OS/390®

Distributed File Service DFS Configuring and Getting Started

SC28-1722-05

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SC28-1722-05

Note!

Before using this information and the product it supports, be sure to read the general information under Appendix D, “Notices” on page 151.

| **Sixth Edition (December 1999)**

| This edition applies to Version 2, Release 8 of OS/390 (product number 5647-A01) and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces SC28-1722-04.

The following statements are provided by the Open Software Foundation.

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About This Book

This book helps system and network administrators configure OS/390 Distributed File Service (DFS). This book is used after the successful installation of OS/390 DFS. Installation is described in the *OS/390 Program Directory*.

OS/390 Distributed File Service includes a DFS** function that is based on the OSF DCE Distributed File Service component. The OSF DCE Distributed File Service includes distributed file system capabilities based on the OSF DCE RPC protocols and security.

Who Should Use This Book

This book is intended for system administrators who understand the basic concepts of the Distributed Computing Environment (DCE). A knowledge of TCP/IP communications also helps administrators to use this book more effectively. Administrators who have little or no experience with the Distributed Computing Environment (DCE) are advised to read *Distributed Computing Environment: Understanding the Concepts*, GC09-1478, before using this book.

How to Use This Book

This book provides overview information on configuring and deconfiguring OS/390 DFS. It takes you through the steps you will perform to prepare for configuration by running the DFS Server Configuration Program (**DFSCONF**) from TSO to configure or deconfigure DFS.

Note: The chapters in this book describe procedures that should be performed in the order that they appear.

In addition, there are appendices:

- Appendix A, “Example DFS Server Configuration Log File (dfsconf.log)” on page 123, shows the contents of a log file created after a typical configuration on an OS/390 DFS host system using the OS/390 DFS Server Configuration Program (**DFSCONF**).
- Appendix B, “OS/390 DFS Directories and Files” on page 129, lists the important files and subdirectories shipped as part of the OS/390 DFS product. A listing of symbolic links created during the installation process is also provided.
- Appendix C, “Environment Variables in DFS” on page 135, lists and describes some of the DCE environment variables and all of the OS/390 DFS environment variables.

Any reference to DCE in this book is understood to specifically mean DCE for the IBM OS/390 operating system, unless otherwise noted.

Where to Find More Information

To understand most of the topics that are covered in this book, refer to the *OS/390 Distributed File Service Administration Guide and Reference*.

For information about installing DFS components, refer to the *OS/390 Program Directory*.

Information about administrative commands and syntax is available in the *OS/390 Distributed File Service Administration Guide and Reference*.

For information concerning Distributed File Service-related messages, refer to the *OS/390 Distributed File Service DFS Messages and Codes* book.

Information about DFS configuration on other IBM systems can be found in the configuration guide for those systems.

Where necessary, this book references information in other books using shortened versions of the book title. For complete titles and order numbers of the books for all products that are part of OS/390, see the *OS/390 Information Roadmap*, GC28-1727.

Unsupported Services and Commands

The following commands and services are not supported in OS/390 DFS:

- The **TapeConfig** configuration file.
- The **FMSLog** log file.
- The following **bos** commands are not supported in OS/390 DFS:
  - **bos getdates** command
  - **bos install** command
  - **bos prune** command
  - **bos uninstall** command.

  In addition, the **-newbinary** option is not available in OS/390 DFS for any **bos** commands.
- The following **bak** commands cannot be issued against an OS/390 **bakserver**. These commands may be issued from OS/390 against non-OS/390 **bakserver** processes:
  - **bak labeltape** command
  - **bak scantape** command
  - **bak readlabel** command.
- The **fms** command.
- The **dfsgw** gateway function is provided, see the *OS/390 Distributed File Service Administration Guide and Reference* for complete details. However, the following **dfsgw** commands cannot be issued from OS/390:
  - **dfsgw add** command
  - **dfsgw apropos** command
  - **dfsgw delete** command
  - **dfsgw help** command
  - **dfsgw list** command
  - **dfsgw query** command.
- The **dfstrace** command.

Commands and services not directly supported in OS/390 DFS may be run or requested from other non-OS/390 DFS systems. Exceptions are noted where applicable.

Conventions Used in This Book

This book uses the following typographic conventions:

Bold	**Bold** words or characters represent system elements that you must enter into the system literally, such as commands.
Italic	*Italicized* words or characters represent values for variables that you must supply.
`Example Font`	Examples and information displayed by the system are printed using an example font that is a `constant width typeface`.
[ ]	Optional items found in format and syntax descriptions are enclosed in brackets.
{ }	A list from which you must choose an item found in format and syntax descriptions are enclosed by braces.
|	A vertical bar separates items in a list of choices.
< >	Angle brackets enclose the name of a key on a keyboard.
...	Horizontal ellipsis points indicate that you can repeat the preceding item one or more times.
\	A backslash is used as a continuation character when entering commands from the shell that exceed one line (255 characters). If the command exceeds one line, use the backslash character **** as the last non-blank character on the line to be continued, and continue the command on the next line. **Note:** When you enter a command from this book that uses the backslash character (\) make sure you immediately press the Enter key and then continue with the rest of the command. In most cases, the backslash has been used for ease of readability.
$	A dollar sign that appears before a command indicates that the example is shown in shell mode, that is, commands are entered from the shell.
#	A number sign is used for the command prompt in instances where *root* authority is needed (in OS/390 DFS, **root** refers to a user with a **UID = 0**).

This book uses the following keying convention:

<**Return**>	The notation <**Return**> refers to the key on your terminal or workstation that is labeled with either the word “Return” or “Enter,” or with a left arrow.
Entering commands	When instructed to enter a command, type the command name and then press <**Return**>.

Online Books

All the books belonging to the IBM OS/390 Distributed File Service library are available as online publications. They are included in the *IBM OS/390 Collection*, SK2T-6700.

All the books in the Online Library are viewable, without change, on these IBM operating platforms: OS/390, VM, OS/2, DOS, and AIX/6000. The same book can be viewed on any of these platforms using

the IBM BookManager Library Reader for OS/2, Windows, and DOS, or any of the IBM BookManager READ licensed programs for OS/390, VM, OS/2, Windows, DOS, or AIX/6000.

The booklet, included with the Online Library, provides details on accessing the IBM OS/390 Distributed File Service online publications.

How to Send Your Comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this book or any other OS/390 documentation:

- Visit the home page at:
  `http://www.ibm.com/s390/os390/`
- Fill out one of the forms at the back of this book and return it by mail, by fax, or by giving it to an IBM representative.

Summary of Changes

Summary of Changes
for SC28-1722-05
OS/390 Version 2 Release 8

This book contains information previously presented in Release 6 of the *OS/390 Distributed File Service Configuring and Getting Started* book, SC28-1722-04.

Changed Information

- The OS/390 Distributed File Service now provides support for the SMB File/Print Server as well as the DFS client and server support for a DCE.
- A new environment variable, **_IOE_PROTOCOL_RPC**, has been added to allow the Distributed File Service server to start with the DCE RPC support disabled.
- The DFS customable files reside in the path **/etc/dfs** instead of a separate HFS dataset mounted at **/usr/lpp/dfs/local**.

This book includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Summary of Changes
for SC28-1722-04
OS/390 Version 2 Release 6

This book contains information previously presented in Release 5 of the *OS/390 Distributed File Service Configuring and Getting Started* book, SC28-1722-03.

Changed Information

- As part of the name change of OpenEdition to OS/390 UNIX System Services, occurrences of OpenEdition have been changed to OS/390 UNIX System Services or its abbreviated name, OS/390 UNIX. OpenEdition may continue to appear in message, panel text, and other code locations.
- The DFSKERN process of the OS/390 DFS File Server can be run in a separate address space. This can provide better recovery characteristics in DFSKERN failure situations.
- The DFS customable files reside in the path **/etc/dfs** instead of a separate HFS dataset mounted at **/usr/lpp/dfs/local**.

Summary of Changes
for SC28-1722-03
OS/390 Version 2 Release 5

This book contains information previously presented in Release 3 of the *OS/390 Distributed File Service Configuring and Getting Started* book, SC28-1722-02. This version of the book has been reorganized to help you better explain the steps required for configuring DFS.

Summary of Changes
for SC28-1722-02
OS/390 Version 1 Release 3

This book contains information previously presented in Release 2 of *OS/390 OpenEdition DCE Distributed File Service Configuring and Getting Started* book, SC28-1722-01.

The following summarizes the changes to that information.

New Information:

- OS/390 DFS configures using ISPF dialogs. Chapter 7, “Configuring DFS” on page 31 provides this information.
- The DFS Server exports OS/390 record data. Chapter 9, “Exporting Data in DFS” on page 83 provides this information.

Summary of Changes
for SC28-1722-01
OS/390 Version 1 Release 2

This book contains information previously presented in Release 1 of *OS/390 OpenEdition DCE DFS: Configuration and Release Notes*, SC28-1722-00.

The following summarizes the changes in this addition.

New Information: Information on the following processes now supported in Release 2 of OS/390 has been added:

- DFS Client (**DFSCM**)
- Fileset Location Server (**flserver**)
- Backup Server (**bakserver**).

Information on configuring (and deconfiguring) the above processes has been added to Chapter 7, “Configuring DFS.”

Planning information has been added regarding the DFS Client in Chapter 3, “DFS Client (DFSCM) Considerations.”

Information on how to start and stop the DFS Client in OS/390 has been added to “Starting and Stopping the DFS Client (DFSCM).”

Changed Information: Information on configuring DFS components has been changed in “Using the DFS Configuration Program (DFSCONF)” to reflect support for the DCE **dcecp** administrative interface.

Updates to the following sections have been made:

- Appendix B, “OS/390 DFS Directories and Files”
- Appendix C, “Environment Variables in DFS.”

Information has been changed throughout to reflect changes made by upgrading to Open Software Foundation's Revision 1.1 level.

Summary of Changes
for SC28-1722-00
OS/390 Version 1 Release 1

This book contains information previously presented in the *OpenEdition DCE DFS for MVS/ESA: Configuration and Release Notes*, SC24-5723-00, which was a feature of MVS/ESA System Product Version 5 Release 2.2.

Chapter 1. Introduction to OS/390 DFS

The OS/390 Distributed File Service supports the client/server model for distributed file systems. The Distributed File Service provides DCE based OS/390 DFS client and server support. It also provides OS/390 SMB File/Print Server support which is not dependent on DCE. The OS/390 Distributed File Service server running on OS/390 can provide support for either the DFS file serving environment for DCE, the SMB File/Print Server environment or both environments simultaneously. HFS file data exported from the OS/390 Distributed File Service server for workstation user access can be accessed and shared by both DFS clients, SMB workstation users, and OS/390 UNIX System Services users and applications.

For further information on the OS/390 SMB File/Print Server support, refer to the *OS/390 Distributed File Service SMB Administration Guide and Reference*, SC24-5882.

IBM's OS/390 Distributed File Service (DFS) allows users to access and share data in a distributed environment across a wide range of IBM and non-IBM platforms. OS/390 is based on the source code developed by the Open Software Foundation (OSF). In the environment, OS/390 DFS provides access to the Hierarchical File System (HFS), Record File System (RFS), and OSF's DCE Local File System. The benefits of these file systems are detailed in this chapter.

This chapter discusses the following topics:

OS/390 DFS Features

The Distributed File Service (DFS) allows users to access and share files stored on a File Server anywhere on the network, without having to know the physical location of the file. Files are part of a single namespace. Therefore, no matter where in the network a user is, the file can be found using the same name.

OS/390 DFS includes functionality to configure DFS in a DCE cell and export the OS/390 Hierarchical File System (HFS) and the Record File System (RFS). For further information on DCE cells, see the *OS/390 DCE Administration Guide,* SC28-1584.

Note: IBM OS/390 DCE Base Services must be installed and running before installing OS/390 DFS.

For information regarding other corequisites and prerequisites for OS/390 DFS, see the *OS/390 Program Directory*.

Using OS/390 DFS with HFS and RFS file systems provides the following benefits:

- File location transparency. DFS keeps track of the location of files at all times so users do not have to.
- Data consistency for distributed data through the use of advanced token management.
- Access to the OS/390 Hierarchical File System and Record File System.
- Uniform access to enterprise-wide data through unique naming of files.
- Improved security based on Kerberos authentication.

- Increased manageability through the use of distributed databases to track file location and authentication.

There are no DFS application programming interfaces. Access to DFS resources is transparent to the application.

DFS Client Support

OS/390 DFS now provides support for the Distributed File Service Client (**DFSCM**). This support allows an OS/390 user or application to access directories and/or files in the DFS global namespace. (Note that the terms DCE global namespace and DFS global namespace can be used interchangeably.) The DFS global namespace includes any directories and files exported by DFS servers running on either the local OS/390 system, a remote OS/390 system, or on non-OS/390 systems. OS/390 Hierarchical File System (HFS), Record File System (RFS), or DCE Local File System files exported by DFS on a remote OS/390 system running an OS/390 DFS server are part of this namespace. The DFS servers can be in the same or different DCE cells.

DFSCM uses the DCE Remote Procedure Call (RPC) security mechanisms based on Kerberos authentication. Support for directory and file authorization based on DCE Access Control Lists (ACLs) is included with **DFSCM**. Optimal performance through memory or local disk caching is also included with **DFSCM**.

Refer to the “DFSCM Address Space and Processes” on page 9 for more information on the OS/390 implementation of the DFS client.

DFS Server Support

OS/390 DFS provides support for all the Distributed File Server daemons. In OS/390, the term daemons, server processes, and servers are used interchangeable. The DFS servers export file data for access by DFS clients. Refer to the “DFS Address Space and Processes” on page 13 for more information on the OS/390 implementation of the DFS servers.

DCE Local File System Support

OS/390 DFS also includes support for the DCE Local File System. The DCE Local File System is part of the Open Software Foundation DFS product. DCE Local File System is a high-performance, log-based file system. It provides enhanced performance and reliability over traditional file systems by providing improved data storage and management. The DCE Local File System provides support for the extended DFS fileset management functionality of setting fileset quotas, moving filesets, creating backup filesets, and limiting access to DCE Local File System data by supporting DCE Access Control Lists (ACLs).

DCE Local File System support provided with OS/390 DFS includes:

- OS/390 kernel extension for the DCE Local File System.
- Greater reliability through data replication across multiple servers.
- Better availability of data through data replication.
- The following DCE Local File System processes and commands:
  - Fileset Replication server (**repserver**)
  - DCE Local File System salvager (**salvage**)
  - DCE Local File System aggregate initialization (**newaggr**, **growaggr**).

Using the OS/390 Hierarchical File System

OS/390 Hierarchical File Systems (HFS) can be exported to the DFS filespace. In the DFS documentation this is referred to as a non-Local File System fileset. The entire HFS file system is registered in the Fileset Location Database machine as one DFS fileset. Additional DFS filesets cannot be created within that HFS file system.

An HFS file system has to be locally mounted on the DFS file server machine before it is exported to the DFS filespace. An HFS data set is mounted at its root.

See the *OS/390 DFS Administration Guide and Reference* for more information about exporting HFS file systems (non-Local File System partitions) to the OS/390 DFS filespace.

There are some limitations when using HFS file systems with DFS. The fileset management functions of creating backup filesets, moving filesets, and fileset replication are not supported for HFS filesets. In addition, only UNIX mode bits can be used to protect HFS files that have been exported to the OS/390 DFS filespace.

An inconsistent DFS token state can occur if there is any local file system activity occurring on an HFS file system before it is exported to the DFS filespace. To avoid this state, when configuring the DFS File Server on OS/390 to export HFS file systems, ensure that DFS is started at system start time (see "Using the DFS Configuration Program (DFSCONF)" on page 37). It is not recommended that **/**, **/tmp**, **/user**, **/bin**, **/etc**, or **/var** be exported since the operating system generates activity on these systems at system restart time. If **/home** is exported with DFS, it should be exported before local system logins are permitted. Consequently, the DFS File Exporter should be started as early in the OS/390 startup sequence as is possible.

Using the OS/390 Data Sets

OS/390 data sets can be exported to the DFS filespace. In the DFS documentation an exported OS/390 data set is referred to as a non-Local File System fileset, an RFS (Record File System) fileset, or simply as an RFS (Record File System). The entire RFS is registered in the Fileset Location Database machine as one DFS fileset. Additional DFS filesets cannot be created within that RFS.

There are some limitations when using RFS filesets with DFS. The fileset management functions of creating backup filesets, moving filesets, and fileset replication are not supported for RFS filesets.

See the *OS/390 DFS Administration Guide and Reference* for more information about exporting RFS filesets (non-Local File System partitions) to the OS/390 DFS filespace and using OS/390 data sets from DFS clients.

Using OS/390 DFS Commands in TSO

In OS/390 DFS, most commands can be run from Time Sharing Option Extensions (TSO/E), the shell, or submitted as batch jobs. To ensure TSO/E users can run these commands, the SIOEEXEC library containing the OS/390 DFS REXX EXECs for TSO/E must be either allocated to SYSEXEC or concatenated with existing SYSEXEC libraries. This is normally done during the installation process (for details, see the *OS/390 Program Directory*).

The SIOEEXEC library is supplied with a record format of Fixed Block. Ensure that all libraries in the SYSEXEC concatenation have the same record format.

To ensure that the SYSEXEC library SIOEEXEC is available to be searched, execute the following TSO/E command:

```
EXECUTIL SEARCHDD(YES)
```

You may also, optionally, add the SIOEEXEC library to SYSPROC instead of SYSEXEC. To do so, ensure all libraries in the SYSPROC concatenation have the same record format. For further information, see the *OS/390 Program Directory*.

Using the OS/390 DFS Client (DFSCM)

The OS/390 DFS client (**DFSCM**) can be used to access directories and files in the DFS global namespace from OS/390.

The DFS global namespace is identified by the pathname prefix, **/...**. Any directory or file with this pathname prefix is considered a part of the DFS global namespace. In addition, any directories or files exported by DFS servers on any system platform are part of the DFS global namespace. The DFS namespace includes any Hierarchical File System (HFS) or Record File System (RFS) (also referred to as a non-Local File System) or DCE Local File System files exported by a DFS server running on any OS/390 system. This includes either the local OS/390 system where **DFSCM** is running or a different OS/390 system.

In addition, any OS/390 command that references a pathname beginning with **/...** uses **DFSCM** services to access the requested directory or file information.

Chapter 2. Global and Cell Considerations

The purpose of this chapter is to assist you in planning for the installation and configuration of OS/390 DFS. “Using the DFS Configuration Program (DFSCONF)” on page 37 describes the configuration process for setting up and configuring DFS servers.

This chapter discusses the following topics:

Note: After a DCE cell is configured and named you cannot change the name after DFS is configured and used.

Planning for Access Control

In planning for access control, it is important to keep the level of access control in your cell restrictive enough to ensure that security is maintained. A special set of individuals or a special group can be given permission to create accounts and groups in the root directory of the Security namespace. The **acct-admin** group is created when you configure DCE. **acct-admin** is the only group that can create accounts and groups in the root directory of the Security space.

While maintaining an adequate level of security in your cell, you also need to consider the requirements of administrators who are maintaining DCE services when you set access control levels. For example, if one person is responsible for administration of DFS in your cell, that person may need to add servers to the Security and CDS namespaces. On the other hand, an administrator responsible for the Security Service manages the Security server but does not control the DFS filespace.

Following are some of the groups created when you configure DFS:

dfs-admin This group administers DFS File Servers and related DFS functions.

dfs-fs-servers This group contains abbreviated forms of the DFS server principal of all Fileset Database machines.

dfs-bak-servers This is the security group to which all database servers belong.

Cell Filespace

This section contains guidelines for planning your cell's filespace.

The filespace begins under the cell root at the **/.:/fs** junction to DFS from the CDS namespace. The notation **/.:** is set up by default to be equivalent to **/.../***cellname*. The notation **/:** is set up by default to be equivalent to **/.:/fs**. Thus, the notation **/:/usr/***user_name* is equivalent to **/.:/fs/usr/***user_name* which in turn is equivalent to **/.../***cellname***/fs/usr/***user_name*.

Some parts of DFS run in the host machine's kernel. This kernel function must be present on your machine before you run DFS. On OS/390, this function is implemented as MVS kernel extensions that are loaded when you configure DFS on the machine.

DFS Administrative Domains

A DFS administrative domain is a collection of machines in the same cell configured for administration as a single unit. In a single cell, you can have one or many administrative domains, depending on the size of your organization. Organizing DFS server machines into different administrative domains simplifies the management of the cell filespace by creating smaller units for administration.

DFS Administrative Lists

DFS administrative lists are files that define the principals and groups that can perform actions affecting specific server processes on a server machine. There is one DFS administrative list for each DFS server process running on a machine. For example, a server's **admin.bos** file defines who has administrative rights to the BOS Server (**boserver**), and thus determines who can manipulate and maintain server processes on that one server. Groups, as well as individual users, can be placed in an administrative list. Each server machine stores administrative lists for its processes on its local HFS file system. A process automatically creates its initial administrative list when it is started if the list does not already exist.

Determining the Roles of DFS Machines

Follow recommendations when you assign roles to the DFS machines in your cell. The first DFS machine that you configure needs to function as a System Control Machine. The System Control machine runs the Update Server (**upserver**) that is responsible for distributing the DFS configuration. Next, you configure a Fileset Location server, the server that maintains the fileset location database. Then, you configure a DFS File Server machine. Usually, the first DFS File Server is the machine on which you plan to put the root fileset (**root.dfs**). After configuring the DFS File Server, you should create the **root.dfs** fileset. Then configure a machine as a DFS client (if a machine is not already a DFS client). “Setting Up Filesets” contains further information about **root.dfs**.

Machines that you configure as DFS servers run the processes required to be File Servers. Be sure the machine you choose has enough space to store DCE Local File System filesets. The amount of free space you need depends on how much data you plan to store in DCE Local File System filesets. Filesets on File Servers can store DFS client binaries in addition to user files. These filesets can also be distributed on other File Server machines in your cell. In addition, if your domain has only one server machine, this machine must run all processes and fill all required machine roles. For example, in addition to being a System Control machine, this machine must be a File Server and a Fileset Location server. An odd number of DFS Fileset Location machines is recommended. Additionally, an odd number of DFS Backup Database Servers is also recommended.

Setting Up Filesets

Consider the following recommendations and restrictions when you set up filesets:

- Fileset names must be limited to 111 characters or less.
- Every cell must include **root.dfs**. The root fileset can be a DCE Local File System fileset or it can be an HFS fileset. If you plan to use replication, your **root.dfs** must be a DCE Local File System fileset and you need to follow the steps described in the *OS/390 DFS Administration Guide and Reference*, which explains how to create **root.dfs** as a DFS Local File System fileset and create a read-write mount point for the fileset below the top level of the cell's filespace. See also Chapter 9, “Exporting Data in DFS” on page 83 for information on creating **root.dfs**.

- You should use a common prefix when naming related filesets. This aids in manipulating and grouping related filesets. It also relates the fileset's name to its mount point.
- You can group filesets on the same partition of a File Server machine. This can localize the effects of an outage, but you also need to consider factors such as number of File Server machines and load balancing before grouping filesets.
- You can replicate filesets for load balancing and to make fileset contents more available. Replication is appropriate for filesets that are read much more often than they are written, such as filesets containing installed executable files. Replication is not supported for non-Local File System filesets.
- Consider the disk space a fileset requires before setting up filesets.
- You should create the initial Access Control Lists (ACLs) for the filesets you want to set up. For further information on creating ACLs, see the *OS/390 DFS Administration Guide and Reference*.

Chapter 3. DFS Client (DFSCM) Considerations

This chapter describes the OS/390 DFS client machine (**DFSCM**). The term Cache Manager is also used to refer to the **DFSCM**. On OS/390, the **DFSCM** is an independent part of the Distributed File Service.

In DFS, the **DFSCM** is responsible for the local caching of file and directory data on machines used as DFS clients. The **DFSCM** enables users on an OS/390 system to access directories and files in the DFS global namespace.

This chapter discusses the following topics:

- "DFSCM Relationship to DCE and DFS Servers"
- "DFSCM Address Space and Processes."

DFSCM Relationship to DCE and DFS Servers

To configure and use the **DFSCM**, DCE must be running on the same host system. **DFSCM** waits for DCE to start before completing initialization. If DCE is stopped while the **DFSCM** is running, the **DFSCM** cannot continue to run successfully.

The **DFSCM** does not require the installation and running of DFS servers on the same OS/390 system. The OS/390 system, where the **DFSCM** is run, must be part of a DCE cell. The **DFSCM** can then access file data exported by DFS file servers running in the same or different DCE cell.

DFSCM Address Space and Processes

The DFS Client in OS/390 DFS is implemented as an a physical file system running as a colony address space named **DFSCM**.

The **DFSCM** address space is started when OS/390 is initialized. The OS/390 system parmlib member **BPXPRM***xx*, read during initialization, identifies the physical file systems.

The variable, *xx*, is an installation specific suffix used to uniquely identify system parmlib members. For more information, see "System Parmlib Member BPXPRMxx Entry for the DFSCM" on page 56.

Additionally, the proclib member **IOEP0002** is supported with JCL to run the DFSCM. Refer to the *OS/390 Program Directory* for proclib member customization considerations for Wave 2 elements.

Refer to the *OS/390 UNIX System Services File System Interface Reference*, SC28-1909, for more information on the physical file system and colony address space.

The **DFSCM** daemons **ioecmini**, **ioedfsd**, and **ioelogin** run as individual processes in the **DFSCM** address space as shown in Figure 1 on page 10.

