- In USS issuing the command: `kill -9` *`process_id`*
- Issuing a stop application command from the DB2 OLAP Server console
- Issuing an MVS cancel command. For example:
  - / d omvs,a=all
  - f Sample (the name of the application that is not responding)

– /c jobname,a=MVSjob#

Problem: How do I know which version of DB2 OLAP Server I am running?:

Solution: To verify the level of code that is installed, the message `Essbase System Files` is written to the server console and added to the `$ARBORPATH/Essbase.log` when the server is started and is followed by the name and build date of each executable file of DB2 OLAP Server each time the server is started. For example:

```
[Tue Nov 26 19:15:59 2002]Local/ESSBASE0///Info(1055094)
Essbase System Files:

   DATAPOOL (6.5.1 11/18/02)
   ESSCMD (6.5.1 11/18/02)
   ESSBASE (6.5.1 11/18/02)
```

You can also view a list of the ESSBASE system modules and versions by clicking **Server –> Information –> License Info** panel in Application Manager.

Problem: Why is performance slow?:

Check the following system resources by reviewing an RMF or equivalent report:

- Processor usage and delay
- Storage usage and delay
- I/O device usage and delay
- I/O queuing activity
- Channel path activity
- The DB2 OLAP Server workload and how well the server can obtain the system resources that it needs

You can also check:

- zFS cache statistics by reviewing a zFS query report
- The impacts of other external components such as network delay, server delay from other platforms, and DB2
- The optimal layout of DB2 OLAP Server database files according to guidelines that are described in Chapter 11, “Performance monitoring and tuning”, on page 95.

Follow these steps to improve performance for the import process:

- Check that the `/u/olap81/bin/dsnaoini` file contains the following DB2 ODBC parameters: CONNECTTYPE=1 and MVSATTACHTYPE=RRSAF.

- Increase the DB2 OLAP Server setting for **Number Of Blocks Modified Before Internal Commit**
- If you load data from a text file, use the **Server** option for the location of the data file.
- Enable parallel load if multiple processors are available.

Follow these steps to improve performance for the export process:

- Isolate the export files on a separate volume to avoid I/O contention.
- Use parallel export if multiple processors are available.

Follow these steps to improve performance for the calculation process:

- Tune DB2 OLAP Server cache settings by using the ESSCMD **RESETPERFSTATS** and **GETPERFSTATS**.
- Enable parallel calculation if multiple processors are available.

Appendix B. Messages and codes

This section describes messages that pertain to the server component of DB2 OLAP Server for z/OS, Version 8.1.

1051131 IBM DB2 OLAP Server for OS/390 - finished

Explanation: This message appears when DB2 OLAP Server and all applications are shut down.

User Response: No action required.

1055094 Welcome to the IBM DB2 OLAP Server for z/OS.

Explanation: Before you use this product, you must define in your z/OS system a DB2 OLAP Server administrator user ID, for example, DB2OLAP or OLAPADM. This user must be logged in at this point to continue with registration. If this user is not logged in, you must exit from the program.

This message appears the first time that you start DB2 OLAP Server. For more information about starting DB2 OLAP Server, see "Starting DB2 OLAP Server for the first time" on page 54. For more information about the DB2 OLAP Server administrator, see "Defining the OLAP administrator user ID" on page 32.

User Response: Continue with the setup.

1051127 Password error: EDC5111I Permission denied

Explanation: You entered the wrong RACF password.

User Response: Check your RACF password and try again.

1051127 Password error: EDC5121I Invalid argument

Explanation: You entered the wrong RACF user name or password.

User Response: Check your RACF user name or password and try again.

1051127 Password error: EDC5157I An MVS internal error has occurred

Explanation: There is a problem with the system. The +p extended attribute might not be set.

User Response: Contact the system administrator.

1051127 Password error: EDC5169I Password is invalid

Explanation: The new password does not meet the RACF requirements.

User Response: When you change your RACF password, ensure that it meets RACF requirements. See the system programmer for RACF password requirements.

1051127 Password error: EDC5163I SAF/RACF extract error

Explanation: Access for the user was revoked.

User Response: Contact the system administrator.

1051127 Password error: EDC5164I SAF/RACF error

Explanation: A system error occurred during login.

User Response: Contact the system administrator and report the error.

1051127 Password error: EDC5143I No such process

Explanation: The RACF user name is not defined.

User Response: Check the RACF user name and try again. If the problem continues, contact the system administrator.

1055094 Essbase System Files

Explanation: This message is written to the server console, added to the log, and followed by the name and build date of each executable file of DB2 OLAP Server each time the server is started. This is useful for IBM Technical Support to verify the level of code when there is a problem.

User Response: No action required.

1051196 IBM DB2 OLAP Server for z/OS - started

Explanation: This message is logged each time DB2 OLAP Server is started.

User Response: No action required.

1051192 Invalid application name: *application name*

Explanation: DB2 OLAP Server cannot process application or database names with double-byte characters.

User Response: Create an application and database name that contains only single-byte characters.

1051193 Invalid database name: *database name*

Explanation: DB2 OLAP Server cannot process application or database names with double-byte characters.

User Response: Create an application and database name that contains only single-byte characters.

1013146 Invalid file name [*file name***]**

Explanation: DB2 OLAP Server cannot process file names that contain double-byte characters.

User Response: Create an application or database name that contains only single-byte characters.

2002017 The group or user name is missing or invalid. Please provide valid login information.

Explanation: This message is only seen if a group ID is entered in the OLAP Metadata Catalog field. Either the group ID is invalid or the specified user is not a valid member of that group.

User Response: Ensure that the group and user ID are spelled correctly. If you cannot resolve the problem, contact the system administrator.

2003008 Error 2003008: The username and/or password supplied is incorrect.

Explanation: The user name or password or both are incorrect.

User Response: Check the user name and password and try again.

2003008 Error 2003008: The password supplied has expired. To update your password, log in to DB2 OLAP Server using the Application Manager or Spreadsheet Add-in or log in to the system using a TSO or Telnet session.

Explanation: The RACF password has expired. RACF can require each password to be changed at regular intervals.

User Response: Change the password by using the Application Manager or Spreadsheet Add-in or log in to the system by using a TSO or Telnet session.

2003008 **Error 2003008: The user ID's access has been revoked. Contact your OS/390 or z/OS system programmer.**

Explanation: Access for the user ID can be revoked if users enter the wrong password too many times.

User Response: Contact the system programmer.

2003008 **Error 2003008: The user ID is unknown to RACF.**

Explanation: The user ID is unknown to RACF. All DB2 OLAP Server user IDs must be defined in RACF.

User Response: Check that the user ID is entered correctly. Contact the system programmer if you cannot resolve the problem.

2003008 **Error 2003008: The supplied password is not authorized.**

Explanation: The login failed because of an authorization failure. The failure might be at the system level or the application level.

User Response: Contact the system programmer.

2003008 **Error 2003008: Login failed. Internal processing error. Contact your OS/390 or z/OS system programmer.**

Explanation: This is an MVS error that is probably unrelated to the application or the user ID.

User Response: Contact the system programmer.

-1 **You cannot drop the Metadata Catalog from the Desktop. You or your DB2 Administrator should run the MCATDROP job which is in your SMP/E library *.*.SDOLPLIB.**

Explanation: Using the OLAP Metadata Catalog Setup dialog box to drop an OLAP Metadata Catalog automatically is not supported in z/OS.

User Response: Follow the instructions in the message. If you cannot resolve the problem, contact your DB2 administrator.

-1 **You cannot drop the Sample application from here. You should select File —> Delete to delete the TBC Model and Metaoutline.**

Explanation: Using the Sample Application dialog box to automate the delete of the Sample TBC application is not supported in z/OS.

User Response: Follow the instructions in the message. If you cannot resolve the problem, contact your DB2 administrator.

Not applicable **You cannot create or update the Metadata Catalog from the Desktop. You or your DB2 Administrator should run the MCATCRE8 or the MCATUPD job which is in your SMP/E library *.*.SDOLPLIB.**

Explanation: Using the OLAP Metadata Catalog Setup dialog box to create or update an OLAP Metadata Catalog automatically is not supported in z/OS.

User Response: Follow the instructions in the message. If you cannot resolve the problem, contact your DB2 administrator.

Not applicable **You cannot create the sample from the Desktop. You or your DB2 Administrator should run the SDATCRE8 job which is in your SMP/E library *.*.SDOLPLIB.**

Explanation: Using the Sample Application dialog box to automate the setup of the Sample TBC application is not supported in z/OS.

User Response: Follow the instructions in the message. If you cannot resolve the problem, contact your DB2 administrator.