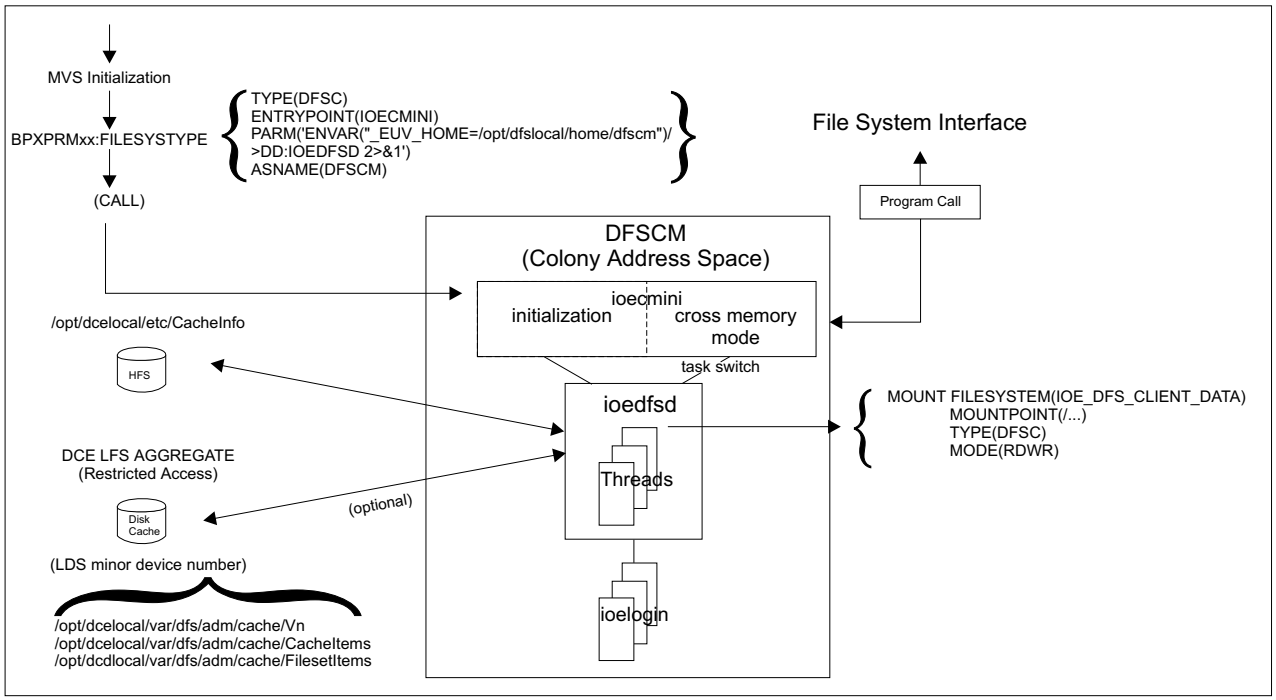

Figure 1. DFSCM Address Space

The **DFSCM** is composed of three daemons: **ioecmini**, **ioedfsd**, and **ioelogin**. These processes are controlled at the address space level and can not be stopped or started independently. A description of the function performed by each process is:

ioedfsd The **ioedfsd** process controls the Cache Manager on OS/390 DFS. The functions provided by the DFS processes, **dfsd** and **dfsbind**, are combined in the **ioedfsd** process.

ioecmini The **ioecmini** process is invoked during **OMVS** initialization to perform **DFSCM** initialization services. These services include starting the other **DFSCM** daemons: **ioedfsd** and **ioelogin**. After returning to allow **OMVS** initialization to continue, **ioecmini** waits for DCE initialization to complete before mounting the HFS file system name that identifies the DFS global namespace at **/...**. The **ioecmini** process also queues work for the **ioedfsd** process.

ioelogin The **ioelogin** process is invoked when a DCE single sign-on is required.

Important Note to Users

The **ioedfsd** process is also unique in OS/390 in that it combines the functions of the traditional Cache Manager **dfsd** and **dfsbind** processes.

Before running the **DFSCM** on an OS/390 host system you must configure it using **DFSCONF**, see Chapter 7, “Configuring DFS” on page 31 for more information.

Control and customization of several **DFSCM** features is accomplished on OS/390 by the following:

- Modifying the local HFS **/opt/dcelocal/etc/CacheInfo** file;
- Adding Cache Manager initialization parameters to the **_IOE_CM_PARMS** parameter in the **/opt/dfslocal/home/dfscm/envar** file;
- Adding parameters to the **FILESYSTYPE TYPE(DFSC)** entry in the system parmlib member **BPXPRM***xx*; or

- Enabling **DFSCM** to use DCE single sign-on.

Refer to “Completing the DFS Client (DFSCM) Configuration” on page 56 for more information.

On OS/390 DFS, the DFS Cache Manager is invoked when OS/390 is started. It can be stopped and restarted without stopping OS/390. Cache Manager customization and control parameters can be specified in the local HFS **/opt/dcelocal/etc/CacheInfo** file or in the **/opt/dfslocal/home/dfscm/envar** file. The parameters are effective when the Cache Manager is started or restarted. Refer to Chapter 11, “Starting and Stopping DFS Components” on page 113 for more information.

Chapter 4. DFS Server Considerations

On OS/390, DFS servers run as processes in the DFS address space. DFS servers are configured to run a certain set of software. This software is made up of at least one daemon and, in some cases, one or more additional programs that comprise the server side of a DFS component. DFS servers also run the software that makes up the DFS Client configuration.

This chapter discusses the following topics:

DFS Address Space and Processes

OS/390 DFS supports all types of DFS servers. DFS servers can assume different roles as described below. The DFS system requirements vary, depending on the DFS servers that are configured and in use.

After DFS has been configured and initialized, the DFS server address space (**DFS**) can be started. The DFS daemons run as individual processes in a single **DFS** address space; or as individual processes in the DFS server and DFSKERN address space as illustrated in Figure 2.

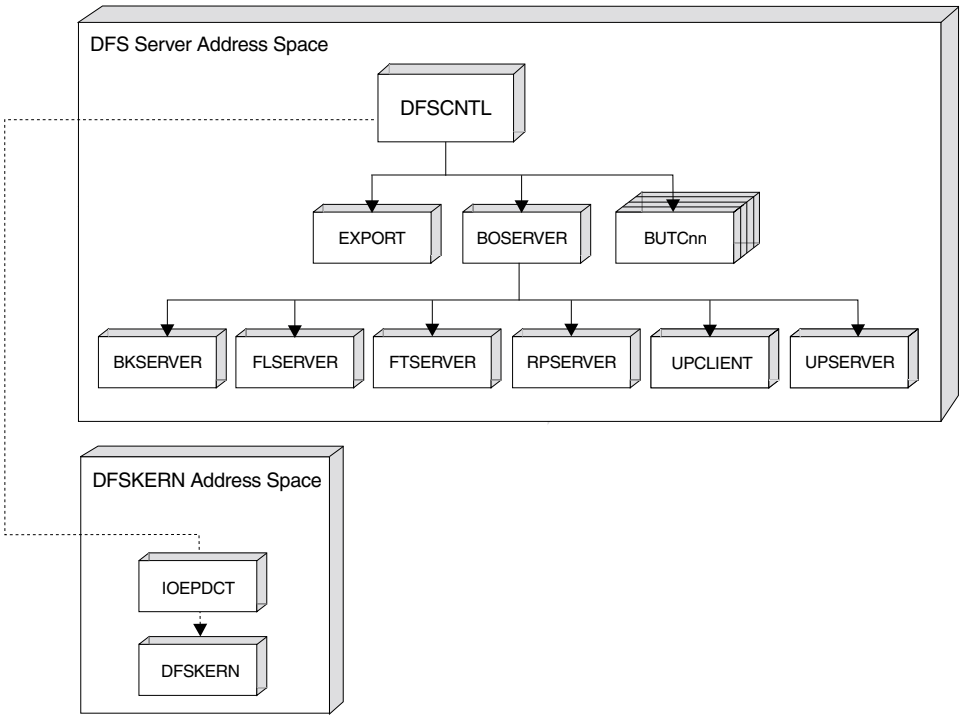

Figure 2. DFS Address Space

The proclib member **IOEP001** is supplied with JCL to run the DFS server address space. The proclib member **IOEP003** is supplied with additional JCL to run the DFSKERN processes in a separate address space when the environment variable, **_IOE_DAEMONS_IN_AS=DFSKERN**, is specified in the file **/opt/dfslocal/home/dfscntl/envar**. Refer to the *OS/390 Program Directory* for proclib member customization considerations for Wave 2 elements. It is recommended that the DFSKERN processes be

run in an address space separate from the other DFS server processes to take full advantage of the system termination processing.

Important Note to Users

In DFS, there are two types of processes: **simple** and **cron**. A **simple** process is defined as a continuous process that runs independently of any other processes on a server machine. All standard DFS processes are **simple** processes. A **cron** process refers to a process that runs independently of any other processes; however, unlike a **simple** process, a **cron** process runs periodically, not continuously.

In OS/390 DFS, **simple** processes are not identified by complete path names to the binary files for the processes. All **simple** process commands in OS/390 DFS are members of the SIOELMOD data set created during installation (for further information, refer to the *OS/390 Program Directory*).

Also, as all OS/390 process names and PDS member names are limited to eight or less characters, the **bakserver**, **repserver**, and **boserver** process member names are shortened to **bkserver**, **rpserver**, and **boserver**, respectively.

The DFS Control Task, **dfscntl**, is the *parent process* to all the DFS server processes including those that may be running in a separate DFSKERN address space. All requests to **DFS** are directed to **dfscntl** to perform the requested action.

Once DFS is configured, all servers that have been configured can be started (see Chapter 7, “Configuring DFS” on page 31). DFS servers can be started and stopped using the OS/390 system commands **start** and **modify** as described later in this chapter.

The content of the **/opt/dfslocal/etc/ioepdcf** file (also referred to as the daemon configuration file) is used to determine the DFS server processes that are started by **dfscntl** (see “Customizing the ioepdcf File” on page 62). Initializing DFS on OS/390 automatically starts all processes as specified in the **ioepdcf** file. The DFS processes identified in the **ioepdcf** file are:

dfscntl The DFS Control Task which controls the **dfskern**, **export** (and **unexport**), **boserver**, and **butc***nn* processes.

The **dfscntl** and all of its child processes are controlled by the OS/390 system command, **modify**. All options for this command are specified in the DFS **ioepdcf** file.

The name, **dfscntl**, is an alias in the SIOELMOD load library for the load module **IOEDFSCL**.

dfskern The **dfskern** process is the DFS kernel program which includes sub-processes that:

- Provide support for DFS file locking and data sharing
- Allow the DFS server to export OS/390 file data to DFS clients
- Provide support for the DCE Local File System
- Allow the DFS server to export OS/390 sequential, PDS(E), and VSAM data sets.

In OS/390 DFS, the **fxd** command is run as part of the **dfskern.** process. All options of this command are specified in the **ioepdcf** file.

The name, **dfskern**, is an alias in the SIOELMOD library for the load module **IOEDFSKN**.

ioepdct The **ioepdct** process is used to initialize the DFSKERN process when DFSKERN is defined to run in a separate address space from the other server processes.

export The DFS **export** process allows aggregates to be exported by issuing the **dfsexport** command. The SIOELMOD load library entry **IOEDFSXP** is run in the **export** process.

unexport DFS **unexport** is a process that allows aggregates to be unexported by issuing the **dfsexport -detach** command. It is not a separate process but runs as part of the **export** process (see above).

boserver The **Basic OverSeer Server** (BOS) processes **bos** commands and monitors the server processes that it starts on the local machine.

The **boserver** can restart the processes it controls and provides an interface for administrative tasks. In OS/390 DFS, the **boserver** runs under the control of the Control Task, **dfscntl**. The names and descriptions of processes started by the **boserver** daemon are listed later in this section.

The name, **boserver**, is an alias in the SIOELMOD load library for the load module **IOEBOSRV**.

butc*nn* A **BackUp Tape Coordinator** (BUTC) daemon is a tape coordinator server on which backup and restore operations are physically conducted. Valid entries for *nn* are **01** through **08**. The names, **butc01** through **butc08**, are all aliases in the SIOELMOD load library for the load module **IOEBUTC**.

In OS/390 DFS, the **boserver** process, in turn, acts as the *parent process* to the following sub-processes listed below. The **bos create** command is used to control these processes. The processes that must be started by the **boserver** process are:

bkserver The **Backup Server** processes **bak** commands and maintains the Backup Database where information that is used to control the backup and restore of filesets is stored.

The name, **bkserver**, is an alias in the SIOELMOD load library for the load module **IOEBKSRV**.

flserver The **Fileset Location Server** maintains the Fileset Location Database (FLDB) which tracks the location of all DCE Local File System and non-Local File System filesets. The FLDB is a cell-wide database that maps filesets to servers on which they are located,

There must be at least one **flserver** running in a DCE cell.

The name, **flserver**, is an alias in the SIOELMOD load library for the load module **IOEFLSRV**.

ftserver The **Fileset Server** processes **fts** commands which allow DFS administrators to create, delete, duplicate, move, back up, or restore entire filesets.

An **ftserver** must be run on a host system to export any filesets to the DFS namespace.

The name, **ftserver**, is an alias in the SIOELMOD load library for the load module **IOEFTSRV**.

rpserver The **Replication Server** tracks the currency of replicas and updates the versions of data used at each replication site.

Only replicas of DCE Local File System filesets are supported; replicas of HFS and RFS data sets are not supported.

The name, **rpserver**, is an alias in the SIOELMOD load library for the load module **IOERPSRV**.

upclient The **Update Client** daemon checks specified files and directories on the local machine and ensures they match the corresponding files on the System Control machine.

The **upclient** contacts the **upserver** to verify that the most recent version of each DFS administrative list is being used.

The name, **upclient**, is an alias in the SIOELMOD load library for the load module **IOEUPCLN**.

upserver The **Update Server** distributes files such as common configuration files and administrative lists from System Control machines to other servers in a domain.

The name, **upserver**, is an alias in the SIOELMOD load library for the load module **IOEUPSRV**.

Note: In OS/390 DFS, the DFS System Control machine function is implemented as part of the **boserver** and **upserver** process. Also, in OS/390 DFS, the DFS file server support is used to export the DCE Local File System and non-Local File System (HFS and RFS) data to the global DFS namespace. The file server function runs as part of the **dfskern** process and optionally, the **rpserver** process.

DFS Administration Utilities

DFS provides the following administration utilities:

- The **bak** commands help you perform backup tasks for Local File System filesets.
- The **bos** commands help you contact the Basic OverSeer (BOS) Server used to monitor processes on servers in your cell. You can also use the **bos** commands to perform some Security tasks.
- The **cm** commands help you examine and customize Cache Manager attributes for the current instance of the Cache Manager.
- The **dfsexport** command makes DCE Local File System aggregates and non-Local File System partitions available to remote users through use of the File Exporter.
- The **fts** commands help you manage filesets.
- The **growaggr** command increases the size of DCE Local File System aggregates. This process is available **only** for DCE Local File System.
- The **newaggr** command can format a logical volume consisting of one or more OS/390 Virtual Storage Access Method (VSAM) linear data sets (LDS) for use as a DCE Local File System aggregate. This process is available **only** for DCE Local File Systems.
- The **salvage** process checks the DCE Local File System for internal consistency and corrects errors it finds. This process is available **only** for DCE Local File Systems.
- The **scout** program helps you monitor the File Exporters running on File Servers.
- The **udebug** command provides status information relevant to specified DFS database servers.

DFS Server Relationship to DCE

To configure and use the DFS server, DCE must be running on the same host system. The DFS server cannot successfully start if DCE is not running. If DCE stops after the DFS server is initialized, the DFS server support terminates.

Chapter 5. DFS Migration Considerations

If you have an earlier release of OS/390 DFS installed on your system and you plan to install this release of OS/390 DFS, there are some important items to consider. This chapter contains OS/390 DFS release migration considerations in the following sections:

New for each Release of DFS

This section summarizes the new and changed information for each release of OS/390 DFS.

Version 2 Release 8

The following information describes the new and changed information for Version 2 Release 8 of OS/390 DFS.

- The OS/390 Distributed File Service now supports the SMB File/Print Server as well as the DFS client and server support for a distributed computing environment. Refer to the *OS/390 Distributed File Service SMB Administration Guide* and Reference for further information on the SMB File/Print Server support.
- A new environment variable, **_IOE_PROTOCOL_RPC**, has been added to allow the Distributed File Service server to start with the DCE RPC support disabled. **_IOE_PROTOCOL_RPC=ON** is the default. **_IOE_PROTOCOL_RPC=OFF** allows the server to be used only for the SMB File/Print Server.
- In Version 2 Release 8, the list of authorized programs for the Distributed File Service has been expanded and includes:
  - IOEBAK
  - IOEBOS
  - IOECM
  - IOEDCERR
  - IOEDFSXP
  - IOEFTS
  - IOEGRWAG
  - IOEMAPID
  - IOENEWAG
  - IOESALVG
  - IOESCOUT
  - IOEUDBG.

Version 2 Release 7

The following information describes the new and changed information for Version 2 Release 7 of OS/390 DFS.

- The OS/390 DFS client now supports multi-homed servers (reference OSF RFC77). Multi-home support enhances DFS's fault tolerance by enabling the OS/390 DFS client to communicate with a server by using any set of specified communication addresses.
- OS/390 DFS now supports protected RPC (reference OSF RFC 90). This allows an administrator to specify a range of DCE protections that can be used for DFS client-server communication.

Version 2 Release 6

The following information describes the new and changed information for Version 2 Release 6 of OS/390 DFS.

- The DFSKERN process of the OS/390 DFS File Server can be run in a separate address space. This can provide better recovery characteristics in DFS server failure situations.
- OS/390 DFS supports file sizes greater than 2GB. File sizes at the server are dependent on the Physical File System (PFS) being exported. File sizes at the client are dependent on the DFS client chunck size. The OS/390 DFS client supports up to 2G chunks. (Chunks are generally 64K for disk caching or 8K for memory caching. This would result in maximum file sizes of $(2^{47})-1$ bytes and $(2^{44})-1$ bytes, respectively.)
- With OS/390 Version 2 Release 6, DFS can backup multiple filesets to a single tape data set that can span multiple volumes. The maximum size of a backup data set can be controlled by the environment variable, **_IOE_BACKUP_TAPE_CAPACITY**. If a single fileset backup exceeds the maximum size specified for a backup data set, multiple data sets will be used.

  Previous to OS/390 Version 2 Release 6, DFS backup created a data set for each fileset. These backup data sets can be read by DFS restore processing in OS/390 Version 2 Release 6.
- The DFS customable files reside in the path **/etc/dfs** instead of a separate HFS data set mounted as **/usr/lpp/dfs/local**.
- Support for additional translation capability using the **cm attributes file (cmattr)**. The file contains directives that map a file name extension (suffix) to an indication whether the OS/390 DFS Cache Manager should translate the file data from ASCII to EBCDIC and vice versa (encoding).

Version 2 Release 5

The following information describes the new and changed information for Version 2 Release 5 of OS/390 DFS.

The new information includes:

- The **cm getpreferences** command.
- The **cm setpreferences** command.
- The **CMLog** file.
- The **w_pioctl** application programming interface (API). This API reads a DFS mountpoint.

The changed information includes:

- The **dfsd** command.
- The **fts release** command.
- The maximum DCE Local File System aggregate size is now 4GB.
- An authorized user can now release an RFS file by using the **touch** command.
- RFS attributes can now be specified on a file basis (by using the Attributes file).

- The **dfstrace** command suite has been removed.

Version 2 Release 4

In Version 2, Release 4 there were no functional changes.

Version 1 Release 3

The following information describes the new and changed information for Version 1 Release 3 of OS/390 DFS.

- OS/390 DFS configures using ISPF dialogs. Chapter 7, “Configuring DFS” on page 31 provides this information.
- The DFS Server exports OS/390 record data. Chapter 9, “Exporting Data in DFS” on page 83 provides this information.

Version 1 Release 2

The following information describes the new and changed information for Version 1 Release 2 of OS/390 DFS.

Information on the following processes now supported in Release 2 of OS/390 has been added:

- DFS Client (**DFSCM**)
- Fileset Location Server (**flserver**)
- Backup Server (**bakserver**).
- Information on configuring (and deconfiguring) the above processes has been added.
- Planning information has been added regarding the DFS Client.
- Information on how to start and stop the DFS Client in OS/390
- Information on configuring DFS components has been changed to reflect support for the DCE **dcecp** administrative interface.

DCE Cell and Host System Considerations

DFS must be configured and customized to run in a DCE cell.

DFS can be running on different host systems in the same DCE cell. Or, DFS can be running on different host systems in different DCE cells. Different releases of DCE and DFS can be running on these host systems in both cases.

This release of DFS can be installed on a host system where DFS is already installed and configured. If DFS is already installed and configured on a host system, existing DFS customable and configuration files are not replaced during the installation of this DFS release.

If you have DFS configured on a different host system, you should not copy the entire HFS data set containing DFS customable and configuration files to another host system. The DFS customable and configuration files are contained in the same HFS data set in the directories **/etc/dfs/etc/IBM/** and **/etc/dfs/home/IBM/**. Refer to “DFS Customable and Configuration Data Set Considerations” on page 20 for a description of the DFS customable and configuration files that you can copy for use on another DFS host system.

DCE Cell Configuration Considerations

You should deconfigure DFS from a DCE cell before deconfiguring DCE. If you deconfigure DCE without first deconfiguring DFS, the task of reconfiguring (deconfigure/configure) DFS in the DCE cell is more difficult.

If you have not reconfigured (deconfigured/configured) DCE in the cell prior to installing this version of OS/390 DFS, you do not need to reconfigure DFS before installing this DFS release.

If you have reconfigured DCE prior to installing this version of OS/390 DFS, you should deconfigure DFS before proceeding.

Note: Refer to Chapter 10, "Deconfiguring DFS" on page 99 for information on how to deconfigure DFS. This information is superseded by any specific instructions on how to deconfigure DFS in the documentation for your current DFS release.

Test DCE Cell Considerations

If you install DFS into a test DCE cell, you can move the new release of DFS into the production at a later time by:

- Using the new DFS executable code in the production DCE cell;
- Creating any new customable files in the DCE cell using **dfs_cpfiles** program; and
- Optionally updating the customable files with new parameters available with this release.

DFS Customable and Configuration Data Set Considerations

Certain DFS configuration files contain DCE cell specific information. These are HFS files that cannot be copied and used in a different DCE cell.

Certain DFS customable files are specific to the data sets exported by the DFS server running in a specific DCE cell. Since the same data set cannot be exported by DFS servers running in different DCE cells, the customable files with data set specific information cannot be copied for use in a different DCE cell.

Prior to OS/390 Version 2 Release 6, DFS customable files resided in a separate HFS data set mounted at **/usr/lpp/dfs/local**. Starting in OS/390 Version 2 Release 6, the DFS customable files reside in the path **/etc/dfs**. During DFS installation, DFS symbolic links are deleted and recreated to link to files in **/etc/dfs**. If you have replaced any DFS symbolic links with user files, they will be deleted during DFS installation. You should save the file data before installing DFS. These files are listed in Appendix B, "OS/390 DFS Directories and Files" on page 129.

Only DFS customable files that do not contain DCE cell or data set specific information can be selectively copied. You can copy any of the following DFS files either before or after running the **dfs_cpfiles** program which is run during DFS installation. The **dfs_cpfiles** program will create (**not replace**) a required customable file with default information if the file does not exist. For a list of customable files see, Table 6 on page 133.

Migration to New DFS Release

When migrating to a new release of DFS, you must decide whether to install DFS into an existing DCE cell or into a new DCE cell. You must also insure that any DCE cell specific configuration or customable file data is not inadvertently used in a different DCE cell. Refer to “DCE Cell and Host System Considerations” on page 19 and “DFS Customable and Configuration Data Set Considerations” for more details.

If you install DFS into an existing DCE cell and DCE must be deconfigured and configured to accomplish the installation of DCE, you should deconfigure DFS before deconfiguring DCE. Refer to “DCE Cell Configuration Considerations” on page 20 for more details.

In general, if you are migrating from a previous release of OS/390 DFS (or re-installing this version) and have customized your system, it is not necessary to copy and save your customized data prior to installing this version. The customable files listed in “Customable Files” on page 132 are not replaced by the DFS installation or post installation processing.

Some of the customable files listed in “Customable Files” on page 132 will not be present on your system when installing a new release of DFS (unless you are re-installing this version) because the files are new for this release. Customable files that do not exist will be created as part of DFS post installation by the **dfs_cpfiles** program from sample files provided in the **/opt/dfsglobal/examples** directory.

To install a new release of DFS:

1. Install this version of OS/390 DFS using the System Modification Program/Extended (**SMPE**) program. The SMP/E installation (or re-installation) of this version of OS/390 DFS does not replace any existing customable file listed in “Customable Files” on page 132.
2. Use the DFS shell configuration script program **dfs_cpfiles**, to copy the **ioepdcf**, **CacheInfo**, and **envar** files from the **/opt/dfsglobal/examples** directory to create (not replace) a customable version of each file in the appropriate directory.

   To use the **dfs_cpfiles** program, the OS/390 shell and utilities must be installed. If this is not the case, then the example files listed in “Customable Files” on page 132 that are new for this DFS release must be copied to the correct directory using other means.

   More information on the **dfs_cpfiles** program can be found in Chapter 6, “Post Installation Considerations” on page 25.
3. Compare your customable files with the example **ioepdcf**, **CacheInfo**, and **envar** files in the **/opt/dfsglobal/examples** directory for this release to determine if any new parameters or variables for this release are applicable for your system.

   For information on what is new for this release of DFS, refer to “New for each Release of DFS” on page 17.

   For further information regarding the customizing of this release of DFS, refer to the sections “Completing the DFS Client (DFSCM) Configuration” on page 56 and “Completing the DFS File Server Configuration” on page 45.

Year 2000 Support for OS/390 Distributed File Service

OS/390 DFS complies with the Year 2000 requirements, no further migration actions are needed.

For further information on Year 2000 Support, see *Year 2000 and 2-Digit Dates: A Guide for Planning and Implementation*, GC28-1251. For additional information on Year 2000, see: `http://www.ibm.com/IBM/year2000/`.

For information about migrating to OS/390, see the *OS/390 Planning for Installation* book, GC28-1726.

DFSKERN in a Separate Address Space

If DFS was installed and configured under a release previous to OS/390 Version 2 Release 6, the DFS server only runs in a single address space. With OS/390 Version 2 Release 6, the proclib member **IOEP0003** is supplied to run the DFSKERN process and sub-processes in a separate address space when the environment variable, **_IOE_DAEMONS_IN_AS=DFSKERN**, is specified in the file **/opt/dfslocal/home/dfscntl/envar**. Refer to the *OS/390 Program Directory* (Distributed File Service Customization considerations section) for a description of the RACF entries required. You can also refer to "Customization of the DFS Server and the DFSCM envar Files" on page 64.