1003044 **Unable to perform optimized data load for file [***file name***].**

Explanation: This is a warning message indicating that DB2 OLAP Server cannot either obtain enough memory to perform an optimized data load, or it cannot create a temporary file name with which to open a memory file. This message means that the data load will proceed using normal file I/O from a permanent HFS file.

User Response: If the data load input text file is larger than 64 MB, memory file processing for data load is bypassed. If the data load input text file is not larger than 64 MB, contact the system administrator, who should stop DB2 OLAP Server and export the `DB2OLAP_ERRORLOG` environment variable by entering the following command:

```
export DB2OLAP_ERRORLOG= "y"
```

Restart DB2 OLAP Server, re-run the data load that produced this warning, and read the `$ARBORPATH/db2olap.errlog` to see what system call possibly failed.

Appendix C. Setup.sh program prompts

Complete the following worksheet before you start the setup.sh program.

Table 8. Pre-installation worksheet for DB2 OLAP Server

setup.sh program prompts	Example	Your response
Enter your DB2 OLAP Server home directory. This directory will be identified by the environment variable $ARBORPATH. This directory must exist and have a zFS file system mounted.	`/u/olap81`	
Enter the number of the language that you will use.	1 (United States English)	
Do you want to install custom-defined functions?	Yes	
Java installation directory. Provide the path name of the Java product directory if $JAVA_HOME does not have a current value.	`/usr/lpp/java/J1.3`	
Do you want to use DB2 OLAP Server to DB2?	Yes	
Enter your DB2 subsystem ID.	DSN7	
Enter the MVS data set names for the DB2 ODBC load libraries. These data set names will be included in the STEPLIB environment variable. If these libraries are already in the link list, you can omit them.	DSN710.SDSNEXIT: DSN710.SDSNLOAD	
Do you want to install DB2 OLAP Integration Server?	Yes	
Do you want to configure the Import/Export utility?	Yes	
Enter the location of your DB2 JDBC installation directory	`/usr/lpp/db2/db2710`	
Did you purchase additional user licenses?	Yes	
How many?	100	
Did you purchase the Partitioning Option?	Yes	

Table 8. Pre-installation worksheet for DB2 OLAP Server (continued)

setup.sh program prompts	Example	Your response
Did you purchase the Tools Bundle?	Yes	
Did you purchase the Integration Server?	Yes	

Appendix D. Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:
INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
J46A/G4
555 Bailey Avenue
San Jose, CA 95141-1003
U.S.A.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this information and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some

measurement may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

AIX
DB2
DB2 OLAP Integration Server
DB2 OLAP Server
IBM
z/OS
zSeries
zFS

The following terms are trademarks or registered trademarks of other companies:

Lotus and 1-2-3 are trademarks of Lotus Development Corporation in the United States, other countries, or both.

Microsoft, Windows, Windows NT, Windows 2000, Windows XP, and Micorsoft Excel are trademarks or registered trademarks of Microsoft Corporation.

Java or all Java-based trademarks and logos, and Solaris are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

UNIX is a registered trademark in the United States, other countries or both and is licensed exclusively through X/Open Company Limited.

Hyperion Essbase and Essbase Integration Services is a registered trademark in the United States, other countries or both.

Other company, product, or service names may be trademarks or service marks of others.

Glossary

This glossary defines terms that are used in this book and throughout the DB2 OLAP Server for z/OS library.

administrator. A person who is responsible for installing and maintaining DB2 OLAP Server and for setting up user accounts and security.

agent. A process that starts and stops applications and databases, manages connections from users, and handles user-access security.

.

API. Application programming interface. The DB2 OLAP Server API is a library of functions that you can use in a custom C or Visual Basic program to access DB2 OLAP Server.

Application Manager. A tool that you can use to create and maintain OLAP applications.

block. A string of data elements recorded or transmitted as a unit.

cache. A component of memory. Each multidimensional database contains a data cache and an index cache.

calculation. An equation within a database outline, a calculation script, or a report script that calculates a value for a particular member or point in a report.

calculation script. A text file that contains instructions to perform calculations within a multidimensional database. Also called a calc script.

data load. The process of populating a multidimensional database with data. Loading data establishes actual values for the values of the cells defined in the database outline for the database.

data load rules. A set of operations that DB2 OLAP Server performs on data as it is loaded from an external source file.

database name. The name of the relational database where you want DB2 OLAP Server to store your multidimensional data.

database outline. The structure that defines all elements of a database within DB2 OLAP Server. It contains definitions of dimensions and members, dense or sparse dimension tags and attributes, the anchor dimension attribute, calculations, shared members, and alternations to the basic roll-up structure of the database.

database password. The password for the user ID that you want DB2 OLAP Server to use to log on to your relational database.

database user ID. The user ID that you want DB2 OLAP Server to use to log on to your relational database. The default is the supervisor ID that you specify when you start DB2 OLAP Server for the first time.

dimension. A data category, such as time, accounts, products, or markets. In a database outline, the dimensions represent the highest consolidation level.

dimension table. A table that DB2 OLAP Server creates in your relational database that contains detailed information about the members in a dimension. There is one dimension table for each dimension in an outline.

dimension view. A view that DB2 OLAP Server creates in your relational database that allows an SQL user to access information about members contained in a dimension.

DOLISMKD. JCL job that creates the DB2 OLAP Server product subdirectory.

DOLRECEV. JCL job that copies DB2 OLAP Server files to the product subdirectory.

essbase.cfg. The DB2 OLAP Server configuration file.

essbaseenv.doc. A file that contains the environment variables that are needed by DB2 OLAP Server and DB2 OLAP Integration Server.

ESSCMD. A command-line interface used to perform server operations interactively or through a batch file.

HFS. Hierarchical file system. In CDE, a way to organize data on computer systems using a hierarchy of containers, often called folders (directories) and files. In this scheme, folders can contain other folders and files. The successive containment of folders within folders creates the levels of organization, which is the hierarchy.

home subdirectory. See *OLAP home subdirectory*.

Hybrid Analysis. The integration of a relational database with an OLAP multidimensional database such that lower-level data remains in the relational database and is mapped to summary-level data that resides in the OLAP database. Hybrid Analysis allows OLAP to take advantage of the mass scalability of a relational database while maintaining a multidimensional view of the data in a live environment.

IEFUSI. MVS installation exit

JCL. Java control language.

JDBC. Java database connectivity.

license.id. The DB2 OLAP Server license file.

member. A discrete component within a dimension. For example, January 1997 or 1Qtr97 are typical members of a Time dimension.

metadata catalog. In DB2 OLAP Integration Server, a relational database that contains metadata describing the nature, source, location, and type of data that you extract from the relational data source. DB2 OLAP Integration Server accesses the OLAP Metadata Catalog to generate the SQL statements and the information that is required to generate an OLAP database outline.

metaoutline. A template containing the structure and rules for creating a database outline from an OLAP model. Using the metaoutline, you can create a database outline and load data into it. The DB2 OLAP Integration Server desktop includes a tool called OLAP Metaoutline that you can use to create one or more metaoutlines from an OLAP model.

model. A logical model (star schema) that you create from tables and columns in a relational database. You can use the OLAP model to create a metaoutline that generates the structure of a multidimensional database. The DB2 OLAP Integration Server desktop includes a tool called OLAP Metaoutline that you can use to design and create an OLAP model based on a relational data source.

multidimensional data. The data in a multidimensional database. Data can include basic data values (loaded from an external source) that represent combinations of the lowest level of members in the dimensions of the database; data values that are calculated from the base data values; and rolled up data values that are created by combining values for members in dimension hierarchies.

multidimensional database. An OLAP database that you create using the Application Manager, ESSCMD, or MaxL commands (in DB2 OLAP Server) or with the DB2 OLAP Integration Server desktop. An OLAP database includes a database outline, data, associated optional calculation scripts, optional report scripts, and data load rules.

ODBC. Open database connectivity.

OLAP application. An application that you create using the Application Manager, ESSCMD, or MaxL commands (in DB2 OLAP Server) or with the DB2 OLAP Integration Server desktop. An OLAP application can contain one or more multidimensional databases and any associated calculation scripts, report scripts, and data load rules.

OIS administrator. A person who designs, creates, and maintains the OLAP Metadata Catalog.

OLAP home subdirectory. The OLAP subdirectory in which user application files, application data, logs, configuration files, and links to system files are stored. The OLAP home subdirectory is frequently identified by the environment variable, $ARBORPATH, that points to this subdirectory.

OLAP product subdirectory. The OLAP subdirectory in which OLAP Server system files, including executable files, dynamic link libraries, and locale files to support multiple languages are stored.