RACF or Equivalent Security System Entries

RACF or equivalent security system entries are required to define the started tasks for the Distributed File Service and the users who can run them. Refer to the *OS/390 Program Directory* (Distributed File Service Customization considerations section) for a description of the RACF entries required.

SMB File/Print Considerations

The Distributed File Service server can also function as a file/print server for workstation clients that are not in a DCE cell. Files exported to DCE DFS clients can be accessed and shared with these non-DCE clients. Print requests from these clients can be routed to the Infoprint Manager on OS/390. Refer to the *OS/390 Distributed File Service SMB Administration Guide and Reference* for more information on this support.

Authorized Programs

With Version 2 Release 8, the list of authorized programs for the Distributed File Service has been expanded and includes:

- IOEBAK
- IOEBOS
- IOECM
- IOEDCERR
- IOEDFSXP
- IOEFTS
- IOEGRWAG
- IOEMAPID
- IOENEWAG
- IOESALVG
- IOESCOUT

- IOEUDBG.

Refer to the *OS/390 Program Directory* for a description of the PARMLIB member updates required for the member IJKTSOxx.

Chapter 6. Post Installation Considerations

Before OS/390 DFS can be used, you must create the various DFS configuration files. These files are usually created before the DFS installation is verified by the **dfs_cpfiles** shell script program as described in the instructions of the *OS/390 Program Directory*. **dfs_cpfiles** is described in further detail later in this chapter.

You also need to perform administrative actions such as, identifying all the DFS processes you wish to start; specifying DFS process options; defining DFS users and administrators and file data to export for access by the DFS server running on your host system. This chapter contains the following information, in the order that it should be performed, to assist and guide you in completing the installation and configuration of DFS.

DFS Installation and Configuration Overview

To install and configure DFS for operation, you must perform the following administrative actions:

1. Install DFS using the applicable instructions in the *OS/390 Program Directory*.
2. If the DFS Client runs on the host system, and if it's not already done during the OS/390 installation, add the entry **FILESYSTYPE TYPE(DFSC)** in the system parmlib member **BPXPRM***xx* as described in "System Parmlib Member BPXPRMxx Entry for the DFSCM" on page 56.
3. Create the default DFS configuration files using the **dfs_cpfiles** if they were not created during the DFS installation process. Refer to "Using dfs_cpfiles to Create Default DFS Configuration Files" for more information.
4. Configure and customize either the DFS Client or DFS Servers or both on the host system following the applicable instructions in Chapter 7, "Configuring DFS" on page 31.
5. Define DFS administrators and users on the host system following the applicable instructions in Chapter 8, "Defining DFS Administrators and Users" on page 67.
6. If DFS Servers are run on the host system, define aggregates and filesets following the applicable instructions in Chapter 9, "Exporting Data in DFS" on page 83.
7. Start DFS following the applicable instructions in Chapter 11, "Starting and Stopping DFS Components" on page 113.

Using dfs_cpfiles to Create Default DFS Configuration Files

This section describes the use of the OS/390 DFS Default Configuration Files Creation Program (**dfs_cpfiles**), an OS/390 shell script that automates the process of copying the IBM-supplied **CacheInfo**, **ioepdcf**, and **envar** files from the **/opt/dfsglobal/examples** directories and creating a customable file in the appropriate directory if the file does not already exist.

Notes:

1. **dfs_cpfiles** resides in **/opt/dfsglobal/scripts** directory.
2. An existing DFS configuration file will not be replaced to insure any existing user customized data is not overlaid.

To invoke **dfs_cpfiles**:

1. Log in as **root** on the local machine. In OS/390 DFS, this means as a user with a **UID = 0**.
2. While in the OS/390 shell environment, invoke the OS/390 DFS Default Configuration Files Creation Program by entering the following:

   ```
   $ dfs_cpfiles
   ```

3. The following example output shows the output after using **dfs_cpfiles** to create all the customable DFS configuration files:

```
**************************************************************************
**                          OS/390 DFS                                  **
**            Default Configuration Files Creation Program              **
**************************************************************************

    Process DFS envar files....
       File /opt/dfslocal/home/bakserver/envar created
       File /opt/dfslocal/home/boserver/envar created
       File /opt/dfslocal/home/butc01/envar created
       File /opt/dfslocal/home/butc02/envar created
       File /opt/dfslocal/home/butc03/envar created
       File /opt/dfslocal/home/butc04/envar created
       File /opt/dfslocal/home/butc05/envar created
       File /opt/dfslocal/home/butc06/envar created
       File /opt/dfslocal/home/butc07/envar created
       File /opt/dfslocal/home/butc08/envar created
       File /opt/dfslocal/home/daemonct/envar created
       File /opt/dfslocal/home/dfscm/envar created
       File /opt/dfslocal/home/dfscntl/envar created
       File /opt/dfslocal/home/dfsexport/envar created
       File /opt/dfslocal/home/dfskern/envar created
       File /opt/dfslocal/home/flserver/envar created
       File /opt/dfslocal/home/ftserver/envar created
       File /opt/dfslocal/home/growaggr/envar created
       File /opt/dfslocal/home/newaggr/envar created
       File /opt/dfslocal/home/repserver/envar created
       File /opt/dfslocal/home/salvage/envar created
       File /opt/dfslocal/home/upclient/envar created
       File /opt/dfslocal/home/upserver/envar created

    Process DFS ioepdcf file....
       File /opt/dfslocal/etc/ioepdcf created

    Process DFS CacheInfo file....
       File /opt/dcelocal/etc/CacheInfo already exists
```

Notes:

1. Only **dfs_cpfiles** messages are displayed when a file is created as shown in the previous example. Different **dfs_cpfiles** messages identify if a file was not created.
2. If you are migrating to this version of OS/390 DFS from an earlier version of DFS and **dfs_cpfiles** created new customizable configuration files, you may need to add any previous user customization data to the newly created files.
3. If you are migrating to this version of OS/390 DFS from an earlier version of DFS and new customizable configuration files were not created by **dfs_cpfiles**, you may want to update customable files with any new customization options available with this release of DFS. Refer to Chapter 5, "DFS Migration Considerations" on page 17 for more information on what is new in this release.
4. Refer to Chapter 7, "Configuring DFS" on page 31 for more information on how to customize these files.

After all the configuration files required by this DFS release have been created, you can proceed to perform the additional DFS configuration steps outlined in "DFS Installation and Configuration Overview" on page 25.

DFS Configuration Considerations

Before using DFS on a host system, you must configure the host system into a DCE cell. Refer to the *OS/390 DCE Configuring and Getting Started* book for information on how to configure DCE.

After DCE is configured on the host system, before using DFS, you must configure either or both the DFS client and server using the same DCE cell name (*dcecellname*) and DCE host name (*dcehostname*) used for DCE configuration. Refer to Chapter 7, "Configuring DFS" on page 31 for more information.

DFS Server Considerations

Optionally, you can configure DFS servers on the host system.

All DFS servers do not need to be configured at this time but it is recommended that you configure those that may be needed at some time in the future. If you choose to configure any DFS servers to export file data to the DFS namespace from the DCE host system where DFS is being configured, minimally you must:

- Configure the DFS File Server which includes the following DFS server process:
  - DFS Control (**dfscntl**)
  - DFS Kernel (**dfskern**)
  - DFS Export (**export** and **unexport**)
  - DFS Basic Overseer Server (**boserver**).

    Note: You must also configure a DFS Fileset Location Database (FLDB) if one does not already exist in the DCE cell.

- If you are a new DFS customer, the DFS server is installed and configured to run the IOEPDCT and DFSKERN processes in the DFSKERN address space. This is separate from the DFS server address space where the other DFS server processes will run.

  If you had DFS configured prior to OS/390 Version 2 Release 6, you can now configure the DFS server to run the IOEPDCT and DFSKERN process in the separate DFSKERN address space. This is done by setting the environment variable, **_IOE_DAEMONS_IN_AS=DFSKERN**, in the file **/opt/dfslocal/home/dfscntl/envar**.

It is recommended that the **dfskern** processes be run in an address space separate from the other DFS server processes to take full advantage of the system termination processing. Refer to the *OS/390 DFS Administration Guide and Reference*, for additional information about running **dfskern** and **ioepdct** in a separate address space.

- Configure a DFS Fileset Location Database Server (**flserver**) if an **flserver** does not already exist in the DCE cell.

  You can configure one or more DFS Fileset (Location) Database Servers.

  The Fileset Database Servers maintain the Fileset Location Database, the mechanism by which DFS clients can find out which File Server machine actually holds the files being requested.

  One Fileset Location Server is required in each DCE cell using DFS. Multiple Fileset Location Servers in the cell provide availability and load balancing of the data. For most cells, three Fileset Location Server machines are recommended because three machines are usually sufficient for the tasks. If you configure more than three, an odd number is preferable.

- Complete the configuration of the DFS Fileset Server (**ftserver**).

Optionally, you can complete configuration for the following DFS server processes that run under control of the DFS Basic Overseer Server (**boserver**):

- You can optionally complete configuration for the DFS Backup processes which includes the DFS Backup Server process **bkserver** and from one to eight Backup Tape Coordinator **butc** processes. Note that the OS/390 Backup Server process is named **bkserver** but the Backup Server is identified as the **bakserver** after it is initially created and started.

  A **bakserver** maintains the Backup Database, which is used for managing individual and periodic backups of DFS files. Backup Servers are optional (required only if you want to take advantage of the backup capabilities of DFS). Multiple Backup Servers provide for availability of the data. For DCE cells with DFS running on three or more host machines, three Backup Servers are recommended. If you configure more than three Backup Servers in a DCE cell, an odd number is preferable.

  You can also set up and start one or more DFS Backup Tape Coordinators (**butc01** through **butc08**). A DFS Backup Tape Coordinator (**butc**) server actually performs the DFS backup and restore operations on the host system. A **butc** server requires a **bakserver** to be running in the DCE cell. But, a **bakserver** does not need to be running on the same OS/390 DCE host system where a **butc** server is running.

- You can optionally complete configuration for the DFS Replication Server process. Note that the OS/390 Replication Server process is named **rpserver** but the Replication Server is identified as the **repserver** after it is initially created and started.

- You can optionally complete configuration for the DFS Update Client (**upclient**) process. An **upclient** is required on a DCE host system if there are more than one DCE host system in a DCE cell running DFS and there is a DFS Update Server (**upserver**) running on another system.

- You can optionally complete configuration for the DFS Update Server (**upserver**) process. An **upserver** is usually required on a DCE host system if there is more than one DCE host system in a DCE cell running DFS and there is no DFS Update Server (**upserver**) running in the DCE cell and the other systems in the DCE cell will run the **upclient**.

You can refer to the *OS/390 DFS Administration Guide and Reference*, for more information on DFS servers.

For more information on configuring DFS servers, see “Using DFSCONF to Configure DFS Servers” on page 41.

DFS Client (DFSCM) Considerations

Optionally, you can configure the **DFSCM** for use by OMVS users on the host system.

The DFS client in OS/390 DFS, **DFSCM**, also referred to as the Cache Manager, maintains contact with the File Exporter and other server processes. The Cache Manager translates file requests into Remote Procedure Calls (RPCs) to File Exporter processes on File Server machines. The Cache Manager receives and caches requested data from a File Exporter before passing the data to the application program that requested it. The Cache Manager always has access to the most current copy of the data.

For more information about the DFS Client, see the *OS/390 DFS Administration Guide and Reference*.

For more information about DFS Client configuration, see Chapter 7, “Configuring DFS” on page 31.

Chapter 7. Configuring DFS

The purpose of this chapter is to assist you in creating and configuring the Distributed File Service. OS/390 DFS provides an ISPF dialog to assist you. The use of these panels is explained in this chapter. For information regarding planning considerations you should consider prior to configuring your system, see Chapter 2, "Global and Cell Considerations" on page 5.

For information on setting up the intercell environment, managing intercell naming, and administering a multicell environment, see the *OS/390 DCE Administration Guide*.

This chapter provides information on the following topics:

Notes:

1. The DCE cell name (*dcecellname*) and DCE host name (*dcehostname*) used for DCE configuration must be the same *dcecellname* and *dcehostname* used to configure DFS.
2. DFS configuration command examples sometimes use **/.:** to denote **/.../***dcecellname*.

Overview of DFS Configuration

Configuring DFS in a DCE cell takes several steps. You should follow the steps in the order presented, although some steps allow you to configure multiple servers before moving on to the next. You can also come back later to configure another server of a given role.

For more information on DFS, see the *OS/390 DFS Administration Guide and Reference*.

DFS Configuration Steps

The DFS configuration steps reference detailed explanations in other sections of this publication. Once you complete a step and its supporting instructions, you should refer to the next step in this list.

1. Before Proceeding with DFS Configuration

   Note: The following important information is required before proceeding with the DFS configuration steps.

   a. **Install DCE on the Host System**

      Insure that DCE is installed on the host system where DFS is configured, following the instructions in the *OS/390 Program Directory*.

   b. **Install DFS on the Host System**

      Insure that DFS is installed on the host system where DFS is configured, following the instructions in the *OS/390 Progfam Directory*.

   c. **Insure DCE is Running on the Host System**

      Insure that the host system where DFS will be configured is already configured into a DCE cell and that DCE is running on the host system. Refer to the *OS/390 DCE Configuring and Getting Started* book for more information.

      Attention: If you configure a DCE cell with an X.500-style name and plan to run DFS, you must also configure GDS on the host system. If you do not, you cannot access the local cell's space.

   d. **Complete DFS Post Installation Processing**

      Insure that the steps described in Chapter 6, “Post Installation Considerations” on page 25 have been completed successfully.

   e. **Determine DCE Login Information**

      You must log in as **cell_admin** to perform DFS configuration so you will need to know the correct **cell_admin** login password before proceeding. Contact the person who initially configured DCE on the host system or the DCE administrator for this information.

   f. **Determine DCE Cell Name and DCE Host Name**

      You must also know the correct **dcecellname** and **dcehostname** defined during DCE configuration. After DCE is configured on the host system, this information is defined in the **/opt/dcelocal/dce_cf.db** file.

   g. **Add DFS Administrative Principals to DCE Registry**

      This step only applies if DFS servers will be run on the host OS/390 system where DFS is being configured.

      If this is not already done, it is recommended that you register at least one user or group principal to be used in all DFS administrative lists. You can register more administrative users or groups at a later time. If you define a group for DFS administrative authorization, you can add users to the group now or more at a later time. It is recommended that the user or group you now select be used in all the DFS administrative lists. Later, different users or groups can be selectively added to the various DFS administrative list files. To register a user or group in a DCE cell, refer to the instructions in the *OS/390 DCE Configuring and Getting Started* book or in the *OS/390 DCE Administration Guide*.

   h. **Stop DFS and the DFS Client**

The OS/390 installation verifying instructions call for starting the DFS client and server address spaces. It is recommended that you stop DFS processing on the host system during configuration processing.

If DFS (the DFS server) is already running, issue the following OS/390 system command:

```
stop dfs
```

If the DFS Client is already running, issue the following OS/390 system command:

```
stop dfscm
```

i. **Validate that DCE is Configured for DFS on the Host System**

You should validate that DCE is properly configured on the OS/390 host system where DFS configuration is performed.

From OMVS on the host system, you can issue the following commands to receive the output shown, if the DCE cell is properly configured for DFS.

```
dcecp -c show rpcentry /.:/subsys/dce/dfs/bak
dcecp -c show rpcentry /.:/fs
```

If either command results in the message indicating that the name service object is not found, then the DCE cell is not configured for DFS. You must contact the DCE cell administrator to determine the status of the DCE cell (see the *OS/390 DCE Configuring and Getting Started* book or the *OS/390 DCE Administration Guide*).

2. **Set OS/390 shell Flag**

   If you plan to configure the DFS Client (**DFSCM**) on the OS/390 host system, it is recommended that the UNIX System Services shell's logical flag be set using the **set -o logical** command. See the *OS/390 DFS Administration Guide and Reference*, for more information about displaying the current working directory from the shell with the **DFSCM** configured. Also, see the *OS/390 UNIX System Services Command Reference*, SC28-1982, for more information about the **set** command.

3. **Set Up to Use the DFSCONF Command**

   Refer to “Using the DFS Configuration Program (DFSCONF)” on page 37, for setting up information necessary to use the **DFSCONF** command from TSO.

4. **Optionally Modify the DFS envar Files**

   Default DFS process **envar** files are created by **dfs_cpfiles** during DFS post installation (see Chapter 6, “Post Installation Considerations” on page 25). You can use these default **envar** files to configure DFS and customize them at a later time. Instructions on how to modify the DFS **envar** files can be found in “Customization of the DFS Server and the DFSCM envar Files” on page 64.

5. **Use DFSCONF to Configure the DFS Client (DFSCM)**

   Optionally, you can configure the **DFSCM** for use by OMVS users on the host system (see “DFS Client (DFSCM) Considerations” on page 29). If you do not want to configure the **DFSCM** on the host system at this time, proceed to step 6 on page 34.

   In OS/390 DFS, the **DFSCM** does not require any of the DFS servers to be configured and running on the OS/390 system on which it is configured and running. But, if you want to configure the DFS client and DFS servers on the host system, it is recommended that you configure both at this time using **DFSCONF**.

   For information on configuring a DFS client, see “Using DFSCONF to Configure the DFS Client” on page 43.

   If you choose to also configure DFS servers using **DFSCONF** at this time, see

   - “Using DFSCONF to Configure the DFS File Server” on page 42
   - “Using DFSCONF to Configure the DFS Backup Server” on page 42

- "Using DFSCONF to Configure the DFS Fileset Location Database Server" on page 43.

Note: If no DFS servers will be configured on the host system, after configuring the DFS client using **DFSCONF**, you can now refer to step 10 on page 35, **Complete DFSCM Configuration**, and skip the DFS server configuration steps.

6. **Use DFSCONF to Configure OS/390 DFS Servers**

   Optionally, you can configure DFS servers on the host system (see "DFS Server Considerations" on page 27).

   It is recommended that you configure all DFS servers you initially want on the host system at this time using **DFSCONF** if not already done previously. For detailed information, see

   - "Using DFSCONF to Configure the DFS File Server" on page 42
   - "Using DFSCONF to Configure the DFS Backup Server" on page 42
   - "Using DFSCONF to Configure the DFS Fileset Location Database Server" on page 43.

7. **Modify the ioepdcf File and Complete boserver Configuration**

   This step only applies to DFS server configuration.

   The default **/opt/dfslocal/etc/ioepdcf** file created during DFS post installation processing by **dfs_cpfiles** (see Chapter 6, "Post Installation Considerations" on page 25) is set up to automatically start only **dfskern** when the DFS server address space is next initialized. It is recommended that you update the **ioepdcf** file to automatically start the **boserver**. This is the recommended setting for subsequent DFS server configuration processing. If you want to change the default **ioepdcf** file settings, refer to "Customizing the ioepdcf File" on page 62 for more information.

8. **Start the DFS Server**

   This step only applies to DFS server configuration.

   Initialize the DFS server address space by issuing the following OS/390 system command:

   ```
   start dfs
   ```

   Notes:

   a. Only the required DFS server processes **dfskern** and **boserver** will be started if the recommended **/opt/dfslocal/etc/ioepdcf** settings are used (see step 7).

   b. Starting the **boserver** creates empty **/opt/dcelocal/var/dfs/admin.bos** and **/opt/dcelocal/var/dfs/BosConfig** files, if those files do not already exist.

   c. DFS should be running with DFS authorization disabled by the existence of the file **/opt/dcelocal/var/dfs/NoAuth**.

9. **Create Initial DFS Administrative Authorization Lists**

   This step only applies to DFS server configuration.

   You can now define the DFS administrators for the DFS servers you will run on the DCE host system by updating the DFS administrative list file for each server.

   At this time, it is recommended that you only update all the DFS administrative list files on this DCE host system with a single user ID that has **cell_admin** authority. Note, the DCE **cell_admin** user ID inherits no special DFS authorization and has to be explicitly specified in a DFS administrative list file.

   In case you are configuring this DCE host system into an existing DCE cell and another system is acting as a DFS System Control Machine (where the **upserver** is running), the user ID that is specified in the DFS administrative list file on this DCE host should also be one that is specified in the DFS administrative list file on the DFS System Control Machine. Later, you will be instructed when to update the DFS administrative list files with additional users and user groups and to perform updates of the DFS administrative list files on the DCE host system where the **upserver** is running.

Refer to “Creating the Initial DFS Administrator(s)” on page 71, “Defining a DFS Administrator” on page 68 and “Adding Principals and Groups to Administrative Lists” on page 73 for further information.

10. **Complete DFS Client Configuration**

    If the DFS Client (**DFSCM**) was configured on the host system using **DFSCONF**, you must complete configuring and start the **DFSCM** as described in “Completing the DFS Client (DFSCM) Configuration” on page 56.

11. **Complete flserver Configuration**

    There must be a Fileset Location Database Server (**flserver**) running in the DCE cell. If there is no **flserver** running in the DCE cell or if you you want an **flserver** to also run on this DCE host system, follow the instructions for “Completing the FLDB Server (flserver) Configuration” on page 45.

12. **Create FLDB Entry for DFS File Server**

    After an **flserver** is running in the DCE cell (on this host or another host in the DCE cell), you must follow the instructions in “Creating the DFS File Server FLDB Entry” on page 47.

13. **Complete ftserver Configuration**

    If you have configured the DFS File Server using **DFSCONF**, you must configure a DFS Fileset Server (**ftserver**) if you plan to export any file data from this DCE host system. See “Completing Fileset Server (ftserver) Configuration” on page 47 for more information.

14. **Complete repserver Configuration**

    If you have configured the DFS File Server using **DFSCONF** and if you plan to run a DFS Replication Server (**repserver**) on this DCE host system, you must follow the instructions in “Completing Replication (repserver) Server Configuration” on page 49.

    Note: If you plan to define a **root.dfs** fileset for the DCE cell on this DCE host system, you must configure a **repserver** on this DCE host.

15. **Complete upclient Configuration**

    If you have configured the DFS File Server using **DFSCONF** and if you plan to run a DFS Update Client (**upclient**) on this DCE host system, you must follow the instructions in “Completing Update Client (upclient) Configuration” on page 49.

    Note: If an **upserver** is already defined in the DCE cell, you should configure an **upclient** on this DCE host system. Otherwise, you should not configure an **upclient** and configure an **upserver** on this DCE host system as described in step 16.

16. **Complete upserver Configuration**

    If you have configured the DFS File Server using **DFSCONF** and if you plan to run a DFS Update Server (**upserver**) on this DCE host system, you must follow the instructions in “Completing Update Server (upserver) Configuration” on page 50.

    Note: If an **upserver** is not already defined in the DCE cell, you should configure an **upserver** on this DCE host system if you plan to have DFS running on more than one DCE host system in the DCE cell.

17. **Complete bakserver Configuration**

    If you have configured the DFS Backup Server using **DFSCONF** and if you plan to run a DFS Backup Server (**bakserver**) on this DCE host system, you must follow the instructions in “Completing the Backup Database Server (bakserver) Configuration” on page 51.

    Note: If you do not plan to use the DFS backup facility or if a **bakserver** is already defined in the DCE cell, you do not need to define one on this DCE host system.

18. **Complete butc Configuration**

    If you have configured the DFS Backup Server using **DFSCONF** and if you plan to run at least one DFS Backup Tape Coordinator (**butc**) daemon on this DCE host system, you must follow the instructions in “Completing the DFS Backup Tape Coordinator Configuration” on page 53.

    Note: If you want to use the DFS backup facility for DCE Local File System data stored on OS/390, you should configure at least one **butc** server on the host system.

19. **Customize the ioepdcf File**

    It is recommended that you can now customize the **ioepdcf** file to indicate that all servers you have configured should be started automatically when the DFS address space is started. (see “Customizing the ioepdcf File” on page 62).

20. **Restart DFS and Start DFS Client**

    It is recommended that you stop and restart DFS processing at this time. For detailed information, see Chapter 11, “Starting and Stopping DFS Components” on page 113.

    a. To stop DFS (all DFS servers running in the DFS address space), issue the following OS/390 system command:

       ```
       stop dfs
       ```

    b. If the DFS Client is already running, issue the following OS/390 system command:

       ```
       stop dfscm
       ```

    c. Issue the following OS/390 system command to start the DFS address space:

       ```
       start dfs
       ```

    d. Restart the DFS Client following the instructions in “Stopping and Restarting the DFSCM” on page 115.

21. **Create Additional DFS Administrators**

    This step only applies to DFS server configuration.

    You can now define additional DFS administrators for the DFS servers you will run on the DCE host system by updating the DFS administrative list file for each server.

    If this DCE host system was added to an existing DCE cell, and there is an **upclient** running on this system, you should update the DFS administrative list files on the DCE host machine where the **upserver** is running. The **upclient** and **upserver** processing will propagate the DFS administrative list file updates back to administrative list files located on this DCE host machine.

    Refer to “Defining a DFS Administrator” on page 68 and “Adding Principals and Groups to Administrative Lists” on page 73, for further information.

22. **Define a root.dfs Fileset for the DCE Cell**

    This step applies to configuring DFS servers on OS/390.

    Each DCE cell requires a **root.dfs** fileset for DFS. If a **root.dfs** fileset does not already exist for the DCE cell into which the OS/390 host system was configured, one must be created.

    The **ftserver** and **rpserver** must be configured and running on the OS/390 host system before proceeding to the instructions in Chapter 9, “Exporting Data in DFS” on page 83.

23. **Create and Export a DCE Local File System Aggregate**

    If you want to export file data for general use that is stored in a DCE Local File System aggregate on the OS/390 host, refer to Chapter 9, “Exporting Data in DFS” on page 83.

24. **Setting Up OS/390 User IDs for HFS and RFS Access**

If you will run the DFS File Server on an OS/390 system and plan to export HFS or RFS data sets, see “Mapping OS/390 User IDs for HFS and RFS Access” on page 76.

25. **Create and Export General Use HFS Aggregate**

    If you want to export file data for general use that is stored in an HFS aggregate on the OS/390 host, refer to Chapter 9, “Exporting Data in DFS” on page 83.

26. **Create and Export General Use RFS Aggregate**

    If you want to export file data for general use that is stored in an RFS aggregate on the OS/390 host, refer to Chapter 9, “Exporting Data in DFS” on page 83.

27. **Customize the DFS envar Files**

    Default **envar** files are created by **dfs_cpfiles** during post installation processing if they did not exist (see Chapter 6, “Post Installation Considerations” on page 25). At this time, you may want to follow the instructions in “Customization of the DFS Server and the DFSCM envar Files” on page 64.

Using the DFS Configuration Program (DFSCONF)

Use **DFSCONF** from TSO to configure the OS/390 DFS servers and the DFS client. The **DFSCONF** configuration program has interactive panels that prompt and guide you through the details of configuring the OS/390 DFS servers and the DFS client.

The OS/390 DFS Server Configuration program automates the DCE configuration (and deconfiguration) of the DFS servers and creation of symbolic links required by the DFS Client.

DFSCONF uses the DCE administrative facilities to enter configuration information in the Security Registry and the CDS namespace. These facilities are the Registry Editor, ACL Editor, RPC Control Program, CDS Control Program, and the DCE Control Program. You must be properly authenticated and authorized by the DCE Security Service.

In the DFSCONF panels, you will either be prompted to select from a list of options or to enter a value. To select from a list of options, enter the number corresponding to the desired function in the selection field. For panels that require values, enter the appropriate response in the input field.

Details on using these panels are described in this chapter.

Note: If you have previously configured DFS on this DCE host system, running **DFSCONF** does not alter any DFS administrative file that may exist in the **/opt/dcelocal/var/dfs** directory.

DCE Messaging Subsystem Environment Variables for DFSCONF

The **DFSCONF** configuration program uses the DCE messaging facility. The DCE messaging facility is controlled by the environment variables **_EUV_SVC_MSG_LOGGING** and **_EUV_SVC_MSG_LEVEL**.

It is recommended that when you run **DFSCONF**, **_EUV_SVC_MSG_LOGGING** should be set to
| **CONSOLE_LOGGING** and **_EUV_SVC_MSG_LEVEL** should be set to **VERBOSE** (the default value).

Refer to “Setting DFSCONF Environment Variables” on page 39 for more information. For more information on specifying the DCE messaging facility environment variables refer to the *OS/390 DCE Administration Guide*.

Configuration Log File for DFSCONF

The **DFSCONF** program appends messages to the **dfsconf.log** file that detail the steps that it performs in configuring or deconfiguring DFS on the host system. If the **dfsconf.log** file does not exist, it is created by **DFSCONF**.

By default, the **dfsconf.log** file resides in the home directory of the user running **DFSCONF**. The environment variable **_IOE_CFG_LOG_FILE** can be used to control the location of the **dfsconf.log** file. If the default is not used, be sure that the user running **DFSCONF** has write access to the specified **dfsconf.log** file.

The environment variable, **_IOE_CFG_INFORM_LEVEL** should be set to **2** during DFS configuration. This setting causes each DFS configuration or deconfiguration to generate approximately 7K bytes of message text. Insure that the **dfsconf.log** file resides in the file system that has sufficient free space to contain the messages.

Refer to "DFSCONF Environment Variables" for more information. Refer to Appendix A, "Example DFS Server Configuration Log File (dfsconf.log)" on page 123 for an example of the content of a **dfsconf.log** file.

DFSCONF Environment Variables

The **DFSCONF** configuration program uses environment variables to set the default values for host information. The environment variables are declared in the **envar** file in the home directory of the administrator running **DFSCONF**. If set, the values of these environment variables are displayed as default values in the DFS configuration panels. If the environment variables are not set, the appropriate information must be entered on the **DFSCONF** configuration panels.

Following is a brief description of the environment variables that apply when running the **DFSCONF** program:

Variable	Description
_EUV_SVC_MSG_LOGGING	Defines where DCE messages are written. The default value **CONSOLE_LOGGING** is used if this is not specified.
_EUV_SVC_MSG_LEVEL	Controls the types of DCE messages generated. The default value **VERBOSE** is used if this is not specified.
_IOE_CFG_INFORM_LEVEL	Controls the types of DFS messages generated. The default value **1** is used if this is not specified. The value **2** is recommended when running **DFSCONF**.
_IOE_CFG_LOG_FILE	Defines the name of the DFS configuration log file where DFS messages are written. The default value **dfsconf.log** is used if this variable value is not specified. By default, the file is located in the home directory of the administrator running **DFSCONF**.
_IOE_CFG_CELL_ID	Defines the DCE principal name of the administrator who is running **DFSCONF**. The default value **cell_admin** is used if this is not specified.
NLSPATH	Defines the search path used by DCE for the DCE and DFS message catalogs. The default value, **/usr/lib/nls/msg/En_US.IBM-1047/%N**, is used if this is not specified.

Refer to Appendix C, "Environment Variables in DFS" on page 135 for more information on these environment variables.

Important Note About the DCE Cell Name and DCE Host Name

It is critical that the DCE cell name and the DCE host name, specified on the **DFSCONF** configuration panels, are correct. They must be the same names used to configure DCE. DFSCONF displays the DCE cell name and the DCE host name obtained from the DCE configuration file **/opt/dcelocal/dce_cf.db**.

Setting DFSCONF Environment Variables: The **DFSCONF** environment variables are declared in the **envar** file in the home directory of the administrator performing the OS/390 DFS configuration. Environment variables are set using the following syntax:

```
VARIABLE_NAME=value
```

Following is an example of the entries in the **envar** file for the **DFSCONF** program:

```
_EUV_SVC_MSG_LOGGING=CONSOLE_LOGGING
_EUV_SVC_MSG_LEVEL=VERBOSE
_IOE_CFG_INFORM_LEVEL=2
_IOE_CFG_LOG_FILE=dfsconf.log
_IOE_CFG_CELL_ID=cell_admin
NLSPATH=/usr/lib/nls/msg/En_US.IBM-1047/%N
```

Set Up the DFSCONF Administrator TSO User ID

You must set up a TSO user ID that has authority to run the OS/390 DFS configuration program. Following are the specifics of this user ID, the **DFSCONF** administrator:

- The **DFSCONF** administrator must have a superuser ID. In OS/390, the superuser or root has a **UID = 0**. A user can be accorded superuser privileges by specifying zero in the UID parameter of the ADDUSER or ALTUSER commands.
- Add the SIOEPNLE data set to the ISPPLIB concatenation.
- Add the SIOEMSGE data set to the ISPMLIB concatenation.
- Add the SIOEXEC library to the SYSEXEC or SYSPROC concatenation.

DCE Login Panel

To configure OS/390 DFS on the OS/390 host, you must be appropriately authenticated and authorized by the DCE Security Service. If you attempt to perform any of the functions provided by **DFSCONF** that require DCE authentication, **DFSCONF** automatically displays the DCE Login panel. You must then enter the correct Cell Admin ID and password. This ensures that you are logged in to DCE as the administrator who has all the necessary permissions to configure OS/390 DFS.

The DCE Cell Admin ID and DCE Cell Admin Password are usually the same as those used during the initial configuration of the cell. However, these may have been changed. Figure 3 on page 40 shows the DCE Login panel.

```
IOEBLGN----------------------- DCE LOGIN ------------------------------

COMMAND ===>

Login for DCE Cell Name:  dcecellname

  DCE Cell Name           ===> dcecellname

  DCE Cell Admin ID       ===>

  DCE Cell Admin Password ===>

Enter END COMMAND to return to previous menu.









F1=HELP      F2=SPLIT     F3=END       F4=RETURN    F5=RFIND     F6=RCHANGE
F7=UP        F8=DOWN      F9=SWAP     F10=LEFT     F11=RIGHT    F12=RETRIEVE
```

Figure 3. DCE Login Panel

If you have previously set the **_IOE_CFG_CELL_ID** environment variable (note, this needs to be specified in the home directory), its value is displayed in the **DCE Cell Admin ID** field of the panel. You can either accept it or overwrite it with a new value.

DFS Configuration Main Menu

After you run **DFSCONF** from TSO, the DFSCONF Main Menu displays. The DFSCONF Main Menu is shown in Figure 4.

```
IOEBMAIN------------- DFS CONFIGURATION/DECONFIGURATION MAIN MENU -------------

SELECT OPTION ===>

                  1. Configure DFS Servers
                  2. Deconfigure DFS Servers
                  3. Configure DFS Client
                  4. Deconfigure DFS Client


Enter END COMMAND to terminate.

      ********************************************************************
      *  copyright:   Licensed Materials - Property of IBM               *
      *               5696-942 (C) Copyright IBM Corporation 1997, 1998.*
      *               All rights reserved.                               *
      *               US Government Users Restricted Rights - Use,       *
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      *               Schedule Contract with IBM Corp.                   *
      *               See Copyright Instructions, G120-2083.             *
      ********************************************************************




F1=HELP      F2=SPLIT     F3=END       F4=RETURN    F5=RFIND     F6=RCHANGE
F7=UP        F8=DOWN      F9=SWAP     F10=LEFT     F11=RIGHT    F12=RETRIEVE
```

Figure 4. DFSCONF Main Menu

The menu items are:

Menu Item	Description
Configure DFS Servers	If you select option **1** you get a list of all the DFS Servers that may be configured. See “Using DFSCONF to Configure DFS Servers.”
Deconfigure DFS Servers	If you select option **2** you get a list of all the DFS Servers that may be deconfigured. See “Using DFSCONF to Deconfigure DFS Servers” on page 106.
Configure DFS Client	If you select option **3** you perform the DFS Client configuration. See “Using DFSCONF to Configure the DFS Client” on page 43.
Deconfigure DFS Client	If you select option **4** you perform the DFS Client deconfiguration. See “Using DFSCONF to Deconfigure the DFS Client” on page 108.

Using DFSCONF to Configure DFS Servers

Selecting Configure DFS Servers from the DFSCONF Main Menu displays the panel shown in Figure 5.

```
IOEBCCFG-------------- CONFIGURE DFS SERVERS ---------------------------------

COMMAND ===>

DCE Cell Name ===> dcecellname

DCE Host Name ===> dcehostname


Options:

  DFS File Server               ===> N
  DFS Backup Server             ===> N
  DFS Fileset Database Server   ===> N

Enter END COMMAND to return to previous menu.









F1=HELP      F2=SPLIT     F3=END       F4=RETURN    F5=RFIND     F6=RCHANGE
F7=UP        F8=DOWN      F9=SWAP     F10=LEFT     F11=RIGHT    F12=RETRIEVE
```

Figure 5. Configuring DFS Servers Panel

The menu items are:

Menu Item	Description
DCE Cell Name	This is the DCE cell name used to previously configure DCE on this system and should not be changed on this panel. It is displayed for information purposes only. The DCE cell name is obtained from the DCE configuration file **/opt/dcelocal/dce_cf.db**.
DCE Host Name	This is the DCE host name of the system on which DFS is being configured and should not be changed on this panel. It is displayed for information purposes only. The DCE host

	name is obtained from the DCE configuration file **/opt/dcelocal/dce_cf.db**. The DCE host name is case sensitive.
DFS File Server	Enter **Y** to configure the DFS server on this host system. See “Using DFSCONF to Configure the DFS File Server.”
DFS Backup Server	Enter **Y** to configure the DFS Backup Server and the DFS Tape Coordinator on this host system. See “Using DFSCONF to Configure the DFS Backup Server.”
DFS Fileset Database Server	Enter **Y** to configure the DFS Fileset Database server on this host system. See “Using DFSCONF to Configure the DFS Fileset Location Database Server” on page 43.

Note: When you specify the **DCE Cell Name**, it is case sensitive and it is not fully qualified (for example, you can enter **dcecell1**, but not **/.../dcecell1**).

Using DFSCONF to Configure the DFS File Server

The DFS File Server Configuration Program automates the configuration of the DFS File Server. You **must** first configure the DFS File Server before configuring the DFS Backup Server or DFS Fileset Database Server. After configuring the DFS File Server, you can configure or reconfigure the remaining servers in any combination. Therefore, you can specify **Y** on each of the options to have all the servers configured at once.

To initiate the configuration of this server, change the DFS File Server option from **N** to **Y** and press <**Enter**>.

The program begins to issue the DCE administration commands that configures your DFS Server. If not interrupted, and if successfully completed, the program displays the DFS File Server Configuration Ended....SUCCESSFULLY message.

If interrupted, or if the program did not successfully complete configuration, the DFS File Server Configuration Ended....UNSUCCESSFULLY message is displayed. To determine where the error occurred that caused the configuration to fail, examine the **dfsconf.log** file, which by default is in your home directory, or at the location specified by the environment variable **_IOE_CFG_LOG_FILE**. Refer to Appendix A, “Example DFS Server Configuration Log File (dfsconf.log)” on page 123 for an example of a **dfsconf.log** file. If the **dfsconf.log** file already exists any execution of the DFSCONF program appends any messages to the end of the log file.

After configuring the DFS File Server using **DFSCONF**, additional DFS File Server configuration issues described in “Completing the DFS File Server Configuration” on page 45 must be addressed. But, first, proceed to complete the next step in the “DFS Configuration Steps” on page 32.

Using DFSCONF to Configure the DFS Backup Server

If you want to run the DFS Backup Database Server (**bakserver**) or any DFS Backup Tape Coordinators (**butc01** through **butc08**) on an OS/390 DCE host system, you should configure the DFS Backup Server using **DFSCONF**.

The OS/390 DFS Server Configuration Program (**DFSCONF**) can be used to configure the Backup server (**bakserver** and **butc**) processes. The procedure is identical with that used in configuring other OS/390 DFS server processes. It is recommended that the DFS File Server be the first DFS server component configured on your system as described in “Using DFSCONF to Configure the DFS File Server.”

To initiate the configuration of the Backup Server, change the DFS Backup Server option from **N** to **Y** and press <**Enter**>.

The program begins to issue the DCE administration commands that configures your DFS Backup Server. If not interrupted, and if successfully completed, the program displays the DFS Server Configuration Ended....SUCCESSFULLY message.

If interrupted, or if the program did not successfully complete configuration, the DFS Backup Server Configuration Ended....UNSUCCESSFULLY message is displayed. To determine where the error occurred that caused the configuration to fail, examine the **dfsconf.log** file, which by default is in your home directory, or at the location specified by the environment variable **_IOE_CFG_LOG_FILE**. Refer to Appendix A, "Example DFS Server Configuration Log File (dfsconf.log)" on page 123 for an example output of a **dfsconf.log** file. If the **dfsconf.log** file already exists any execution of the **DFSCONF** program appends any messages to the end of the log file.

After configuring the Backup Server using **DFSCONF**, additional Backup Server configuration issues described in "Completing the Backup Database Server (bakserver) Configuration" on page 51 must be addressed. But, first, proceed to complete the next step in the "DFS Configuration Steps" on page 32.

Using DFSCONF to Configure the DFS Fileset Location Database Server

The OS/390 DFS Server Configuration Program (**DFSCONF**) can be used to configure the Fileset Location Database server (**flserver**) process. The procedure is identical with that used in configuring other OS/390 DFS server processes. It is recommended that the DFS File Server be the first DFS server component configured on your system as described in "Using DFSCONF to Configure the DFS File Server" on page 42.

To initiate the configuration for this server, change the DFS Fileset Database Server option from **N** to **Y** and press <**Enter**>.

The program begins to issue the DCE administration commands that configures your DFS Fileset Database server. If not interrupted, and if successfully completed, the program displays the DFS Server Configuration Ended....SUCCESSFULLY message.

If interrupted, or if the program did not successfully complete configuration, the DFS Fileset Database Server Configuration Ended....UNSUCCESSFULLY message is displayed. To determine where the error occurred that caused the configuration to fail, examine the **dfsconf.log** file, which by default is in your home directory, or at the location specified by the environment variable **_IOE_CFG_LOG_FILE**. Refer to Appendix A, "Example DFS Server Configuration Log File (dfsconf.log)" on page 123 for an example output of a **dfsconf.log** file. If the **dfsconf.log** file already exists any execution of the **DFSCONF** program appends any messages to the end of the log file.

After configuring the DFS Fileset Database server using **DFSCONF**, additional DFS Fileset Database server configuration issues described in "Completing the FLDB Server (flserver) Configuration" on page 45 must be addressed. But, first, proceed to complete the next step in the "DFS Configuration Steps" on page 32.

Using DFSCONF to Configure the DFS Client

Selecting Configure DFS Client from the DFSCONF Main Menu displays the panel shown in Figure 6 on page 44.

```
IOEBCL--------------- CONFIGURE DFS CLIENT ---------------------------

COMMAND ===>

DCE Cell Name  ===> dcecellname

DCE Host Name  ===> dcehostname


Options:

  DFS Client   ===> N

Enter END COMMAND to return to previous menu.









F1=HELP      F2=SPLIT     F3=END       F4=RETURN    F5=RFIND     F6=RCHANGE
F7=UP        F8=DOWN      F9=SWAP     F10=LEFT     F11=RIGHT    F12=RETRIEVE
```

Figure 6. Configuring the DFS Client Panel

The menu items are:

Menu Item	Description
DCE Cell Name	This is the DCE cell name used to previously configure DCE on this system and should not be changed on this panel. It is displayed for information purposes only. The DCE cell name is obtained from the DCE configuration file **/opt/dcelocal/dce_cf.db**.
DCE Host Name	This is the DCE host name of the system on which DFS is being configured and cannot be changed on this panel. It is displayed for information purposes only. The DCE host name is obtained from the DCE configuration file **/opt/dcelocal/dce_cf.db**. The DCE host name is case sensitive.
DFS Client	To initiate the configuration of the DFS Client, change the DFS Client option from **N** to **Y** and press <**Enter**>.

The OS/390 DFS Server Configuration Program (**DFSCONF**) can be used to configure the DFS Client (**DFSCM**).

The program begins to issue the DCE administration commands that configures your **DFSCM**. If not interrupted, and if successfully completed, the program displays the DFS Client Configuration Ended....SUCCESSFULLY message.

If interrupted, or if the program did not successfully complete configuration, the DFS Client Configuration Ended....UNSUCCESSFULLY message is displayed. To determine where the error occurred that caused the configuration to fail, examine the **dfsconf.log** file, which by default is in your home directory, or at the location specified by the environment variable **_IOE_CFG_LOG_FILE**. Refer to Appendix A, “Example DFS Server Configuration Log File (dfsconf.log)” on page 123 for an example output of a **dfsconf.log** file. If the **dfsconf.log** file already exists any execution of the **DFSCONF** program appends any messages to the end of the log file.

After configuring the DFS Client using **DFSCONF**, additional **DFSCM** configuration issues described in "Completing the DFS Client (DFSCM) Configuration" on page 56 must be addressed. But, first, proceed to complete the next step in the "DFS Configuration Steps" on page 32.

Completing the DFS File Server Configuration

To complete the configuration of the DFS File Server, you must identify the new DCE host system as a DFS file server system to other systems in the DCE cell. You must also complete the configuration of the server components that will comprise the DFS File Server on the DCE host system. This includes updating the associated DFS administrative files and starting the servers.

The DFS configuration steps will instruct you when to perform the additional configurations steps. For your reference, here are the sections where these additional server configurations steps are described:

1. "Completing the FLDB Server (flserver) Configuration"
2. "Creating the DFS File Server FLDB Entry" on page 47
3. "Completing Fileset Server (ftserver) Configuration" on page 47
4. "Completing Replication (repserver) Server Configuration" on page 49
5. "Completing Update Client (upclient) Configuration" on page 49
6. "Completing Update Server (upserver) Configuration" on page 50
7. "Completing the Backup Database Server (bakserver) Configuration" on page 51
8. "Customizing the ioepdcf File" on page 62
9. "Customization of the DFS Server and the DFSCM envar Files" on page 64.

Completing the boserver Configuration

When configuring and running DFS, it is recommended that the **boserver** be automtically started. To automatically start, the **boserver**, update the **boserver** setting in the **ioepdcf** file. Refer to "Customizing the ioepdcf File" on page 62 for more information.

Completing the FLDB Server (flserver) Configuration

After using the OS/390 DFS Server Configuration Program, the following additional steps required to configure the Fileset Database Location Database (FLDB) Server (**flserver**) on a DCE host system.

Note: If you are configuring this DCE host system into an existing DCE cell, DFS administrative lists are typically updated on the cell's System Control machine and propagated by the Update Server to other DCE hosts running Update Clients. Refer to Chapter 8, "Defining DFS Administrators and Users" on page 67 for more information on DFS administrative lists and System Control Machines.

The following instructions assume that the system with DCE host name *dcehostname* is the system where the **flserver** and **upserver** will be run.

1. Use the **bos addadmin** command to add the abbreviated DFS server principal (**hosts/***dcehostname***/dfs-server**) of the new DFS server machine on the system with DCE host name *dcehostname* to the **/opt/dcelocal/var/dfs/admin.fl** administrative list file on DCE host system where the **flserver** will be being run.

   You can use the **dcecp group add** command to add the abbreviated DFS server principal to a security group and include the group in the **admin.fl** administrative list file. Note that DFSCONF processing created the security group **subsys/dce/dfs-fs-servers** and added the member **hosts/***dcehostname***/dfs-server** for this DCE host system to the group. It is recommended that you add this group to the **admin.fl** file using the command:

```
$ bos addadmin -server /.:/hosts/dcehostname \
               -adminlist admin.fl -group subsys/dce/dfs-fs-servers -createlist
```

Alternatively, you can add the abbreviated DFS server principal for the DCE host system to the **admin.fl** file using the command:

```
$ bos addadmin -server /.:/hosts/dcehostname \
               -adminlist admin.fl \
               -principal hosts/dcehostname/dfs-server -createlist
```

2. Ensure that the **admin.fl** administrative list is also updated with administrator principals and groups in the **/opt/dcelocal/var/dfs** directory on DCE host system where the **flserver** will be being run.

   To update the **admin.fl** administrative list on the system with DCE host name *dcehostname*, issue the following:

   ```
   $ bos addadmin -server /.:/hosts/dcehostname \
                  -adminlist admin.fl \
                  -principal cell_admin -group dfsteam -createlist
   ```

   To verify the **admin.fl** administrative list has been updated on the new database server machine with DCE host name **DCEDFS**, issue the following:

   ```
   $ bos lsadmin /.:/hosts/DCEDFS -adminlist admin.fl

   Admin Users are: user: cell_admin,
   user: hosts/DCEDFS/dfs-server,
   group: dfsteam,
   group: subsys/dce/dfs-fs-servers
   ```

3. Stop and restart the **flserver** process on each system in the DCE cell. Restarting the existing database server processes causes the processes to read the updated RPC server group. This ensures that each Ubik coordinator agrees on the number and identities of the other database server machines of its type, which is vital to Ubik's use of a quorum of database server machines to maintain database consistency. For additional information on Ubik, see the *OS/390 DFS Administration Guide and Reference*.

4. Start the **flserver** database server process on this DCE host machine using the **bos create** command. The following is an example of how to start the **flserver** on a system with the DCE host name of **DCEDFS**:

   ```
   $ bos create /.:/hosts/DCEDFS flserver simple "flserver \
         envar('_EUV_HOME=/opt/dfslocal/home/flserver')/ >dd:flserver 2>&1"
   ```

   The **bos create** command will also instruct the **boserver** to automatically start the **flserver** when the **boserver** is subsequently restarted. For more information on using the **bos create** command, refer to “Starting the boserver Processes from OMVS” on page 118.

5. Verify that there is not already a DFS server entry for the system with DCE host name *dcehostname* by issuing the following command from OMVS which displays all server entries:

   ```
   $ fts lsserverentry -all
   ```

   If the output identifies that a list of sites can not be acquired (normally because this is the first system in the DCE cell where DFS will be configured) or the the **principal=hosts/***dcehostname* identifying this DCE host system is not displayed, then a server entry must be created in the Fileset Location Databases (FLDB).

   To create a DFS server entry in the FLDB with the DCE cell name *dcecellname* and the DCE host name *dcehostname* issue the command:

   ```
   $ fts crserverentry -server /.../dcecellname/hosts/dcehostname \
                       -principal hosts/dcehostname
   ```

6. Synchronize the Fileset Location Databases in the DCE cell.

If the FLDB entry was created, it is recommended that you synchronize the Fileset Location Databases in the DCE cell by issuing the following command from OMVS using the DCE host name (*dcehostname*) for each system in the DCE cell where an **flserver** is configured:

```
$ udebug -rpcgroup /.:/fs -server /.:/hosts/dcehostname
```

For additional detailed information, see *OS/390 DFS Administration Guide and Reference*.

This completes **flserver** configuration. You should proceed to the next configuration step.

Creating the DFS File Server FLDB Entry

It is recommended that you always create a DFS File Server entry in the Fileset Location Database (FLDB). You must create this entry for a DCE host system if you will ever export files using DFS from the DCE host system.

To create the FLDB entry, an **flserver** must be running in the DCE cell. Note that if you previously completed an **flserver** configuration on this DCE host system, you were instructed to create the entry for the DCE host system at that time.

To create the FLDB entry, use the following procedure:

1. Verify that there is not already a DFS server entry with the DCE host name of *dcehostname* by issuing the following command from OMVS to display all server entries:

   ```
   $ fts lsserverentry -all
   ```

   If the output identifies that a list of sites cannot be acquired (normally because this is the first system in the DCE cell where DFS will be configured) or the **principal** = **hosts**/*dcehostname* identifying this DCE host system is not displayed, then a server entry must be created in the FLDB.

   To create a DFS server entry in the FLDB with the DCE cell name of *dcecellname* and the DCE host name of *dcehostname* issue the following command:

   ```
   $ fts crserverentry -server /.../dcecellname/hosts/dcehostname \
                       -principal hosts/dcehostname
   ```

2. If the FLDB entry was created, it is recommended that you synchronize the Fileset Location Databases in the DCE cell by issuing the following command from OMVS using the DCE host name of *dcehostname* for each system in the DCE cell where an **flserver** is configured:

   ```
   $ udebug -rpcgroup /.:/fs -server /.:hosts/dcehostname
   ```

For additional detailed information, see *OS/390 DFS Administration Guide and Reference*.

Completing Fileset Server (ftserver) Configuration

After using the OS/390 DFS Server Configuration Program to configure the DFS File Server, the following additional steps required to configure the DFS Fileset Server on a DCE host.

If you are configuring this DCE host system into an existing DCE cell, DFS administrative lists are typically updated on the cell's System Control machine and propagated by the Update Server to other DCE hosts running Update Clients. Refer to Chapter 8, “Defining DFS Administrators and Users” on page 67 for more information on DFS administrative lists and System Control Machines.