OLAP Metadata Catalog. See *metadata catalog*.

OLAP metaoutline. See *metaoutline*.

OLAP model. See *model*.

online analytical processing (OLAP). A multidimensional, multi-user, client server computing environment for users who need to analyze consolidated enterprise data in real time. OLAP systems feature zooming, data pivoting, complex calculations, trend analyses, and modeling.

PSP. Preventive service planning.

outline. See *database outline*.

product subdirectory. See *OLAP product subdirectory*.

relational database. A database that is organized and accessed according to relationships between data items. A relational database contains a collection of relational tables, views, and indexes.

report script. An ASCII file that contains Report Writer commands that generate one or more production reports. Report scripts can be run in batch mode, using the ESSCMD command-line interface, or through the Application Manager. The script is a text file that contains data retrieval, formatting, and output instructions.

restructure. An operation to regenerate or rebuild a database index and, in some cases, data files.

setup.sh. A script that creates and initializes the DB2 OLAP Server home directory, creates `essbaseenv.doc`, `dsnaoini`, `essbase.cfg`, and `license.id`.

SMP/E. System modification program / extended.

shared member. A member that explicitly shares storage space with another member of the same name. This member has an attribute that designates it as shared. Shared members prevent making extra calculations on a member that appears in more than one location in a database outline.

sparse dimension. A dimension with a low percentage of available data positions filled. For example, a product that is not sold in all of a company's available markets would be a good sparse candidate.

Spreadsheet Add-in. Software that merges with Microsoft Excel and Lotus 1-2-3 to enable analysis of multidimensional databases. The software library appears as a menu Add-In to the spreadsheet and provides such features as connect, zoom-in, and calculate.

SQL. Structured Query Language. A standardized language for defining and manipulating data in a relational database.

star schema. The type of relational database schema used by DB2 OLAP Server. When you use the Application Manager to create a multidimensional database, DB2 OLAP Server creates a main fact table and a set of dimension tables. The fact table holds the actual data values for the database, and the dimension tables hold data about members and their relationships.

star view. A relation view that DB2 OLAP Server creates in your relational database that allows an SQL user to access data from the star schema in a single view with the JOIN already done.

XML import and export. In DB2 OLAP Integration Server, a function that enables importing data to and exporting data from an OLAP Metadata Catalog in an Extensible Markup Language (XML) file format. Both OLAP models and metaoutlines can be saved as XML files and imported into other OLAP Metadata Catalogs.

zFS. zSeries file system. A decentralized file system that distributes all aspects of file and storage management over a set of cooperating machines interconnected by a high-speed network.

Index

N

O

P

R

S

T

U

V

X

Z

Contacting IBM

If you have a technical problem, please review and carry out the actions suggested by the product documentation before contacting DB2 OLAP Server Customer Support. This guide suggests information that you can gather to help DB2 OLAP Server Customer Support to serve you better.

For information or to order any of the DB2 OLAP Server products, contact an IBM representative at a local branch office or contact any authorized IBM software remarketer.

If you live in the U.S.A., you can call one of the following numbers:

- 1-800-237-5511 for customer support
- 1-888-426-4343 to learn about available service options

Product Information

If you live in the U.S.A., then you can call one of the following numbers:

- 1-800-IBM-CALL (1-800-426-2255) or 1-800-3IBM-OS2 (1-800-342-6672) to order products or get general information.
- 1-800-879-2755 to order publications.

http://www.ibm.com/software/data/db2/db2olap/
The DB2 OLAP Server World Wide Web pages provide current DB2 OLAP Server information about news, product descriptions, education schedules, and more.

http://www.ibm.com/software/data/db2/db2olap/library.html
The DB2 OLAP Server Technical Library provides access to frequently asked questions, fixes, books, and up-to-date DB2 technical information.

Note: This information may be in English only.

http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi The International Publications ordering Web site provides information about how to order books.

http://www.ibm.com/education/certify/
The Professional Certification Program from the IBM Web site provides certification test information for a variety of IBM products.

Note: In some countries, IBM-authorized dealers should contact their dealer support structure instead of the IBM Support Center.

Program Number: 5655–H81

Printed in U.S.A.

SC18-7280-00

Spine information:

IBM DB2 OLAP Server for z/OS

DB2 OLAP Server Installation and Administration Guide for z/OS

Version 8.1