Note: The following instructions assume that there is only one system in the DCE cell where DFS is running or that the **upserver** will be run on the same system with the **ftserver**.

1. Use the **bos addadmin** command to add the abbreviated DFS server principal (**hosts/***dcehostname***/dfs-server**) of the new DFS server machine on the system with DCE host name *dcehostname* to the **/opt/dcelocal/var/dfs/admin.ft** administrative list file.

   You can use the **dcecp -c group add** command to add the abbreviated DFS server principal to a security group and include the group in the **admin.ft** administrative list file. Note that DFSCONF processing created the security group **subsys/dce/dfs-fs-servers** and added the member **hosts/***dcehostname***/dfs-server** for this DCE host system to the group. You can add this group to the **admin.ft** file using the command:

   ```
   $ bos addadmin -server /.:/hosts/dcehostname -adminlist admin.ft \
                  -group subsys/dce/dfs-fs-servers -createlist
   ```

   Alternatively, you can add the abbreviated DFS server principal for the DCE host system to the **admin.ft** file using the command:

   ```
   $ bos addadmin -server /.:/hosts/dcehostname -adminlist admin.ft \
                  -principal hosts/dcehostname/dfs-server -createlist
   ```

2. Ensure that the **/opt/dcelocal/var/dfs/admin.ft** administrative list file is also updated with administrator principals and groups on the DCE host system where the **ftserver** will be run. To update the **admin.ft** administrative list file with the user **cell_admin** and the group **dfsteam** on the system with DCE host name *dcehostname*, issue the following:

   ```
   $ bos addadmin -server /.:/hosts/dcehostname -adminlist admin.ft \
                  -principal cell_admin -group dfsteam -createlist
   ```

   To verify the **admin.ft** administrative list has been updated on the system with DCE host name *dcehostname*, issue the following:

   ```
   $ bos lsadmin /.:/hosts/dcehostname -adminlist admin.ft

   Admin Users are: user: cell_admin,
   user: hosts/dcehostname/dfs-server,
   group: dfsteam,
   group: subsys/dce/dfs-fs-servers
   ```

3. Start the **ftserver** on this DCE host machine using the **bos create** command. The following is an example of how to start the **ftserver** on a system with the DCE host name of **DCEDFS**:

   ```
   $ bos create /.:/hosts/DCEDFS ftserver simple "ftserver \
         envar('_EUV_HOME=/opt/dfslocal/home/ftserver')/ >dd:ftserver 2>&1"
   ```

   For more information on using the **bos create** command, refer to “Starting the boserver Processes from OMVS” on page 118.

4. Verify that there is not already a DFS server entry for the system with DCE host name *dcehostname* by issuing the following command from OMVS which displays all server entries:

   ```
   $ fts lsserverentry -all
   ```

   If the output identifies that a list of sites can not be acquired (normally because this is the first system in the DCE cell where DFS will be configured) or the **principal=hosts/***dcehostname* identifying this DCE host system is not displayed, then a server entry must be created in the Fileset Location Databases (FLDB).

   To create a DFS server entry in the FLDB with the DCE cell name *dcecellname* and the DCE host name *dcehostname* issue the command:

   ```
   $ fts crserverentry -server /.../dcecellname/hosts/dcehostname \
                       -principal hosts/dcehostname
   ```

For additional detailed information, see *OS/390 DFS Administration Guide and Reference*.

This completes **ftserver** configuration. You should proceed to the next configuration step.

Completing Replication (repserver) Server Configuration

After using the OS/390 DFS Server Configuration Program, additional steps required to configure and start the Replication Server (**repserver**) on a DCE host system to replicate filesets or house a replica of a fileset. If you plan to define the **root.dfs** fileset for the DCE cell on the OS/390 host system where DFS is being configured, you must configure the **repserver**.

To complete the initial configuration and start a **repserver** on a DCE host system:

1. Ensure that a FLDB entry for the DCE host system running as a DFS File server machine is created as described in “Creating the DFS File Server FLDB Entry” on page 47.
2. Ensure that the **ftserver** is running on the DCE host system as described in “Completing Fileset Server (ftserver) Configuration” on page 47.
3. Start the **repserver** on this DCE host machine using the **bos create** command. The following is an example of how to start the **repserver** on a system with the DCE host name of **DCEDFS**:

   ```
   $ bos create /.:/hosts/DCEDFS repserver simple "rpserver \
         envar('_EUV_HOME=/opt/dfslocal/home/repserver')/ >dd:rpserver 2>&1"
   ```

   Note: Enter the previous command specifying **repserver** and **rpserver** exactly as shown.

   The **bos create** command will also instruct the **boserver** to automatically start the **repserver** when the **boserver** is subsequently restarted. For more information on using the **bos create** command, refer to “Starting the boserver Processes from OMVS” on page 118.

You must refer to the *OS/390 DFS Administration Guide and Reference* for additional information on how to set up filesets for replication in a DCE cell.

This completes **repserver** configuration. You should proceed to the next configuration step.

Completing Update Client (upclient) Configuration

After using the OS/390 DFS Server Configuration Program, additional steps are required to configure and start the Update Client (**upclient**) on a DCE host system. This section explains how to complete the **upclient** configuration.

An **upclient** is run to allow the **upclient** to periodically request an **upserver** to identify the latest level of specific administrative files that exist on the **upserver** DCE host machine. If the latest level of a file does not exist on the **upclient** DCE host system, the **upclient** requests the latest level of the file from the **upserver** and over writes the file that is on the **upclient** DCE host system.

Note: You can run either an **upserver** or **upclient** on a DCE host system. You cannot run an **upserver** and an **upclient** on the same system. Also, the **upserver** or **upclient** must run in the same DCE cell.

Completing the configuration of the **upclient** consists of:

1. Updating the **admin.up** administrative list file on the **upserver** system.

   To identify the DCE host system where the **upclient** will be run to the **upserver**, you must update the **/opt/dcelocal/var/dfs/admin.up** administrative list file on the DCE host system where the **upserver** is running.

For example, if the **upserver** is running on the system with the DCE host name *dcehostnameups* and the **upclient** will be run on the system with the DCE host name *dcehostname*, you can add the abbreviated DFS server principal for the **upclient** system (**hosts/***dcehostname***/dfs-server**) to the **admin.up** file on the **upserver** system using the following command:

```
$ bos addadmin -server /.:/hosts/dcehostnameups \
               -adminlist admin.up -principal hosts/dcehostname/dfs-server
```

2. Ensuring all administrative list files are updated on the **upserver** system before the **upclient** is started.

   Once the **upclient** is started, DFS administrative list files on the system where the **upclient** is running can be overlayed by the interaction of the **upclient** with the **upserver**. You must ensure that all administrative list file updates made during the configuration of the DFS on this DCE host system are reflected in the administrative list files on the system where the **upserver** is running if the **upserver** is exporting the administrative list file. See Chapter 8, “Defining DFS Administrators and Users” on page 67 for more information.

3. Verifying **admin.up** file updates.

   To verify that the **admin.up** administrative list file has been updated on a system with DCE host name *dcehostnameups*, issue the following:

   ```
   $ bos lsadmin /.:/hosts/dcehostnameups -adminlist admin.up

   Admin Users are: user: hosts/DCEDFS/dfs-server,
   group: dfsteam,
   group: subsys/dce/dfs-fs-servers
   ```

4. Starting the **upclient**

   The following command is an example of how to start the **upclient** on the system with DCE host name *dcehostname* when the **upserver** is running on the system with DCE host name *dcehostnameups*:

   ```
   $ bos create /.:/hosts/dcehostname upclient simple "upclient \
         envar('_EUV_HOME=/opt/dfslocal/home/upclient')/ >dd:upclient 2>&1 \
         /.:/hosts/dcehostnameups \
         (/opt/dcelocal/var/dfs/ admin.bos admin.ft admin.up) -f UpCLog"
   ```

   The previous **bos create** command example requests that the **upserver** allow the **upclient** to acquire **admin.bos**, **admin.ft** and **admin.up** administrative list file information if the **upserver** has been started to export these files. The **bos create** command also causes the **boserver** to automatically start the **upclient** when the **boserver** is subsequently restarted.

   Refer to “Starting the boserver Processes from OMVS” on page 118, for more information.

This completes **upclient** configuration. You should proceed to the next configuration step.

Completing Update Server (upserver) Configuration

Note: You can run either an **upserver** or an **upclient** on the host system where DFS is being configured. You cannot run an **upserver** and an **upclient** on the same host system.

After using the OS/390 DFS Server Configuration Program, additional steps are required to configure and start the Update Server (**upserver**) on a DCE host system. An **upserver** is run to allow an **upclient** to periodically request an **upserver** to identify the latest level of specified administrative files that exist on the **upserver** DCE host machine. If the latest level of a file does not exist on the **upclient** DCE host system, the **upclient** requests the latest level of the file from the **upserver** and over writes the file that is on the **upclient** DCE host system.

Completing the configuration of the Update Server (**upserver**) consists of:

1. Updating the admin.up File on the **upserver** system.

   Before starting the **upserver**, insure that the **admin.up** file is created (see “Defining a DFS Administrator” on page 68 and “Adding Principals and Groups to Administrative Lists” on page 73 and “System Control Machines and Domains” on page 69).

   To identify the DCE host system where the **upclient** will be run to the **upserver**, you must update the **/opt/dcelocal/var/dfs/admin.up** administrative list file on the DCE host system where the **upserver** is running.

   For example, if the **upserver** is running on the system with the DCE host name *dcehostnameups* and an **upclient** will be run on the system with the DCE host name **DCEDFS**, you can add the abbreviated DFS server principal for the **upclient** system (**hosts/DCEDFS/dfs-server**) to the **admin.up** file on the **upserver** system using the following command:

   ```
   $ bos addadmin -server /.:/hosts/dcehostnameups \
                  -adminlist admin.up -principal hosts/DCEDFS/dfs-server
   ```

   The **admin.up** file should contain an entry identifying the abbreviated DFS server principal for each file server machine in the domain where an **upclient** is run (see “Completing Update Client (upclient) Configuration” on page 49).

2. Verifying **admin.up** file updates.

   To verify that the **admin.up** administrative list file has been updated on a system with DCE host name *dcehostnameups*, issue the following:

   ```
   $ bos lsadmin /.:/hosts/dcehostnameups -adminlist admin.up

   Admin Users are: user: hosts/DCEDFS/dfs-server,
   group: dfsteam,
   group: subsys/dce/dfs-fs-servers
   ```

3. Starting the **upserver**

   The following is an example of how to create and start the **upserver** on the system with the DCE host name of *dcehostnameups*:

   ```
   $ bos create /.:/hosts/dcehostnameups upserver simple "upserver \
         envar('_EUV_HOME=/opt/dfslocal/home/upserver')/ >dd:upserver 2>&1 \
         (/opt/dcelocal/var/dfs/ admin.bos admin.up admin.ft)"
   ```

   The previous **bos create** command example requests the **upserver** to export the **admin.bos** and **admin.ft** administrative files to any **upclient** with an entry in the **/opt/dcelocal/var/dfs/admin.up** file on the DCE host system where the **upserver** is running. The **bos create** command also causes the **boserver** to automatically start the **upserver** when the **boserver** is subsequently restarted.

   Refer to “Starting the boserver Processes from OMVS” on page 118 for more information.

This completes **upserver** configuration. You should proceed to the next configuration step.

Completing the Backup Database Server (bakserver) Configuration

This section describes how to complete the configuration of the DFS Backup Server (**bakserver**) and the Backup Tape Coordinator (**butc**) servers. The **bakserver** is not required on a DCE host system when DFS is running. However, if you plan to run a Backup Tape Coordinator (**butc**) server on the system you should configure **bakserver**.

If you are configuring this DCE host system into an existing DCE cell, DFS administrative lists are typically updated on the cell's System Control machine and propagated by the Update Server to other DCE hosts

running Update Clients. Refer to Chapter 8, “Defining DFS Administrators and Users” on page 67, for more information on DFS administrative lists and System Control Machines.

Note: The following instructions assume that there is only one system in the DCE cell where DFS is running or that the **upserver** will be run on the same system with the **bakserver**. Also, DFS configuration command examples sometimes use **/.:** to denote **/.../***dcecellname*.

1. Use the **bos addadmin** command to add the abbreviated DFS server principal (**hosts/***dcehostname***/dfs-server**) of the new DFS server machine on the system with the DCE host name of *dcehostname* to the **/opt/dcelocal/var/dfs/admin.bak** administrative list file.

   You can use the **dcecp -c group add** command to add the abbreviated DFS server principal to a security group and include the group in the **admin.bak** administrative list file. Note that DFSCONF processing created the security group **subsys/dce/dfs-fs-servers** and added the member **hosts/***dcehostname***/dfs-server** for this DCE host system to the group. You can add this group to the **admin.bak** file using the following command:

   ```
   $ bos addadmin -server /.:/hosts/dcehostname \
                  -adminlist admin.bak -group subsys/dce/dfs-fs-servers -createlist
   ```

   Alternatively, you can add the abbreviated DFS server principal for the DCE host system to the **admin.bak** file using the following command:

   ```
   $ bos addadmin -server /.:/hosts/dcehostname \
                  -adminlist admin.bak \
                  -principal hosts/dcehostname/dfs-server -createlist
   ```

2. Ensure that the **/opt/dcelocal/var/dfs/admin.bak** administrative list is also updated with administrator principals and groups on the DCE host system where the **bakserver** will be running. To update the **admin.bak** administrative list on the system with the DCE host name of **DCEDFS**, issue the following command:

   ```
   $ bos addadmin -server /.:/hosts/dcehostname \
                  -adminlist admin.bak \
                  -principal cell_admin -group dfsteam -createlist
   ```

   To verify that the **admin.bak** administrative list has been updated on the system with the DCE host name of **DCEDFS**, issue the following command:

   ```
   $ bos lsadmin /.:/hosts/DCEDFS -adminlist admin.bak

   Admin Users are: user: cell_admin,
   user: hosts/DCEDFS/dfs-server,
   group: dfsteam,
   group: subsys/dce/dfs-fs-servers
   ```

3. Stop and restart the **bakserver** process on each system in the DCE cell where it is running. Restarting the **bakserver** processes causes the updated RPC server group to be read. This ensures that each Ubik coordinator agrees on the number and identities of the other database server machines of its type, which is vital to Ubik's use of a quorum of database server machines to maintain database consistency. You must refer to the *OS/390 DFS Administration Guide and Reference* for additional Ubik information.

4. Start the **bakserver** database server process on this DCE host machine using the **bos create** command. The following is an example of how to start the **bakserver** on a system with the DCE host name of **DCEDFS**:

   ```
   $ bos create /.:/hosts/DCEDFS bakserver simple "bkserver \
         envar('_EUV_HOME=/opt/dfslocal/home/bakserver')/ >dd:bkserver 2>&1"
   ```

Notes:

a. Enter the previous command specifying **bakserver** and **bkserver** exactly as shown.

b. The OS/390 DFS implementation assumes that the UUID for the **bakserver** is exported when DCE configures the Cell Directory Server (CDS). If the **bakserver** fails to start because the UUID for the **bakserver** is not exported, refer to "Re-Establish the bakserver Object UUID" on page 55 for a description of the recovery actions that you can take.

c. The **bos create** command will also instruct the **boserver** to automatically start the **bakserver** when the **boserver** is subsequently re-started.

For more information on using the **bos create** command, refer to "Starting the boserver Processes from OMVS" on page 118.

5. Synchronize the Backup Databases in the DCE cell.

   To insure that all the DFS backup databases in the DCE cell are synchronized, issue the following command from OMVS using the DCE host name (*dcehostname*) for each system in the DCE cell where a **bakserver** is running. :

   ```
   $ udebug -rpcgroup /.:/subsys/dce/dfs/bak -server /.:/hosts/dcehostname
   ```

For additional detailed information, see *OS/390 DFS Administration Guide and Reference*.

This completes **bakserver** configuration. You should proceed to "Completing the DFS Backup Tape Coordinator Configuration" or to the next configuration step.

Completing the DFS Backup Tape Coordinator Configuration

This section provides information on completing the DFS Backup Tape Coordinator (**butc***nn*) configuration. You must complete the DFS Backup Database Server (**bakserver**) configuration before you complete the Backup Tape Coordinator (**butc**) configuration. Additionally, setting the Backup Tape Coordinator environment variables and creating a VSAM tape backup management file are discussed in this section and should be performed in the order they appear.

If you plan to use the OS/390 DFS Backup Tape Coordinator with the OS/390 DFS Backup Database Server, complete the following steps:

1. Verify that the Backup Database Server (**bakserver**) is running. Issue the **bos status** command to the DCE host system where the **bakserver** is running, by entering the following:

   ```
   $ bos status /.:/hosts/dcehostname bakserver

   Instance bakserver, currently running normally.
   ```

   If a **bakserver** is not running in the DCE cell, a **bakserver** should be started before proceeding to complete **butc** configuration.

2. The OS/390 DFS implementation assumes that the object UUID for the **bakserver** is exported during DCE configuration when the Cell Directory Server (CDS) is configured.

   Display the exported object UUID for the **bakserver** by issuing the following command from OMVS:

   ```
   dcecp -c show rpcentry /.:/subsys/dce/dfs/bak

   {003c4de0-9485-6182-07ef-b1e000000000}
   ```

   If the command displays an object UUID (for example, 003c4de0-9485-6182-07ef-b1e000000000), then the object UUID is exported and you can proceed to the next configuration step.

   If an object UUID is not shown and a message indicating that the name service object is not found is displayed, the UUID for the **bakserver** is not exported at this time. If the UUID is not exported, refer

to “Re-Establish the bakserver Object UUID” on page 55, for a description of the recovery actions that you can take to allow **butc** configuration to continue.

3. Verify that a **bak addhost** command has been issued for the ID number associated with the **butc***nn* server you want to start. Issue the following command to determine what **butc***nn* servers are defined:

   ```
   $ bak lshosts

   Tape hosts:
       Host /.../dcecellname/hosts/dcehostname, port offset 0
   ```

   The **bak lshosts** command output shown above indicates that the **butc01** server is already defined at offset 0. No tape hosts are displayed if there are no **butc** servers defined on this DCE host system.

   If you want to start a **butc***nn* and it was not displayed by the **bak lshost** command, issue the following **bak addhost** command.

   Note: The numeric offset value shown at the end of the **bak addhost** command is:

   0 to indicate **butc01**
   1 to indicate **butc02**
   2 to indicate **butc03**
   3 to indicate **butc04**
   4 to indicate **butc05**
   5 to indicate **butc06**
   6 to indicate **butc07**
   7 to indicate **butc08**

   For example, if you want to start **butc01** on an OS/390 DCE host with the DCE host name of *dcehostname*, issue the following command:

   ```
   $ bak addhost /.:/hosts/dcehostname 0

   Adding host '/.../dcecellname/hosts/dcehostname' offset 0
   to tape list ...
   The host name and port information were added to the list of tape
   hosts successfully
   ```

4. Issue the OS/390 operator command **modify start** command from the operator console:

   ```
   modify dfs,start butc01

   IOEN00106I DFS daemon BUTC01 is ready for requests.
   ```

   Note: OS/390 DFS uses OS/390 services to control and dynamically allocate tape drives. Because of this, the **TapeConfig** feature of DFS is not necessary and not available in OS/390 DFS.

5. Set the Backup Tape Coordinator environment variables.

   The **/opt/dfslocal/home/butc***nn***/envar** files can be edited to set the environment variables for the **butc***nn* processes, where valid entries for *nn* are 01 through 08. There are four environment variables that may be updated. All have pre-defined default values assigned during installation. These values may be changed if desired.

   The environment variables and default values are:

   _IOE_BUTC_DISKUNIT
   The unit name to be used when dynamically allocating a data definition for disk data sets. This is the name passed to dynamic allocation when allocating the disk device. The default value is **SYSDA**.

   _IOE_BUTC_DUMP_HLQ
   The high-level qualifier for the dump (backup) data set names. The default value is **DFSBKUP**.

_IOE_BUTC_KSDS
The name of the virtual storage access method (VSAM) DFS tape backup management file. The default value is **DFSBUTC.KSDS.LABEL**. Refer to step 6 on page 55 for more information.

_IOE_BUTC_TAPEUNIT
The unit name to be used when dynamically allocating a data definition for tape drives. This is the unit name passed to dynamic allocation when allocating the tape device. The default value is **3490**.

At this point, an alias must be created in the OS/390 master catalog for the backup data set high-level qualifier. This is specified in the **_IOE_BUTC_DUMP_HLQ** environment variable for the appropriate **butc** process (01 through 08). The default value is **DFSBKUP**. If you choose another name as an alias, the name may be up to 17 characters in length.

For further information on how to set environment variables, see the *OS/390 DFS Administration Guide and Reference*. All variables relevant to DFS administration are listed in Appendix C, "Environment Variables in DFS" on page 135.

6. Create a VSAM tape backup management file.

   A VSAM file should be created to maintain a record of each dump processed on the OS/390 system. The name of this file must be specified in the environment variable, **_IOE_BUTC_KSDS**. The file should contain the tape name, the dump number, and the tape label. The tape label will contain the tape's expiration date. A new record is added each time a new label is created and written to tape. When the expiration date is reached, the tape becomes expired and is eligible for re-use. The record for the expired tape is deleted from the VSAM data set, the dump information is deleted from the backup database, and the data sets contained in the dump are uncataloged.

   To create the VSAM dataset to contain the tape management backup file identified by the environment variable **_IOE_BUTC_KSDS**, you can copy, edit and submit the IBM supplied sample job statements found in SIOESAMP(BUTCVSAM). To print this VSAM dataset, you can copy, edit and submit the sample job statements found in SIOESAMP(BUTCVSMP).

   Note: If a VSAM data set is not created, an error message will be generated by the **butc** process. The dump process will, however, continue to process correctly and no expired backup records will be deleted from the system.

Re-Establish the bakserver Object UUID

The OS/390 DFS implementation assumes that the universal unique identifier (UUID) for the **bakserver** is exported when DCE configures the Cell Directory Server (CDS).

You can verify that the UUID for the **bakserver** is exported using the DCE RPC control program (**rpccp**):

```
$ rpccp show entry /.:/subsys/dce/dfs/bak
  objects:
  3396dbb0-1bc1-11d0-a4f6-02608ce88731
>>> no matching binding information found
group members:
  /.../dces390.endicott.ibm.com/hosts/allanon.endicott.ibm.com/self
```

If an object UUID (for example, 3396dbb0-1bc1-11d0-a4f6-02608ce88731) is not displayed in the **rpccp show entry** command output and the message **EUVR12352I Objects not found in server entry** is returned, the UUID for the **bakserver** is not exported at this time. To recover from this condition, you can:

1. Stop other bakservers running in the DCE cell on different DCE host systems.
2. Generate a new UUID using the **uuidgen** command:

```
$ uuidgen
```

The *uuid-value* is displayed by the **uuidgen** command.

3. Issue the **rpcexport command** using the *uuid-value* returned by the **uuidgen** command:

   ```
   $ rpccp export -o uuid-value /.:/subsys/dce/dfs/bak
   ```

4. Re-issue the **rpccp show entry /.:/subsys/dce/dfs/bak** command (see above) to verify that the UUID object is exported.
5. Restart the **bakservers** in the DCE cell. For information on how to start the **bakserver** on an OS/390 DCE host system, refer to “Starting the boserver Processes from OMVS” on page 118.

Completing the DFS Client (DFSCM) Configuration

This section describes additional configuration topics for the DFS client (**DFSCM**) in an OS/390 environment. They include:

System Parmlib Member BPXPRMxx Entry for the DFSCM

This section describes the system parmlib member **BPXPRM***xx* entry required to run the DFS Client (**DFSCM**).

Note: The variable, *xx*, is an installation dependent suffix used to uniquely identify system parmlib members.

The **DFSCM** runs as a physical file system and requires a **FILESYSTYPE TYPE(DFSC)** entry in the system **BPXPRM***xx* parmlib member. This entry is usually made during the DFS installation process as described in the *OS/390 Program Directory* instructions used to install OS/390 and the Distributed File Service (DFS) element.

In case the **BPXPRM***xx* parmlib member for the **DFSCM** was not made when OS/390 was installed, you must now update the **FILESYSTYPE TYPE(DFSC)** entry in the parameter library (parmlib) member **BPXPRM***xx*. Refer to the *OS/390 UNIX System Services File System Interface Reference*, SC28-1909, for detailed information on defining a physical file system on OS/390 using the system parmlib member **BPXPRM***xx* **FILESYSTYPE** statement.

To cause OS/390 to start the **DFSCM**, make the following addition to the parameter member **BPXPRM***xx* in the data set that is allocated to the IEFPARM DD statement in the OMVS Started Task PROC:

```
FILESYSTYPE TYPE(DFSC)
           ENTRYPOINT(IOECMINI)
           PARM('ENVAR("_EUV_HOME=/opt/dfslocal/home/dfscm") /
           >DD:IOEDFSD 2>&1')
           ASNAME(DFSCM)
```

The following provides additional information regarding the above required entries in the parmlib member, **BPXPRM***xx*:

TYPE(DFSC)

This entry must be be specified as shown or the DFS client will fail in an indeterminate manner. **DFSC** is the well-known name that is used to identify the DFS client (**DFSCM**) as a physical file system.

ENTRYPOINT(IOECMINI)

This entry must be specified as shown or OS/390 will not successfully initialize the DFS client.

_EUV_HOME

This environment variable must be specified in the **FILESYSTYPE** statement. A directory other than **/opt/dfslocal/home/dfscm** may be specified but the use of this directory for the DFS client is recommended.

Note: A trailing slash '/' after the **_EUV_HOME** specification is required. **_EUV_HOME** is a DCE runtime option (not a **DFSCM** parameter). A slash identifies the end of the runtime options and the start of the parameters. If the slash '/' is omitted, it indicates that there are no runtime options and **_EUV_HOME** is not defined because it is treated as a **DFSCM** parameter.

>DD:IOEDFSD 2>&1

This entry must be specified as shown. It assigns standard out (**STDOUT**) and standard error (**STDERROR**) for the **DFSCM** DCE login processing to the ddname IOEDFSD. The ddname IOEDFSD is required to be included as started procedure JCL for the DFS client.

DFSCM Cache Configurations

This section describes the different configurations available for the DFS client (**DFSCM**) in an OS/390 system environment which include:

- "Minimum Configuration of DFSCM"
- "DFSCM Memory Caching"
- "DFSCM Disk Caching" on page 59.

Minimum Configuration of DFSCM: The minimum configuration for the **DFSCM** (or DFS) on an OS/390 system is to run with memory caching without any DFS servers. **DFSCM** does not require any DFS servers be running on the OS/390 system where **DFSCM** is running.

DFSCM Memory Caching:

Note: The configuration for **DFSCM** during the OS/390 DFS installation process enables memory caching. The **DFSCM** initialization parameter, **-memcache**, is specified in the **/opt/dfslocal/home/dfscm/envar** file initially supplied with OS/390 DFS.

To configure an OS/390 system to run the **DFSCM** with memory caching, use the following procedure:

1. Create and update the local Hierarchical File System **/opt/dcelocal/etc/CacheInfo** file appropriately.

   The **CacheInfo** file defines the DCE Local File System aggregate to use for a disk cache and the size of a disk or memory cache. The Cache Manager checks this file at initialization to determine this information. (The installation instructions provide details for creating the **CacheInfo** file.) The **CacheInfo** file contains the following three fields separated by colons.

   a. A directory on the local disk where the Cache Manager mounts the DFS global namespace.

      Note: If **/...** is not specified, symbolic links to the global namespace fail.

   b. The minor device number for a local DCE Local File System aggregate that serves as the DFS cache for a disk cache. The Cache Manager creates its cache files in this aggregate. There is no default for this entry. The entry must be specified.

Note: Although this aggregate is not used with a memory cache, a placeholder entry must appear in this field even if memory caching is used for the DFS client.

c. A definition of the cache size in kilobyte blocks.

Following is an example of a **CacheInfo** file. The file lists the DCE namespace mounted at the global namespace designation (**/...**), the minor device number of **999** for the local DCE Local File System aggregate used for the cache files, and a defined cache size of 512 kilobyte blocks (the aggregate must have this many blocks available on its disk(s)):

```
/...:999:512
```

Notes:

a. A default **CacheInfo** file is usually created in **/opt/dcelocal/etc** during installation by the **dfs_cpfiles** program. Refer to the *OS/390 Program Directory* for this release or to the Chapter 6, “Post Installation Considerations” on page 25 for more information on the **dfs_cpfiles** program.

b. The **CacheInfo** file contents shown above reflect the contents of the file immediately after DFS is installed.

c. A minor device number must be specified as a placeholder even if memory caching is being used. Refer to the *OS/390 DFS Administration Guide and Reference* for information on specifying **DFSCM** startup parameters by the environment variable **_IOE_CM_PARMS** which includes the **-memcache** option that indicates memory caching is active.

d. The Cache Manager default is disk caching. However, the Cache Manager can use a machine memory cache rather than a disk cache. To direct the Cache Manager to use memory caching, specify the **DFSCM** initialization parameter, **-memcache**, in the **/opt/dfslocal/home/dfscm/envar** file. Refer to the *OS/390 DFS Administration Guide and Reference* for more information on specifying Cache Manager initialization parameters. When the **-memcache** option is used, the Cache Manager does no disk caching, even if the machine has a disk available.

e. On OS/390 DFS, the Cache Manager initialization parameters are the same as the available **dfsbind** and **dfsd** command options described in the *OS/390 DFS Administration Guide and Reference*.

2. Create and update the **/opt/dfslocal/home/dfscm/envar** file using the **DFSCM** initialization parameter, **_IOE_CM_PARMS**, to specify **-memcache**.

   This step is necessary as the DFS client (**DFSCM**), when initialized by OMVS, reads the **envar** file specified as the **_EUV_HOME** variable value in the parameter library **BPXPRM*xx* FILESYSTYPE TYPE(DFSC)** entry. A **_EUV_HOME** variable value must be specified in the **BPXPRM*xx*** entry for the **DFSCM**. The use of the file **/opt/dfslocal/home/dfscm/envar** is recommended for **DFSCM** processing.

   The DCE and DFS Environment Variables that are key to the DFS client are listed in “Customizing the DFSCM envar File” on page 65. For information on other DCE and DFS environment variables, see Appendix C, “Environment Variables in DFS” on page 135.

   Note: An OS/390 shell configuration script program, **dfs_cpfiles**, is provided in the **/opt/dfsglobal/scripts** directory to copy an example **dfscm.envar** file from the **/opt/dfsglobal/examples** directory to **/opt/dfslocal/home/dfscm**. For further information, see “Using dfs_cpfiles to Create Default DFS Configuration Files” on page 25.

   Following is an example of a **DFSCM envar** file. The first line in the file disables the DFS client usage of the DCE single sign-on function. This controls whether the DFS client will attempt a DCE single sign-on for a user during a file request. The second line in the file controls where **DFSCM** messages are to be sent. In this example, they will be sent to the operator's console. The third line in the file passes initialization parameters to **DFSCM** or options that will take effect when the DFS client is started. In this example, the mounted file system name for the DFS client is set to

IOE_DFS_CLIENT_DATA (this name is displayed by the OS/390 UNIX command, **df**). Translation is set to **ON** for ASCII to EBCDIC by the **-translation text** entry. Memory caching is specified for the DFS client. The last line in the example sets the time zone to Eastern Standard Time.

```
_EUV_AUTOLOG=NO
_EUV_SVC_MSG_LOGGING=CONSOLE_LOGGING
_IOE_CM_PARMS=-mountfilesystem IOE_DFS_CLIENT_DATA -translation text -memcache
TZ=EST5EDT
```

Note: The **DFSCM envar** file example shown above reflects the contents of the file after the example **DFSCM envar** file has been copied from the **/opt/dfsglobal/examples** directory.

3. Stop and restart the **DFSCM**. For details on stopping **DFSCM**, see "Starting and Stopping the DFS Client (DFSCM)" on page 113.

DFSCM Disk Caching: The **DFSCM** disk cache resides on a local DCE Local File System aggregate that must be allocated and defined on the local OS/390 system. **DFSCM** disk caching does not require the running of any DFS servers on the OS/390 system on which **DFSCM** is running.

To configure an OS/390 system to run **DFSCM** with disk caching:

1. Update the parmlib member, **BPXPRM***xx*, to add the **FILESYSTYPE TYPE(DFSC)** entry. Refer to "DFSCM Memory Caching" on page 57 and to the *OS/390 DFS Administration Guide and Reference* for further information.
2. Update the local Hierarchical File System file, **/opt/dcelocal/etc/CacheInfo**, appropriately. Refer to "DFSCM Memory Caching" on page 57 and to the *OS/390 DFS Administration Guide and Reference* for further information.
3. Specify disk caching by adding the **-dcache** entry to the **DFSCM** initialization parameter, **_IOE_CM_PARMS** in the **/opt/dfslocal/home/dfscm/envar** file. (Note: **-dcache** is the default for **DFSCM** processing if **-memcache** is not specified.) Refer to the *OS/390 DFS Administration Guide and Reference* for further information.
4. Allocate and define a local DCE Local File System aggregate.

   The SIOESAMP library member **NEWAGGR** contains sample JCL and control statements that can be modified to allocate VSAM Linear Datasets and initialize a Logical Volume as a DCE Local File System aggregate.

   a. Modify the **/opt/dfslocal/var/dfs/devtab** file. The **devtab** file describes all the Linear Datasets that make up a Logical Volume. It consists of the names of the Linear Datasets that make up the Logical Volume.

      ```
      * Devtab - Example Entry for a logical volume
      define_lfs 999
      DFS.DCELFS.AGGR999.LDS00001
      DFS.DCELFS.AGGR999.LDS00002
      ```

      The previous example defined the device name **/dev/lsf999** that is specified as a PGM=IOENEWAG parameter in the JCL example in item 4c on page 60 that initializes a logical volume as a DCE Local File System aggregate.

   b. Use JCL similar to the following to allocate one or more VSAM Linear Datasets that will make up a Logical Volume. The Linear Datasets may reside on the same or different OS/390 disk volumes. The size of the Linear Datasets determines the size of the DCE Local File System. Refer to the SIOESAMP library member **NEWAGGR** for example JCL.

```
//DFSDEFIN JOB ,'DFS Define LDSs',
//         CLASS=A,MSGCLASS=X,MSGLEVEL=(1,1)
//*-------------------------------------------------------------------
//*
//*  Allocate a VSAM Linear Datasets for use as a Logical Volume
//*
//*-------------------------------------------------------------------
//DEFINE   EXEC   PGM=IDCAMS
//SYSPRINT DD     SYSOUT=*
//SYSUDUMP DD     SYSOUT=*
//AMSDUMP  DD     SYSOUT=*
//DASD0    DD     DISP=OLD,UNIT=3390,VOL=SER=PH2020
//DASD1    DD     DISP=OLD,UNIT=3390,VOL=SER=PH2021
//SYSIN    DD     *
  DEFINE CLUSTER (NAME(DFS.DCELFS.AGGR999.LDS00001) VOLUMES(PH2020) -
    LINEAR CYL( 50 0) SHAREOPTIONS(2) )
  DEFINE CLUSTER (NAME(DFS.DCELFS.AGGR999.LDS00002) VOLUMES(PH2021) -
    LINEAR CYL( 50 0) SHAREOPTIONS(2) )
//
```

c. Run JCL similar to the following to initialize the Logical Volume as a DCE Local File System aggregate. Refer to the *xxx*.SIOESAMP(NEWAGGR) library member (where *xxx* is installation dependent) for example JCL. To access the **devtab** file, the PGM=IOENEWAG must be run under **UID = 0** (**root**).

```
//DFSNEWAG JOB ,'DFS NewAggr',
//         CLASS=A,MSGCLASS=X,MSGLEVEL=(1,1)
//*-------------------------------------------------------------------
//*
//*  Format the Logical Volume as a DCE Local File System aggregate.
//*
//*  This version of newaggr also "loads" the VSAM linear data
//*  set(s) if they have not been previously loaded.
//*
//*  NOTES:
//*        - Note that the "/dev/lvm" *must* be lower case!
//*        - Note that the extra '/' is required because LE
//*          runtime parameters are separated from program
//*          parameters by a '/'.
//*
//*  The syntax of the newaggr command is as follows:
//*
//*  newaggr -aggregate name -blocksize bytes -fragsize bytes
//*        [-initialempty blocks] [-aggrsize blocks]
//*        [-logsize blocks] [-overwrite] [-verbose] [-noaction]
//*
//*-------------------------------------------------------------------
//NEWAGGR  EXEC   PGM=IOENEWAG,
// PARM=('//dev/lfs999 8192 1024 -verbose')
//*
//SYSPRINT  DD    SYSOUT=*
//SYSUDUMP  DD    SYSOUT=*
//*
```

Notes:

1) IBM recommends using a **-blocksize 8192** for optimum disk cache performance and storage utilization.
2) No updates to the **/opt/dfslocal/var/dfs/dfstab** file are required since the local DCE File System aggregate used for **DFSCM** disk caching is not exported. Also, **DFSCM** processing completes any initialization of the aggregate to be used for disk caching.

5. Stop and restart the **DFSCM**. For details on stopping the **DFSCM**, see "Starting and Stopping the DFS Client (DFSCM)" on page 113.

DFSCM User .profile File Considerations

To reduce overall processing overhead associated with the **DFSCM** support for the OS/390 DCE single sign-on function, it is recommended that users issue the following command after initializing OS/390 UNIX:

```
$ cd /...
```

This can be automated by updating the users **/home/***mvs_userid***/.profile** file. Edit the file, adding the following statements:

```
cd /...
cd users_home_directory
```

The first entry will change the directory to the DFS global namespace's pathname prefix, **/...**. The second entry changes the directory to the user's home directory.

Enabling DFSCM to Use DCE Single Sign-on

OS/390 DFS supports OS/390 DCE's single sign-on function. To enable DCE single sign-on processing for a user accessing the DFS global namespace, **/...**, a Resource Access Control Facility (RACF) segment must first be created. If there are currently no DCE credentials (or they have expired) when the DFS client is invoked, then the DFS client does one of the following:

- Attempts a DFS single sign-on, or
- Sends the file request as an unauthenticated request.

Note: Although RACF is mentioned, any OS/390 external security manager (ESM) that has equivalent support can be used instead of RACF.

For detailed information regarding the DFS client usage of the DCE single sign-on function, see the *OS/390 DFS Administration Guide and Reference*.

For user **.profile** file considerations related to DCE single sign-on function, see "DFSCM User .profile File Considerations."

DFSCM Environment Variable Considerations

To complete the **DFSCM** configuration, you can optionally customize the **DFSCM** envar file as described in Appendix B, "OS/390 DFS Directories and Files" on page 129.

Customizing the ioepdcf File

On OS/390 DFS, the DFS Server **ioepdcf** file contains information for each server process you can run in DFS. This file can be customized to meet your needs. The **ioepdcf** file must be located in the following directory: **/opt/dfslocal/etc**. An example **ioepdcf** file can be found in **/opt/dfsglobal/examples**.

If you are installing OS/390 DFS for the first time, you can copy the example file to the **/opt/dfslocal/etc** directory and customize the file. The shell script, **/opt/dfsglobal/scripts/dfs_cpfiles**, automates this procedure (see “Using dfs_cpfiles to Create Default DFS Configuration Files” on page 25 for further information).

If you have previously installed an earlier version of OS/390 DFS, you will normally be able to maintain your customization by using your existing **ioepdcf** file stored in **/opt/dfslocal/etc**.

The following describes how to customize the **ioepdcf** file for your system.

1. Determine what OS/390 DFS processes you want to run.

   All processes running under the control of the Control Task program, **DFSCNTL**, are valid process names that can be specified in the **ioepdcf** file. These processes are:

   - **dfskern**
   - **export**
   - **unexport**
   - **boserver**
   - **butc***nn*. Valid entries for *nn* are 01 through 08.

2. Specify a configuration type for each process you have selected.

   Each process identified in the **ioepdcf** file, must specify a configuration type. There are four valid types available:

Configuration Type	Explanation
CONFIGURED=Y	The specified process will start during DFS initialization. Should the process abend or end for any reason, it will automatically be restarted by the DFS Control Process. **Note:** This configuration type is not supported with the **butc** processes.
CONFIGURED=N	The process will not be started by the DFS Control Process. The process cannot be started manually.
CONFIGURED=I	The specified process will be started during DFS initialization **or** when the OS/390 Operator command **modify dfs,start all** is issued. The process may also be started manually. The specified process is **not** restarted when it is terminated. **Note:** This configuration type is not supported with the **butc** processes.
CONFIGURED=M	The process will not be started by the DFS Control Process but can be manually started by an OS/390 system **modify** command to DFS. The specified process will not restart if it ends for any reason. Always use CONFIGURED=M for **butc***nn* processes.

3. Identify the name of the load module (**LMD**) which corresponds to the name of the member in the SIOELMOD data set in the OS/390 partitioned data set (PDS) load library. The SIOELMOD data set was created during installation.

Each process entry in the **ioepdcf** file must contain the name of the **LMD** which refers to the name of the member in the SIOELMOD data set in the OS/390 partitioned data set (PDS) load library. For further information, refer to the *OS/390 Program Directory*.

The following are the PDS member names for the DFS processes started by the DFS Control Task:

boserver The **boserver** daemon load module name. The name, **boserver**, is an alias for the load library entry, **IOEBOSRV**.

butc*nn* The **butc***nn* daemon load module name. There are eight valid load module names for the butc processes: **butc01**, **butc02**, **butc03**, **butc04**, **butc05**, **butc06**, **butc07**, and **butc08**. All are valid aliases for the single load module used for all **butc***nn* processes- **IOEBUTC**. Always use CONFIGURED=M for **butc***nn* processes. The **butc***nn* processes require **bakserver** to be running to complete configuration.

dfskern The **dfskern** daemon load module name. The name, **dfskern**, is an alias for the load library entry, **IOEDFSKN**.

export The **export** process is started by the DFS Control Task and executes the load library entry, **IOEDFSXP**. The **export** process has no alias.

4. Include any special parameters to be passed to the **LMD** when a process is started.

   Each process entry in the **ioepdcf** file includes special parameters that will be passed to the load module when a daemon is started (including Language Environment/370 (LE/370) runtime options). This is also called the argument list. Any runtime overrides such as storage specifications and redirection of output may also be added. The first argument is the home directory for each process. The home directory points the process to the directory holding the environment variable (**envar**) file for the process. Program parameters for the DFS process are preceded with a slash, **/**, in the argument list.

5. Include any special parameters for controlling restart and timeout intervals for your system.

   Additional special parameters that control restart and timeout intervals may also be entered in the **ioepdcf** file. The **ioepdcf** file can also be used to override the default parameter options for the **file exporter** (**fxd**) daemon. Changes are specified in the **dfskern** process entry. For further information on the **ioepdcf** file, see the *OS/390 DFS Administration Guide and Reference*.

The following example shows an **ioepdcf** file entry for the **dfskern** process. The configuration type is **Y**, specifying that the process start during DFS initialization. The load module, **LMD**, is identified as **DFSKERN**. In the argument list, **ARG**, **ENVAR** indicates the environment variables to be used. In the example, the home directory is identified as **_EUV_HOME=/opt/dfslocal/home/dfskern**. An LE/370 runtime option is specified: **RPSTG(OFF)**. Parameters for the **fxd** program follow the **/**. The > symbol is a redirection character which indicates that the output will be redirected to the data definition name (ddname) that follows, DFSKERN. The **2>&1** entry redirects **STDERR** to the same destination as **STDOUT**, DFSKERN. **RESTART** and **TIMEOUT** values are both set at 300 seconds. The **RESTART** parameter specifies how long the process must be down before DFS control will attempt to restart it. The **TIMEOUT** parameter specifies how long DFS control will wait for the process before it times out.

```
DFSKERN CONFIGURED=Y LMD=DFSKERN \
   ARG="ENVAR('_EUV_HOME=/opt/dfslocal/home/dfskern'),RPSTG(OFF)/ \
   -mainprocs 7 -admingroup subsys/dce/dfs-admin \
   >DD:DFSKERN 2>&1" RESTART=300 TIMEOUT=300
```

Note: The **-admingroup** parameter is required for the file exporter daemon (**fxd**).

Customization of the DFS Server and the DFSCM envar Files

This chapter provides information on the following topics:

Customizing the DFS Server envar Files

Before OS/390 DFS can be initialized, each DFS process that you choose to start must have a corresponding **envar** file created. On OS/390 DFS, the **envar** file for each server process includes information that affects the behavior of the process. The variables for each **envar** may be customized. Setting or changing these variables is optional. Default values are provided if you choose not to set them.

To function properly, the files **must** be stored in the appropriate directories. The following table shows the correct directory for each processes' **envar** file, and the name of the example **envar** supplied in the **/opt/dfsglobal/examples** directory.

Table 1. Directory Locations for envar Files on OS/390 DFS

OS/390 DFS Process	Directory Where Located in /opt/dfslocal	IBM-Supplied example envar in /opt/dfsglobal/examples
bakserver	**home/bakserver/envar**	**bakserver.envar**
boserver	**home/boserver/envar**	**boserver.envar**
butc*01*	**home/butc01/envar**	**butc01.envar**
butc*02*	**home/butc02/envar**	**butc02.envar**
butc*03*	**home/butc03/envar**	**butc03.envar**
butc*04*	**home/butc04/envar**	**butc04.envar**
butc*05*	**home/butc05/envar**	**butc05.envar**
butc*06*	**home/butc06/envar**	**butc06.envar**
butc*07*	**home/butc07/envar**	**butc07.envar**
butc*08*	**home/butc08/envar**	**butc08.envar**
daemonct	**home/daemonct/envar**	**daemonct.envar**
dfscm	**home/dfscm/envar**	**dfscm.envar**
dfscntl	**home/dfscntl/envar**	**dfscntl.envar**
dfsexport	**home/dfsexport/envar**	**dfsexport.envar**
dfskern	**home/dfskern/envar**	**dfskern.envar**
flserver	**home/flserver/envar**	**flserver.envar**
ftserver	**home/ftserver/envar**	**ftserver.envar**
growaggr	**home/growaggr/envar**	**growaggr.envar**
newaggr	**home/newaggr/envar**	**newaggr.envar**
repserver	**home/repserver/envar**	**repserver.envar**
salvage	**home/salvage/envar**	**salvage.envar**
upclient	**home/upclient/envar**	**upclient.envar**
upserver	**home/upserver/envar**	**upserver.envar**

If you are installing OS/390 DFS for the first time, the **envar** files for each process you choose to run must be copied from **/opt/dfsglobal/examples** to the appropriate directory identified in the previous table. An OS/390 shell script provided with OS/390 DFS, **dfs_cpfiles**, automates the process of copying the IBM-supplied **ioepdcf** and **envar** files from the **/opt/dfsglobal/examples** directories to the appropriate locations if they do not already exist from a previous installation of OS/390 DFS. **dfs_cpfiles** is located in the directory **/opt/dfsglobal/scripts**. For further information on this utility, see "Using dfs_cpfiles to Create Default DFS Configuration Files" on page 25.

If you have previously installed an earlier version of OS/390 DFS, you will normally be able to use your existing **envar** files without additional action. You can also take advantage of additional processes when you install the release, by copying the example **envars** from **/opt/dfsglobal/examples** to the respective directories, **/opt/dfslocal/home/bakserver/envar** or **/opt/dfslocal/home/flserver/envar**. The OS/390 DFS Default Configuration Files Creation Program **/opt/dfsglobal/scripts/dfs_cpfiles** can also be used to automate this process (for further information on this utility, see "Using dfs_cpfiles to Create Default DFS Configuration Files" on page 25).

The following example shows how to customize the settings for the **dfskern** process. This variable sets the number of threads to be started in **dfskern** to service token requests from the glue layer. The number of threads may be set to any number, *n*. The default is **5**.

_IOE_TKMGLUE_SERVER_THREADS=*n*

Note: Appendix C, "Environment Variables in DFS" on page 135 provides a description of all environment variables relevant to DFS administration. The appendix provides default values, examples, and descriptions of the environment variables. See the *OS/390 DFS Administration Guide and Reference*, for further information on setting environment variables.

Customizing the DFSCM envar File

When initialized by OMVS, the DFS client (**DFSCM**) reads the environment variable, **envar**, file specified as the **_EUV_HOME** variable value in the system parmlib member **BPXPRM***xx* **FILESYSTYPE TYPE(DFSC)** entry. An **_EUV_HOME** variable value must be specified in the **BPXPRM***xx* entry for the **DFSCM**. The use of the file, **/opt/dfslocal/home/dfscm/envar**, is recommended for the **DFSCM**. See the *OS/390 DFS Administration Guide and Reference*, for more information.

The DCE and DFS environment variables key to the DFS client include:

- **_EUV_AUTOLOG**
- **_EUV_SVC_MSG_LOGGING**
- **_IOE_CM_PARMS**.

See Appendix C, "Environment Variables in DFS" on page 135, for a more comprehensive listing of the environment variables used in OS/390 DFS.

Chapter 8. Defining DFS Administrators and Users

A ***DFS administrator*** refers to an OS/390 user ID used to issue DFS administrator requests to a DFS server running on the same DCE host system or another DCE host system in the DCE cell. A ***DFS user*** refers to an OS/390 user ID used to issue file requests that access the DFS namespace. The file requests are routed through the DFS Client to the appropriate DFS server.

All DFS administrators and users must be authenticated and authorized by the DCE Security Service to be able to access the DFS servers. The DCE administrator has to create a DCE account for each DFS administrator and user.

Also, a DFS administrative list file must be created and updated for each DFS server process run on a DCE host system.

If DFS administrators and users also need access to HFS or RFS filesets exported by DFS servers, a relationship (a **mapping**) must be established between their DCE user IDs and their OS/390 user IDs on the host system where DFS servers are running and exporting the HFS or RFS filesets.

This chapter discusses the following topics related to defining DCE administrator and user accounts for DFS. This information should be performed in the order that appears.

Creating DCE User Accounts for DFS Administrators and Users

The DCE administrator (also known as the cell administrator) must add the DCE user account for the DFS administrator and users to the Security registry using the DCE administrative interface, **dcecp**.

The procedures for creating a DCE account described here assume that the principal, group, and organization have not been created prior to the creation of the account. Skip the relevant steps if the principal, group, and organization have previously been created for the user.

To create a DCE account, follow these steps:

1. Invoke the DCE administrative interface

=> **dcecp**

2. Use the **principal** subcommand to add the principal for the user. For example, if the user is named **smith**:

   ```
   dcecp> principal create smith
   ```

   This assigns a default UNIX number, full name, and object creation quota. If you want to enter values other than the defaults, see the *OS/390 DCE Administration Guide* for details.

3. Add the group (or groups) to which the user belongs. This step must only be performed if the group (or groups) have not been previously added to the registry. For example, if the name of the group is **usergrp**:

   ```
   dcecp> group create usergrp -inprojlist yes
   ```

   This assigns a default UNIX number, full name, and includes the group, **usergrp**, in the project list. If you want to enter values other than the defaults, see the *OS/390 DCE Administration Guide* for details.

4. Add the principal to the group. For example, to add the principal, **smith**, to the group, **usergrp**:

   ```
   dcecp> group add usergrp -member smith
   ```

5. Add the organization to which the user belongs. This step must only be performed if the organization has not previously been created in the registry. For example, to add the organization, **ibm**:

   ```
   dcecp> organization create ibm
   ```

   The above assigns a default UNIX number and full name. If you want to enter values other than the defaults, see the *OS/390 DCE Administration Guide* for details.

6. Add the principal to the organization. For example, to add the principal, **smith**, to the organization, **ibm**:

   ```
   dcecp> organization add ibm -member smith
   ```

7. Add the account for the user. For example, to add the account for a user whose principal is **smith**:

   ```
   dcecp> account create smith -group usergrp -organization ibm \
               -password xxx -mypwd dce_principal_password
   ```

   Note: In the above example, a user's password, *xxx*, associated with the newly created account and the administrator's password, *dce_principal_password*, must be supplied.

After creating the DCE user account for a DFS administrator, the applicable DFS administrative lists must be updated as described in “Defining a DFS Administrator.”

Additionally, if the DFS administrators and/or users need access to HFS and RFS filesets exported by DFS servers, their DCE user IDs must be mapped to their OS/390 user IDs on the host system for the DFS servers. This procedure is described in “Mapping OS/390 User IDs for HFS and RFS Access” on page 76.

Defining a DFS Administrator

Before an administrator is added to DFS, the principal has to be authenticated and authorized by the DCE Security Service to be able to perform administrative tasks. A DCE account has to be created by the DCE administrator for the DFS administrator. Creating an account for the DFS administrator follows the same procedure as creating an account for a DFS user. For detailed information regarding this procedure, see “Creating DCE User Accounts for DFS Administrators and Users” on page 67.

Note: The DCE **cell_admin** user ID inherits no special DFS authorization. The user ID **cell_admin** has to be explicitly specified in a DFS administrative list file.

In DFS, administrative lists are used to define the principals and groups that can perform actions affecting specific server processes on a server machine. There is one DFS administrative list for each DFS server process running on a machine. For example, a server's **admin.bos** file defines who has administrative rights to the BOS Server (**boserver**) and determines the users and servers that can manipulate and maintain server processes on that server.

Because administrative lists exist on a per-process and per-machine basis, different groups of principals can have different sets of administrative privileges within a domain. It is often useful to have the same group or user on several lists.

The following sections contain topics related to defining a DFS administrator:

System Control Machines and Domains

A group of DCE host machines in a DCE cell where DFS server processes run is called a ***domain***. There is a System Control Machine for each domain. The **upserver** process runs on the System Control Machine. The administrative list file, for each DFS server process run on any DCE host machine in the domain, is kept up to date and synchronized on each DCE host machine by the interaction of the Update Client (**upclient**) or the Update Server (**upserver**) processes running on the DCE host machines in the domain. Refer to *OS/390 DFS Administration Guide and Reference* for more information on System Control machines and domains.

Administrative list files should be updated on the DCE cell's System Control machine where the Update Server (**upserver**) is running. The **upserver** then propagates administrative list file changes to the secondary sites where an Update Client (**upclient**) is running. If an administrative file is updated on a DCE host machine where an **upclient** is running and the updates are not also made on the system where the **upserver** is running, the updates are overlaid on the **upclient** system if the **upserver** is acting as a system control machine for that file.

DFS Administrator Considerations for a DCE Cell

It is recommended that you add the same DFS administrator principals or groups to all the administrative list files in the DCE cell. This allows these DFS administrators to issue requests to any DCE host system in the DCE cell where DFS is running.

DFS Server Principal Considerations for a DCE Cell

When adding a new system with DCE host name *dcehostname* to a DCE cell, the abbreviated DFS server principal **hosts/***dcehostname* for the new DCE host system should be added to the **/opt/dcelocal/var/dfs/admin.fl**, **/opt/dcelocal/var/dfs/admin.ft**, and **/opt/dcelocal/var/dfs/admin.bak** files on the other systems in the DCE cell where DFS is configured. This should be done even if the related DFS server is not being run on a DCE host system at this time. Updating the DFS administrative file on the system where the **upserver** is running enables the update to be propagated to other systems in the DCE cell running an **upclient**. Refer to the following sections for information on how to update these administrative files with the abbreviated DFS server principal:

- “Completing the Backup Database Server (bakserver) Configuration” on page 51.

Description of DFS Administrative List Files

In DFS, administrative lists are used to define the principals and groups that can perform actions affecting specific server processes on a server machine. There is one DFS administrative list for each DFS server process running on a machine. For example, a server's **admin.bos** file defines who has administrative rights to the BOS Server (**boserver**) and determines the servers and/or users that can manipulate and maintain server processes on a host system.

Administrative lists exist on a per-process and per-machine basis so different groups of principals can have different sets of administrative privileges within a domain. But, it is often useful to have the same group or user on several DFS administrative lists.

DFS **bos** commands are used to maintain the administrative list files. Refer to the *OS/390 DFS Administration Guide and Reference* for more information on the DFS **bos** commands.

The default directory for the administrative lists is the configuration directory (**/opt/dcelocal/var/dfs**). If the lists are stored in the default directory, you need to provide only the specific file name (for example: **admin.bak**, **admin.bos**, **admin.fl**, **admin.ft**, or **admin.up**) in the DFS **bos** commands.

The DFS administrative list files are :

- The **admin.bak** file is associated with the Backup Server (**bkserver**). It designates the users and groups allowed to issue commands in the **bak** command suite. These commands are used to configure the Backup System and to dump and restore data. The Backup Database, like the FLDB, is typically replicated to several different machines in the cell. Therefore, you need to ensure that the **admin.bak** lists on all machines that house the Backup Database are identical.
- The **admin.bos** file is associated with the BOS Server (**boserver**). It designates the users and groups permitted to create, start, and stop DFS server processes and other processes to be controlled by the BOS Server on a machine. The BOS Server runs as **root**, so processes that it starts run with **root** privileges. Because they can direct the BOS Server to start any process, and because they can add and remove members from the other administrative lists on the machine, users in the **admin.bos** list are usually a subset of the users in the other lists for a machine or domain.
- The **admin.fl** file is associated with the Fileset Location Database Server (**flserver**). It designates the users and groups permitted to create server entries and fileset entries in the Fileset Location Database (FLDB). Because the FLDB is usually replicated to several different machines in the cell, you need to ensure that the **admin.fl** lists on all machines housing the FLDB are identical. Otherwise, an administrator may be able to execute a command from one machine but not from another. To simplify management, it is best that the server principal names of all server machines in the domain be represented in the **admin.fl** list on the System Control machine so that the list is distributed to all File Server machines in the domain. (The server principals can be included directly, or a group to which they belong can be included.)
- The **admin.ft** file is associated with the Fileset Server (**ftserver**). It designates the users and groups permitted to administer filesets on a machine. Because some fileset operations (such as moving filesets) affect multiple machines, the server principal names of the machines involved in the operations must also be in this administrative list. To simplify management, it is best that the server principal names of all server machines in the domain be represented in the **admin.ft** list on the System Control machine so that the list is distributed to all File Server machines in the domain. (The server principals can be included directly, or a group to which they belong can be included.)
- The **admin.up** file is associated with the Update Server (**upserver**). It contains the server principals for all server machines in the domain, allowing the **upclient** processes on those machines to obtain

files such administrative lists from the **upserver** process. The list should be stored on machines such as the System Control machine which runs the **upserver** process.

Administrative lists for server processes are created in one of two ways:

1. When a server is started and a list does not already exist. By default, a server process automatically creates an administrative list and places its list in the configuration directory (**/opt/dcelocal/var/dfs**). An administrative list generated by a process is always empty.

   The BOS server **admin.bos** administrative list file is created before any other administrative list file using this method. Refer to "Creating the admin.bos File" on page 73 for a description of how to establish the **admin.bos** administrative list.

2. Administrative lists other than the **admin.bos** list are created by issuing the **bos addadmin** command with the **-createlist** option. Refer to "Adding Principals and Groups to Administrative Lists" on page 73 for a description of how to create an administrative list file using the **bos addadmin** command.

Refer to the *OS/390 DFS Administration Guide and Reference* for more information on **bos** commands and the DFS administrative list files.

Creating the Initial DFS Administrator(s)

During the initial installation of DFS on a host system, an empty **admin.bos** file is created when **boserver** is first started if the file does not exist. Consequently, there may be no **admin.bos** file entries that define a DFS administrators.

The **boserver** authorization checking must be disabled to allow the initial DFS administrators to be defined. When the **boserver** is running, creating the **/opt/dcelocal/var/dfs/NoAuth** file temporarily disables **boserver** authorization.

The initial DFS administrators can be defined by:

1. Logging in as **root**.

   Creating the file directly requires logging into the OS/390 system with a **root** userid with **UID = 0**.

2. Creating the **NoAuth** file to disable **boserver** authorization checking by issuing the command:

   ```
   touch /opt/dcelocal/var/dfs/NoAuth
   ```

   The **NoAuth** file must be created in the directory **/opt/dcelocal/var/dfs**. The file is always deleted when the **boserver** is re-started. Additionally, the **NoAuth** file is created by the **bos setauth /.:/hosts/***dcehostname* **off** command and deleted by the **bos setauth /.:/hosts/***dcehostname* **on** command.

3. The **bos status /.:/hosts/***dcehostname* can be issued to determine in **boserver** authorization is disabled. Note that the **bos status** command reports if authorization is disabled but the command output does not explicitly report if authorization is enabled.

   An example of the **bos status** command issued for the **boserver** running on a system with DCE host name *dcehostname* is :

   ```
   $ bos status /.:/hosts/dcehostname
   ```

4. Define the initial DFS administrators while DFS authorization is disabled.

   During the initial setup the initial setup of DFS on an OS/390 DCE host system, you should initially add a user and a group with DCE **cell_admin** authority to the **/opt/dfslocal/var/dfs/admin.bos** file which was created when the **boserver** was first started. Note that if DFS was previously configured

on the DCE host system, DFS administrators may still be defined in the various DFS administrator list files including the **bos admin** file.

Before any principal or group can be added to a DFS administrative list file, the DCE principal and group must be defined as described in “Creating DCE User Accounts for DFS Administrators and Users” on page 67.

The DFS configuration examples assumes that the userid **cell_admin** was previously defined during DCE configuration and that the group **dfsteam** was defined by the command:

```
$ dcecp -c group create dfsteam -inprojlist yes
```

The following command is an example of how to add the userid **cell_admin** and the group **dfsteam** to the **admin.bos** file on a system with DCE host name *dcehostname*:

```
$ bos addadmin -server /.:/hosts/dcehostname \
               -adminlist admin.bos -principal cell_admin -group dfsteam \
               -createlist
```

Later you are instructed when to add additional administrators and update the DFS administrative list files on the DCE host system where the **upserver** is running.

5. Enable boserver DFS authorization checking on a system with DCE host name *dcehostname* using the command:

   ```
   $ bos setauth /.:/hosts/dcehostname on
   ```

   After enabling DFS authorization checking using the **bos setauth** command, **boserver** DFS authorization checking can be enabled and disabled while the **DFS** is running using the **bos setauth** on command or creating the **NoAuth** file. Note that DFS authorization checking is re-enabled each time the **boserver** is restarted.

6. Insure that **boserver** authorization checking is enabled on a system with DCE host name *dcehostname* using the command:

   ```
   $ bos status /.:/hosts/dcehostname
   ```

The **NoAuth** file should subsequently be created and deleted using the **bos setauth** command. For detailed information on the **bos** commands, see the *OS/390 DFS Administration Guide and Reference*.

After adding DFS administrators to the **admin.bos** file and enabling **boserver** DFS authorization checking, a DFS administrator can make additional updates to the **admin.bos** administrative list file using the same method employed for the other administrative list files. Refer to “Adding Principals and Groups to Administrative Lists” on page 73 for details on creating and updating the DFS administrative list files after initially establishing the **admin.bos** list.

Disable/Enable DFS Authorization (NoAuth File)

During the initial installation of DFS on a host system, an empty **/opt/dfslocal/var/dfs/admin.bos** file is created when the **boserver** is first started if the file does not exist. Additionally, each time the **boserver** is started, DFS authorization is enabled.

Before DFS administrators are defined, you can not issue a **bos setauth off** command to disable DFS authorization nor can you update the **admin.bos** file to define DFS administrators using the **bos addadmin** command. So, after the **boserver** is first started, you can disable DFS authorization by creating the **/opt/dcelocal/var/dfs/NoAuth** as described in “Creating the Initial DFS Administrator(s)” on page 71

After initial DFS administrators are defined, the **bos setauth** can be used to disable and enable DFS authorization.

The **/opt/dcelocal/var/dfs/NoAuth** file is created as described in "Creating the Initial DFS Administrator(s)" on page 71 or when a **bos setauth off** command is successful. The **/opt/dcelocal/var/dfs/NoAuth** file is deleted each time the **boserver** is started or when a **bos setauth on** command is successful.

Creating the admin.bos File

Starting the BOS Server **boserver** for the first time on a DCE host system creates an empty **/opt/dfslocal/var/dfs/admin.bos** file if the file does not exist. But, the **admin.bos** file can not be updated to define the DFS administrators unless DFS authorization is disabled. During the initial configuration of DFS, you should follow the instructions described in "Creating the Initial DFS Administrator(s)" on page 71.

Adding Principals and Groups to Administrative Lists

After the **admin.bos** file is created and updated to establish initial DFS administrators as described in "Creating the admin.bos File," you can create the other administrative list files and add administrators or groups to them by:

1. Logging into DCE as a DFS administrator.

   The DFS administrator must be included in the **admin.bos** list on the machine on which the administrative list to be affected is located.

2. Verify that you have the necessary privilege to issue the command. You must be included in the **admin.bos** list on the machine on which the administrative list to be affected is located. If necessary, issue the **bos lsadmin** command to check the **admin.bos** list.

   For example, the following command lists the members of the **admin.bos** file on the DCE host name of **fs1** in the DCE cell name of **abc.com**. The administrative list contains two users, a server machine, and two groups, all of which are from the local cell.

   ```
   $ bos lsadmin -server /.../abc.com/hosts/fs1 -adminlist admin.bos

   Admin Users are: user: jones, user: smith,
   user: hosts/fs1/self, group: dfs-admin, group: fs1-admin
   ```

   For detailed information, see the *OS/390 DFS Administration Guide and Reference*.

3. Issue the **bos addadmin** command to create an administrative list file if it does not exist and add principals, groups, or both to the administrative list:

   $ **bos addadmin -server** *machine* **-adminlist** *filename* [**-principal** *name*...] [**-group** *name*...] [**-createlist**]

   - The **-server** *machine* option identifies the DCE host machine where the administrative list file should be updated. Note that there is an **upclient** running on this DCE host machine, and the **upserver** is running on a different DCE host machine, you should update the administrative list file on the DCE host machine where the **upserver** is running. Refer to "System Control Machines and Domains" on page 69 for more information.
   - The **-adminlist** *filename* option specifies the name of the administrative list to which principals and groups are to be added. The default directory for the administrative lists is the configuration directory (**/opt/dcelocal/var/dfs**). If the lists are stored in the default directory, you need to provide only the specific file name (**admin.fl**, **admin.ft**, **admin.up**, **admin.bos**, or **admin.bak**). If the lists are stored elsewhere, you must enter the path name that was used when the specific process was started.
   - The **-principal** *name* option specifies the principal name of each user or server machine to be added to the list. A user from the local cell can be specified by a full or abbreviated principal

name (for example, **/.../***cellname/username* or just *username*); a user from a foreign cell can be specified only by a full principal name. A server machine from the local cell can be specified by a full or abbreviated principal name (for example, **/.../***cellname***/hosts/***hostname***/self** or just **hosts/***hostname***/self**); a server machine from a foreign cell can be specified only by a full principal name.

- The **-group** *name* option specifies the name of each group to be added to the list. A group from the local cell can be specified by a full or abbreviated group name (for example, **/.../***cellname/group_name* or just *group_name*); a group from a foreign cell can be specified only by a full group name.
- The **-createlist** option specifies that the administrative list indicated with **-adminlist** is to be created if it does not already exist. Any principals or groups specified with the command are added to the new file; if no principals or groups are specified, the command creates an empty file. This option has no effect if the specified file already exists.

Example of Updating the admin.bos File

Before you are able to issue any **bos** commands, the **/opt/dfslocal/var/dfs/admin.bos** file must be created and updated to include the user principals and groups that have the authority to issue these commands.

If you are initially configuring DFS, the **admin.bos** file is created earlier during the initial configuration process. But, if it does not exist, see “Creating the admin.bos File” on page 73.

The following command is an example of adding the user **cell_admin** and the group **dfsteam** to the **admin.bos** file on a system with the DCE host name of *dcehostname*:

```
$ bos addadmin -server /.:/hosts/dcehostname -adminlist admin.bos \
               -principal cell_admin -group dfsteam -createlist
```

Example of Updating the admin.fl File

Before you are able to issue any commands that update the Fileset Location Database (FLDB), you must create the **/opt/dfslocal/var/dfs/admin.fl** file and update it to include the user principals, groups and other DFS server machine principals that have the authority to issue these commands or communicate with the **flsever** on the host system where DFS is being configured.

The following command is an example of adding the user **cell_admin**, the abbreviated server principal for the system with a DCE host name of *dcehostname* and the group **dfsteam** to the **admin.fl** file on the system with a DCE host name of *dcehostname*:

```
$ bos addadmin -server /.:/hosts/dcehostname -adminlist admin.fl \
               -principal cell_admin hosts/dcehostname/dfs-server \
               -group dfsteam -createlist
```

Note that the abbreviated server principals for all the systems in the DCE cell where DFS is running should be added to the **admin.fl** file on each system in the DCE cell where an **flserver** is running.

Example of Updating the admin.ft File

Before you are able to issue any **fts** commands, you must create the **/opt/dfslocal/var/dfs/admin.ft** file and update it to include the user principals and groups that have the authority to issue these commands.

The following command is an example of adding the user **cell_admin**, the abbreviated server principal for the system with a DCE host name of *dcehostname* and the group **dfsteam** to the **admin.ft** file on the system with a DCE host name of *dcehostname*:

```
$ bos addadmin -server /.:/hosts/dcehostname -adminlist admin.ft \
               -principal cell_admin hosts/dcehostname/dfs-server \
               -group dfsteam -createlist
```

Note that the abbreviated server principals for all the systems in the DCE cell where DFS is running should be added to the **admin.ft** file on each system in the DCE cell where an **ftserver** is running.

Example of Updating the admin.bak File

Before you are able to issue any **bak** commands, you must create the **/opt/dfslocal/var/dfs/admin.bak** file and update it to include the user principals, groups, and DFS server machine principals that have the authority to issue these commands or communicate with the **baksever** on the host system where DFS is being configured.

The following command is an example of adding the user **cell_admin**, the abbreviated server principal for the system with a DCE host name of *dcehostname* and the group **dfsteam** to the **admin.bak** file on the system with a DCE host name of *dcehostname*:

```
$ bos addadmin -server /.:/hosts/dcehostname -adminlist admin.bak
               -principal cell_admin hosts/dcehostname/dfs-server \
               -group dfsteam -createlist
```

Note that the abbreviated server principals for all the systems in the DCE cell where DFS is running should be added to the **admin.bak** file on each system in the DCE cell where a **bakserver** or **butc** server is running.

Example of Updating the admin.up File

Before you are able to run an **upserver** on a host system, you must create the **/opt/dfslocal/var/dfs/admin.up** file and update it to include the DFS server principal for each **upclient** server or machine that can obtain information from the **upserver**.

The **upclient** and **upserver** relationship defines a domain. The system where the **upserver** runs is the System Control machine for the domain.

The following command is an example of adding the the DFS server principal for an **upclient** on a system with the DCE host name of *dcehostname2* to the **admin.up** file on the system with the DCE host name of *dcehostname*, where the **upserver** is being configured:

```
$ bos addadmin -server /.:/hosts/dcehostname -adminlist admin.up \
               -principal hosts/dcehostname2/dfs-server
```

Mapping OS/390 User IDs for HFS and RFS Access

For authorized HFS and RFS access on the host system for the DFS servers, DFS administrators and users must be registered with the OS/390 security subsystem on the host system for the DFS servers. There must also be a defined relationship (a **mapping**) between their DCE user IDs and their OS/390 user IDs.

Included in this and the following sections are topics related to setting up DFS administrator and user access to HFS and RFS filesets which include:

- "Registering Users With the OS/390 Security Subsystem"
- "Mapping DCE User IDs to OS/390 User IDs"
- "Using the Identity Mapping File Method" on page 77
- "Using the RACF Identity Mapping Function" on page 81
- "DFS Anonymous User Considerations" on page 82.

Note: Although RACF is discussed in the following sections, any OS/390 external security manager (ESM) that has equivalent support can be used instead of RACF.

Registering Users With the OS/390 Security Subsystem

Clients of DFS may access HFS or RFS filesets exported by OS/390 DFS servers. Access to these resources is controlled by the local OS/390 security subsystem (for example, RACF). Thus, all users of the DFS must be registered with the specific security subsystem on the OS/390 host where DFS servers are running and exporting HFS or RFS filesets. Refer to the documentation provided by the Security software on your host for information on registering users on the local security subsystem.

Mapping DCE User IDs to OS/390 User IDs

The DFS server enables DFS clients to access non-DCE Local File System filesets.

The local security subsystem determines if the client is authorized to use the resource. Because the local security subsystem is not integrated with the DCE Security service, the local security subsystem cannot recognize DCE user IDs.

The administrator has to establish a relationship (that is, a **mapping**) between a user's DCE user ID and OS/390 user ID. This section describes methods that OS/390 DFS may use to map DCE user IDs to OS/390 user IDs. The methods are:

1. Mapping the DCE user IDs to the local OS/390 user IDs using the **mapid** utility.

   Note: The mapping procedure in OS/390 DFS is identical with that used for OS/390 DCE Application Support.

   Refer to "Using the Identity Mapping File Method" on page 77 for details.

2. Mapping the DCE user IDs to the local OS/390 user IDs using the identity mapping function of the external security manager (ESM) in use on the host system.

   Note: Although RACF is discussed in this chapter, any OS/390 external security manager (ESM) that has equivalent support can be used instead of RACF.

   Refer to "Using the RACF Identity Mapping Function" on page 81 for details.

3. Optionally establishing a default user ID for unauthenticated access to HFS and RFS filesets.

   Refer to "DFS Anonymous User Considerations" on page 82 for details.

Note: In some cases, the DFS client request is denied if the DFS server cannot determine a mapping to an OS/390 user ID. For example, if the user is unauthenticated or not mapped or mapped but not in RACF and if **_IOE_MVS_DFSDFLT** is not specified or the **_IOE_MVS_DFSDFLT** user ID is not in RACF the mapping function denies the request.

Refer to Appendix C, "Environment Variables in DFS" on page 135 for a description of **_IOE_MVS_DFSDFLT**.

Using the Identity Mapping File Method

To use the Mapping Identity File method to map the DCE user ID to the OS/390 user ID, follow the procedures that are described in:

1. "Creating the Identity Mapping Input File"
2. "Creating the Identity Mapping File" on page 79
3. "Setting the _IOE_MVS_IDMAP Environment Variable" on page 80
4. "Ensuring the _IOE_MVS_IDMAP_SAF Environment Variable Is Set NO" on page 80
5. "Modifying and Deleting Identity Mapping Entries" on page 80
6. "Allowing Foreign Users Access to the DFS Server" on page 80
7. "Authorizing Access to the Identity Mapping File" on page 81.

Creating the Identity Mapping Input File

The Identity Mapping input file is a text file that the administrator creates and maintains. This must be created as an HFS file.

Note: The DFS server administrator must also map his DCE user ID to his OS/390 user ID.

The Identity Mapping input file contains one or more identity mapping declarations and has the following general format:

DCE-user-ID1
OS/390-user-ID1
DFS-server-name
DCE-user-ID2
OS/390-user-ID2
...

This format illustrates the two types of entries that can exist on the Identity Mapping input file. The first entry has three elements: DCE user ID, OS/390 user ID, and DFS server name. The second entry only has two elements: DCE user ID and OS/390 user ID. These are explained later in this chapter. A blank line is required between entries. The following list explains each element in an identity mapping entry:

DCE-user-ID Is the client's DFS identity. This may either be a simple DCE principal name (for clients within the cell) or a fully qualified global name (for clients within and outside the cell). The DCE user ID can be up to 256 characters in length.

OS/390-user-ID Is the OS/390 user ID of the client. All potential DFS server clients must have user IDs on the OS/390 host where the DFS server is running.

DFS-server-name Is the name of the CDS object that represents a specific DFS server. This is optional. If the mapping entry includes the name of a DFS server, the mapping is valid only for that DFS server. If the entry does not include the name of a DFS server, the mapping is valid for all servers that are running on the host system that use the Identity Mapping input file (for example, Application Support for Information

Management System servers). The *DFS-server-name* for a DFS server is specified in the **_IOE_MVS_SERVER** environment variable in the **dfskern** process.

The first entry type (with three elements) is known as the **specific mapping** to a DFS server. The second entry type (with two elements) is known as the **default mapping** for a DFS server user. You can have one or both of these entry types in your Identity Mapping input file.

Although not required, it is recommended that all servers that require identity mapping on a host system share the same Identity Mapping input file (for example, any OS/390 DCE Application Support Servers should share the same Identity Mapping input file with DFS servers). Figure 7 shows a sample Identity Mapping input file.

```
smith
CMSMITH
/.:/subsys/dce/dfs

jones
TSJONES
```

Figure 7. Example Identity Mapping Input File

In the first entry, the DCE user ID **smith** is mapped to the OS/390 user ID **CMSMITH**. This mapping is effective only when accessing the DFS server whose CDS name is **/.:/subsys/dce/dfs**. In the second entry, the DCE user ID **jones** is mapped to the OS/390 user ID **TSJONES**. This mapping is effective when accessing **any** server on the host system.

If a user has both specific mapping and default mapping entries with the same principal in the input file, the specific mapping entry overrides the default mapping entry. Consider an Identity Mapping input file that has the following entries:

```
smith
CMSMITH

smith
TSJOHN
/.:/subsys/dce/dfs
```

The second entry (specific) overrides the first entry.

Each user can only have one default mapping for every DCE principal in the file. For example, the following mapping entries are **not** allowed:

```
smith
CMSMITH

smith
TSJOHN
```

Also, each user can only have one specific mapping entry to a particular server for every DCE principal in this file. For example, the following entries are **not** allowed:

```
smith
CMSMITH
/.:/subsys/dce/dfs

smith
TSJOHN
/.:/subsys/dce/dfs
```

Creating the Identity Mapping File

The **Identity Mapping File** is a binary file that is created by running the **mapid** program on the Identity Mapping input file. The Identity Mapping file is created as an HFS file.

The **mapid** program is run with two parameters as follows:

mapid *input-file output-file*

where:

input-file Is the HFS pathname of the Identity Mapping input file.

output-file Is the HFS pathname of the Identity Mapping output file.

The **mapid** program can be run from TSO, the OS/390 shell, or in batch. For example, you can enter the following from TSO:

```
mapid "/opt/dfslocal/home/dfskern/idmap.i" "/opt/dfslocal/home/dfskern/idmap.o"
```

Important Note to Users

This section includes information on using the **mapid** program. The **mapid** program is run as a batch job, from the TSO/E command line, or from the OS/390 shell. The *xxx*.SIOESAMP(MAPID) member (where *xxx* is installation dependent) has sample JCL for running this program in batch.

For information on running **mapid** from TSO/E, or from the shell, refer to *OS/390 DFS Administration Guide and Reference*.

Figure 8 shows an example JCL that is used to run this program.

```
//*JOBCARD...
//*
//*****************************************************************
//MAPID    EXEC PGM=IOEMAPID,REGION=0M,TIME=1440,
//      PARM=('/DD:INFILE DD:OUTFILE')
//*****************************************************************
//* Parameters
//*****************************************************************
//INFILE   DD PATH='/opt/dfslocal/home/dfskern/idmap.i',
//            PATHMODE=(SIRWXU,SIRGRP,SIXGRP),
//            PATHOPTS=(ORDONLY),PATHDISP=(KEEP)
//OUTFILE  DD PATH='/opt/dfslocal/home/dfskern/idmap.o',
//            PATHMODE=(SIRWXU,SIRGRP,SIXGRP),
//            PATHOPTS=(ORDWR,OCREAT),PATHDISP=(KEEP)
//***************
//*****************************************************************
//SYSOUT   DD SYSOUT=*
//SYSERR   DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//CEEDUMP  DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
```

Figure 8. MAPID Program JCL

Note: The Identity Mapping File must be regenerated every time the Security server host is reconfigured in the cell.

Setting the _IOE_MVS_IDMAP Environment Variable

The **_IOE_MVS_IDMAP** environment variable must be set to the name of the Identity Mapping Output file used by the DFS server. The declaration of this environment variable can be made in the **envar** file of the **dfskern** process located in **/opt/dfslocal/home/dfskern/envar**. (For other ways of declaring environment variables, see *OS/390 DCE Administration Guide*.)

For example, if the HFS pathname of the Identity Mapping Output file is **/opt/dfslocal/home/dfskern/idmap.o**, this variable is set by the following entry in the **envar** file:

```
_IOE_MVS_IDMAP=/opt/dfslocal/home/dfskern/idmap.o
```

You can choose to have one Identity Mapping File for each server, or a single Identity Mapping File for all servers that require identity mapping (for example, any OS/390 DCE Application Support Servers should share the same Identity Mapping file with DFS servers). In both cases, the declaration of the **_IOE_MVS_IDMAP** environment variable can be made in the **envar** file of the **dfskern** process.

Ensuring the _IOE_MVS_IDMAP_SAF Environment Variable Is Set NO

The **_IOE_MVS_IDMAP_SAF** environment variable must be set to **NO** or not specified in the **dfskern** process to enable Identity Mapping.

Note: The environment variables for the **dfskern** process are only read on start-up of the **dfskern** process (not as a result of the **modify dfs,send dfskern,reload,idmap** operator command).

Modifying and Deleting Identity Mapping Entries

Edit the Identity Mapping input file to modify or delete mapping entries. Then run the **mapid** program on the Identity Mapping input file to generate the new Identity Mapping file. For these changes to take effect, you have to either restart the DFS server or reload the Identity Mapping Output file by using the **modify dfs,send dfskern,reload,idmap** command. See the *OS/390 DFS Administration Guide and Reference* for more information on the **modify** command.

Allowing Foreign Users Access to the DFS Server

If there are DFS server users from other cells (that is, ***foreign cells***), the fully-qualified DFS name of each foreign principal must be mapped to an OS/390 user ID. To define this mapping, the foreign principals are entered in the Identity Mapping Input File that is used by the **mapid** utility to generate the binary Identity Mapping Output File. The **mapid** utility must translate the foreign principal name to its corresponding UUID. Hence, it must read the mapping from the foreign cell. To be able to perform this, the administrator running **mapid** must have authority to read the **/.:/sec/principal** directory in the foreign cell.

This is accomplished by having the DFS administrator add a **foreign_user** entry for the administrator (who runs **mapid**) in the ACL of the **/.:/sec/principal** directory of the foreign cell. This entry must give this administrator read permission to this directory. For example, if the DFS server belongs to the cell **/.../cell1.tid.ibm.ca (/.../c=ca/o=ibm/ou=tid/cn=cell1)**, and the principal name of the administrator is **cell_admin**, the DCE control program administration interface (**dcecp** session) performed on the foreign cell is as follows:

```
$ dcecp
dcecp> acl modify /.:/sec/principal -add {foreign_user /.../c=ca/o=ibm/ou=tid/cn=cell1/cell_admin r}
dcecp> exit
```

Authorizing Access to the Identity Mapping File: The Identity Mapping file serves as the link between the DCE Security service and the local security subsystem. Access to the Identity Mapping Input file and the resulting Identity Mapping Output binary file must be restricted to authorized administrators only.

The DFS server must also be given read access to the Identity Mapping file that it uses. The administrator must be given read and write access to the Identity Mapping files.

Using the RACF Identity Mapping Function

To use the RACF Identity Mapping Function method to map the DCE user ID to the OS/390 user ID, follow the procedures that are described in:

1. "Creating the RACF DCEUUIDS Profile"
2. "Creating the RACF DCEUUIDS APPLDATA OS/390 ID Entries"
3. "Ensuring _IOE_MVS_IDMAP_SAF Environment Variable is Set YES"
4. "Modifying and Deleting RACF DCEUUIDS APPLDATA OS/390 ID Entries"
5. "Modifying and Deleting RACF DCEUUIDS APPLDATA OS/390 ID Entries."

Creating the RACF DCEUUIDS Profile

The RACF DCEUUIDS profile is a profile in the RACF database that allows you to store mappings of DCE user IDs to OS/390 user IDs. It is created with the following command:

```
RDEFINE FACILITY IRR.RDCERUID UACC(NONE)
PERMIT IRR.RDCERUID CLASS(FACILITY) ID(DFS1) ACCESS(READ)
SETROPTS CLASSACT(DCEUUIDS)
```

Creating the RACF DCEUUIDS APPLDATA OS/390 ID Entries

RACF DCEUUIDS APPLDATA MVS ID entries specify the OS/390 user ID that the DCE cell and principal should be mapped to. RACF DCEUUIDS APPLDATA OS/390 ID entries are created with the following command:

```
RDEFINE DCEUUIDS cell_uuid.principal_uuid APPLDATA('os/390_id')
```

Ensuring _IOE_MVS_IDMAP_SAF Environment Variable is Set YES

The **_IOE_MVS_IDMAP_SAF** environment variable must be set to **YES** to ensure that the RACF identity mapping facility is used. It must be set in the **dfskern** process **envar** file.

Note: The environment variables for the **dfskern** process are only read on start-up of the **dfskern** process (not as a result of the **modify dfs,send dfskern,reload,idmap** operator command).

Modifying and Deleting RACF DCEUUIDS APPLDATA OS/390 ID Entries

RACF DCEUUIDS APPLDATA OS/390 ID entries may be modified by using the following command:

```
RALTER DCEUUIDS cell_uuid.principal_uuid APPLDATA('os/390_id')
```

RACF DCEUUIDS APPLDATA OS/390 ID entries may be deleted by using the following command:

```
RALTER DCEUUIDS cell_uuid.principal_uuid
```

For these changes to take effect, you have to restart the DFS server, or reload the identity map (causing any cached mappings to be deleted by the **modify dfs,send dfskern,reload,idmap** command. See the *OS/390 DFS Administration Guide and Reference* for more information on the **modify** commands).

DFS Anonymous User Considerations

An anonymous user ID is required for unauthenticated access to non-DCE Local File System filesets (for example, HFS or RFS filesets) exported by DFS servers running on the host system. An anonymous user ID is necessary if the DCE-principal-to-OS/390 ID mapping fails or if a user has not completed the dce_login process and is, therefore, unauthenticated. If an anonymous user ID is not defined, unauthenticated access to HFS or RFS filesets fails.

The DFS anonymous user ID can be created at this time to allow unauthenticated access to HFS or RFS filesets. If the anonymous user ID is not created at this time, it can be added later.

The following example shows how you can create the DFS anonymous user ID by the Resource Access Control Facility (RACF) using TSO/E:

```
ADDUSER dfsdflt DFLTGRP(dfltgroup) OWNER(owner) NAME('DFS DEFAULT ID') \
  OMVS(UID(dfltuid) HOME(/u))
```

Once created, you must specify the ID in the environmental variable file for **dfskern**. To do so, enter the following, where DFSDFLT is the default ID for the DFS anonymous user ID you have created:

```
_IOE_MVS_DFSDFLT=DFSDFLT
```

Note that you must specify an OS/390 Unique Identifier (UID) segment and its group **must** have an OS/390 Group Identifier (GID) segment.

Chapter 9. Exporting Data in DFS

Exporting data in DFS requires you to:

1. Create DFS aggregates for the filesets or data sets to be exported by updating the **/opt/dcelocal/var/dfs/devtab** file.

   For DCE Local File System aggregates, you must also allocate VSAM linear data sets and format them so that they can be used for DFS filesets.

2. Export the aggregates by updating the **/opt/dcelocal/var/dfs/dfstab** file.
3. Create the first fileset **root.dfs** for the DCE cell if it does not already exist.
4. Create mount points in the DFS namespace for other filesets to be exported by DFS from this host system.

This chapter describes the procedures for exporting data in OS/390 DFS. Topics included in this chapter are:

Creating Aggregates in DFS

To make data available from the DFS file server you have just configured (see "Using DFSCONF to Configure the DFS File Server" on page 42), you must export data and create filesets from a File Server using either OS/390 Hierarchical File System (HFS), Record File System (RFS), or DCE Local File System filesets.

The following sections provide information on how to properly create aggregates for HFS, RFS, and DCE Local File System filesets and how to export the aggregates.

Creating Non-Local File System Aggregates in DFS

On OS/390 DFS, a Hierarchical File System (HFS) aggregate is the equivalent of a single HFS partition. The HFS aggregate also is seen as a single complete fileset by the DFS File Server. Because of this, exported HFS aggregates (non-Local File System aggregates) can contain only one fileset per partition and the logical volume of any HFS aggregate equals a single HFS partition. Before you can export an HFS data set, it must be mounted locally to the OS/390 address space. For details regarding allocating and mounting an HFS file system, see *OS/390 UNIX System Services MVS Planning*, SC28-1890.

Once mounted, an entry must be created in the **/opt/dcelocal/var/dfs/devtab** file. This entry maps a minor device number to the HFS file system you wish to export. The minor device number is an identifier for the device you plan to mount. The number can be any integer greater than zero. Each HFS (non-Local File System) aggregate must have a unique minor device number. The minor device number need not be unique across both DCE Local File System and non-Local File System aggregates.

The following is an example of a completed **devtab** file entry. Lines beginning with an asterisk (*) are comment lines. The first entry in the file defines the type of file system, **ufs**. This defines the file system

as HFS. The minor device number, **2**, is assigned. This number is a unique identifier and becomes part of the name of the defined logical volume. The logical volume name must be specified in the **/opt/dcelocal/var/dfs/dfstab** file when exporting the HFS partition to DFS (see "Exporting Non-Local File System Data" on page 86). The last entry in the file, **omvs.user.abc**, is the name of the HFS file system you are preparing to export.

```
* HFS Devices
define_ufs 2
omvs.user.abc
```

An RFS (Record File System) aggregate is an OS/390 data set name that is either the name of a partitioned data set or is the prefix of a set of data sets and is a non-Local File System aggregate. The whole aggregate is also a single complete fileset to the DFS server.

You must add an entry in **/opt/dcelocal/var/dfs/devtab** which maps a minor device number to the RFS fileset you wish to export. For each RFS fileset add the following entries:

```
* RFS devices
define_ufs 3 rfs
USERA
```

In the previous two examples, lines beginning with an asterisk are comments. The next line defines the type of file system (**ufs**), the minor device number and whether the **ufs** file system is an **hfs** (hierarchical file system) subtype or an **rfs** (record file system) subtype. The default subtype is **hfs**. In this case, we are defining a **ufs** with a subtype of **rfs**.

Note: From now on, we will generally refer to this as an **rfs** fileset. You should keep in mind, however, that it is really a **ufs** fileset with a subtype of **rfs**. When we make comments about a **ufs** fileset, they pertain to both subtypes - **hfs** and **rfs**.

As with a DCE Local File System aggregate, the HFS fileset and the RFS fileset have a minor number describing the device, **2** in the HFS example and **3** in the RFS example. This number can be any integer greater than zero. Each **ufs** fileset must have a unique minor device number. (That is, a **ufs** fileset can have the same minor device number as an **lfs** fileset, but each **ufs** fileset, whether it is an **hfs** subtype or an **rfs** subtype, must have a unique minor device number.) Similarly, two DCE Local File System aggregates cannot have the same minor device number.

The third line in the example is the name of the HFS file system or RFS fileset (prefix) you wish to export. The third line also supports an optional parameter in addition to the data set name in the **devtab** for HFS or RFS filesets to control character data translation.

You may also specify the translation control parameter after the HFS or RFS file system name, on the same line. Valid values for the translation control parameter are:

binary Do not translate data.

text Converts incoming data from ASCII ISO 8859-1 to the local OS/390 code page. Converts outgoing data from the local OS/390 code page to ASCII ISO 8859-1.

The following example demonstrates the use of the translation control parameter. In this example, the fileset identified as **omvs.user.abc** will not have data translated.

```
* HFS Devices
define_ufs 2
omvs.user.abc binary
```

If the translation control parameter is omitted the default is controlled by the **_IOE_HFS_TRANSLATION** environment variable setting (for HFS filesets) and the **_IOE_RFS_TRANSLATION** environment variable setting (for RFS filesets) in the **dfskern** process, see the *OS/390 DFS Administration Guide and Reference* for more information.

Finally, the **attrfile** *attributes_file* parameter (where *attributes_file* is the name of the attributes file that controls the data set creation, processing, and site attributes for this RFS fileset) is supported on the same line as the data set name in the **devtab** for RFS filesets. The default attributes file for RFS filesets is specified in the **_IOE_RFS_ATTRIBUTES_FILE** environment variable specified in the **dfskern** process.

Note: The use of the translation control parameter overrides the **_IOE_HFS_TRANSLATION** environment variable and the **_IOE_RFS_TRANSLATION** environment variable settings for this specific fileset.

The logical volume defined is **/dev/ufs2**. This unique logical volume name should be used when specifying the device in the **dfstab** file (located in the **/opt/dcelocal/var/dfs** directory) for exporting to DFS.

Creating DCE Local File System Aggregates in DFS

In OS/390 DFS, DCE Local File System aggregates are made up of one or more formatted linear data sets (LDS). The data sets for each aggregate are specified in the **/opt/dcelocal/var/dfs/devtab** file and make up a logical volume. The logical volume consists of one or more LDSs that have been formatted to create a single aggregate that will be exported by the **dfskern** process. To define a volume, edit the **/opt/dcelocal/var/dfs/devtab** file.

The following example shows a complete entry in the **devtab** file for a DCE Local File System logical volume. Lines preceded by an asterisk (*) are comments. The type of file system, **lfs**, and the minor device number 1 are defined. The minor device number can be any integer greater than zero. Each logical volume should have a unique minor device number. The volume's minor device number will become part of the aggregate's identifying device name. The minor device number need not be unique across both DCE Local File System and non-Local File System aggregates. Following the definition of the logical volume are the names of three linear data sets that make up the DCE Local File System aggregate:

```
*Devtab- Example Entry for a DCE LFS Logical LFS Volume
define_lfs 1
DFS.DCELFS.AGGR001.LDS00001
DFS.DCEFFS.AGGR001.LDS00002
DFS.DCELFS.AGGR001.LDS00003
```

The logical volume defined will be known as **/dev/lfs1**, with 1 being the device's minor number. This logical volume name should be used when you specify the device in DCE Local File System utilities such as **newaggr** and **growaggr** (for detailed information regarding these utilities, see the *OS/390 DFS Administration Guide and Reference*. The logical volume name must also be specified in the **dfstab** file when exporting the volume to **DFS** (see “Exporting DCE Local File System Data” on page 87).

OS/390 Job Control Language (JCL) found in the SIOESAMP library member **NEWAGGR** can be used to both allocate LDSs and to create a DCE Local File System aggregate. The SIOESAMP JCL can be edited to reflect the correct linear data set names and logical volume. To access the **devtab** file, the program must run as **UID = 0** (**root**). After using IDC Access Method Services to allocate each Linear Data Set, the **NEWAGGR** JCL then formats the logical volume into a DCE Local File System aggregate.

Exporting File System Data Using DFS

This section discusses exporting non-Local File System data and exporting DCE Local File System data using DFS.

Exporting Non-Local File System Data

The HFS and RFS aggregates to be exported by the **dfskern** process must now be added to the **dfstab** file. This file is located in **/opt/dcelocal/var/dfs**. The **dfstab** file is used by the File Exporter, **fxd**, to determine the aggregates available for exporting. The **dfstab** file describes each aggregate and contains the aggregate device name, the aggregate name, the file system type, the aggregate id, and, for HFS and RFS aggregates, the fileset id.

Edit the **dfstab** file to add the appropriate control line describing the aggregate. For HFS aggregates, this requires an additional step. Since an HFS aggregate is a complete DFS fileset and not created by issuing the **fts** command, an entry must be made in the Fileset Location Database for the fileset. The **dfstab** entry for HFS aggregates requires that a fileset id be assigned when the Fileset Location Database entry is created. Issue the following **fts** command, **fts crfldbentry**, to create the Fileset Location Database entry for the HFS aggregate (for further information regarding this command, see the *OS/390 DFS DFS Administration Guide and Reference*). The fileset name, *fileset*; server, *server*; and aggregate id, *aggrid*, are assigned by the DFS administrator.

```
$ fts crfldbentry -ftname fileset -server server -aggrid aggrid
```

Once the fileset entry is created, the fileset IDs assigned to the fileset's read-write, read-only, and backup filesets will be displayed. The ID for the read-write fileset must be entered in the **dfstab** file for exporting. The device name for an HFS or RFS aggregate is **/dev/ufs***n*, where *n* is the minor device number previously specified in the **devtab** file. The name is any unique name assigned by the administrator. This name **must** be unique. The export program will not mount any aggregate with a duplicate device name.

Edit the **dfstab** file. HFS or RFS entries in the **dfstab** file should always specify an aggregate type of **ufs**. The aggregate ID is a unique ID assigned by the DFS administrator. The read-write fileset ID from the Fileset Location Database entry is entered as the fileset ID. The following fields appear for each entry in the file, in the order listed. Each field must be separated by a minimum of one space or tab; each entry must be on a separate line.

Device Name
: The device name of the partition, for example, **/dev/ufs2**.

Aggregate Name
: The name to be associated with the exported partition. An aggregate name can contain any characters, but it can be no longer than 31 characters, and it must be different from any other aggregate name in the file. Aggregate names cannot be abbreviated, so you should choose a short, explicit name. For example, the aggregate name of a non-Local File System partition could be **hfs1**.

File System Type
: The identifier for the file system type of the partition. For non-Local File System file systems, this must be **ufs**. It must be in lowercase letters.

Aggregate ID
: A positive integer to serve as the aggregate ID of the exported partition. The integer must match the aggregate ID specified with the **-aggrid** option of the **fts crfldbentry** command, and it must be different from any other aggregate ID in the **dfstab** file. (If the ID is changed, fileset operations on the partition's fileset will fail.)

Fileset ID
: The unique fileset ID number returned by the **fts crfldbentry** command for the fileset on the partition (for example, **0,,1715**). Use the read-write ID number (not the read-only or backup ID number) returned by the command as the value for this field.

  The fileset ID is initially represented as 0,,*x*, where *x* is incremented by one until it exceeds 2^{32}. Once 2^{32}. is exceeded, the ID becomes 1,,1. When creating the root fileset, specify the

OS/390 server name and aggregate name (as specified in the **dfstab** file, see “Exporting Non-Local File System Data” and “Exporting DCE Local File System Data” on page 87) on your OS/390 system where the fileset is to reside.

The following is an example of a **dfstab** entry for an HFS aggregate and an RFS aggregate:

```
device         name           type   id   fileset id
/dev/ufs2      hfs1           ufs    102  0,,1715
/dev/ufs3      rfs1           ufs    103  0,,1718
```

If DFS is not running, you can start DFS address spaces and processes (refer to “DFS Address Space and Processes” on page 13). If DFS is already started, issue the following command from the operator's console to begin exporting HFS data:

```
modify dfs,start export
```

A message written by **dfsexport** specifies each aggregate that you have exported and that is attached to the file system. If there are problems in exporting an aggregate, **dfsexport** issues a message identifying the aggregate that failed to attach.

If you plan to export DCE Local File System data, continue to the next section, “Exporting DCE Local File System Data.”

For further information regarding exporting data, see the *OS/390 DFS Administration Guide and Reference*.

Exporting DCE Local File System Data

The DCE Local File System aggregates to be exported by the **dfskern** process must also be added to the **dfstab** file. This file is located in **/opt/dcelocal/var/dfs**. The **dfstab** file is used by the File Exporter, **fxd**, to determine the aggregates available for exporting. The **dfstab** file describes each aggregate and contains the aggregate device name, the aggregate name, the file system type, and the aggregate id.

Edit the **dfstab** file to add the appropriate control line describing the aggregate. DCE Local File System entries in the **dfstab** file should always specify an aggregate type of **lfs**. The minor device number, *n*, as specified in the **devtab** file should also be included (see “Creating DCE Local File System Aggregates in DFS” on page 85). The administrator assigns the aggregate name and aggregate ID. The following fields appear for each entry in the file, in the order listed. Each field must be separated by a minimum of one space or tab; each entry must be on a separate line.

Device Name
The device name of the partition, for example, **/dev/lfs1**.

Aggregate Name
The name to be associated with the exported aggregate. An aggregate name can contain any characters, but it can be no longer than 31 characters, and it must be different from any other aggregate name in the file. Aggregate names cannot be abbreviated, so you should choose a short, explicit name (for example, **lfs1**).

File System Type
The identifier for the file system type of the partition. For DCE Local File Systems, this must be **lfs**. It must be in lowercase letters.

Aggregate ID
A positive integer to serve as the aggregate ID of the exported aggregate. The integer must be different from any other aggregate ID in the **dfstab** file. (If the ID is changed, fileset operations on the partition's fileset will fail.)

The following is an example of a **dfstab** entry for a DCE Local File System aggregate:

```
device          name            type    id
/dev/lfs1       lfs1            lfs     6
```

If DFS is not running, you can start DFS address spaces and processes (refer to “DFS Address Space and Processes” on page 13). If DFS is already started, issue the following command from the operator's console to begin exporting DCE Local File System data:

```
modify dfs,start export
```

For further information regarding exporting data in OS/390 DFS, see the *OS/390 DFS Administration Guide and Reference*.

Setting Up the root.dfs Fileset

To make data available from the DFS file server you have just configured (see “Using DFSCONF to Configure the DFS File Server” on page 42), you must export data and create filesets from a File Server using either HFS, RFS, or DCE Local File System filesets. The first fileset you create should be **root.dfs**. The **root.dfs** fileset can be created on an OS/390 or non-OS/390 DCE Distributed File Service system. In addition, a server entry must be created for the OS/390 DFS Server (this procedure is explained in “Creating the DFS File Server FLDB Entry” on page 47).

Note: DFS must be configured on a host system that has been configured into a DCE cell. If you have already created a **root.dfs** fileset for the DCE cell, skip this section.

The main read/write fileset, **root.dfs**, is required in every DCE cell's file system. It is the first fileset created during DFS configuration on a host system in the cell.

Important Note to Users

The **root.dfs** fileset is the implied fileset for the root of a cell's DFS filespace (**/.../cellname/fs**). It can be a fileset in a DCE Local File System aggregate or in a non-Local File System Aggregate. However, it must be a fileset in a DCE Local File System aggregate, if DFS functionality such as replication is to be available in the DCE cell. Also, on OS/390, the Record File System (RFS) is not supported for **root.dfs**.

Before proceeding to allocate **root.dfs** on an OS/390 DCE host system, verify that the DFS (the DFS File Server) including the **ftserver** which is a **boserver** sub-process, has been configured and started on the system. Refer to “DFS Configuration Steps” on page 32, for more information on configuring DFS. Refer to Chapter 11, “Starting and Stopping DFS Components” on page 113, for information on starting and stopping DFS components.

Steps to Define a root.dfs Fileset

This section describes the detailed steps that must be performed to allocate, define, and export a DCE Local File System aggregate on OS/390. It also describes how to define a fileset in the DCE Local File System aggregate to be used as the **root.dfs** fileset.

Note: Defining a **root.dfs** fileset is a special case of creating and exporting a DCE Local File System aggregate for general use.

Refer to the *OS/390 DFS Administration Guide and Reference* for further information about defining filesets and the commands issued in the following instructions.

1. **Logon to OS/390 and OMVS**

Logon to OS/390 and OMVS.

Optionally, logon to OS/390 and OMVS as **root** user with **UID = 0**.

Note: Unless otherwise noted, commands described in this section should be issued from OMVS.

2. **dce_login as cell_admin**

   Login to DCE as a user with DCE cell administrator authorization by issuing the following command:

   ```
   dce_login cell_admin
      or
   dce_login userid
   ```

3. **Verify that there is a server entry for the OS/390 DFS Server**

   The following command displays the server entry, in this example, **dcedfs**, from the Fileset Location Database (FLDB). The command is shown as entered from an OS/390 UNIX session.

   ```
   $ fts lsserverentry -server dcedfs

   Description for site 'dcedfs':
   dcedfs.endicott.ibm.com (2:0.0.9.130.79.35)
   FLDB quota: 0;  uses: 35:  principal= hosts/DCEDFS; owner=<nil>
   ```

   If a server entry has not yet been created, see “Creating the DFS File Server FLDB Entry” on page 47.

4. **Create VSAM Data Sets for the DCE Local File System Aggregate for root.dfs**

   In order to have **root.dfs** fileset reside on OS/390, you need to allocate VSAM linear data set(s) for the logical volume that will be associated with the device name for the DCE Local File System aggregate that will contain the **root.dfs** fileset.

   To do this, you can make the necessary changes to the example control statements in the installation data set member SYS1.SIOESAMP(NEWAGGR) and submit the NEWAGGR job for execution.

   Note: The following **root.dfs** related examples assume that the data set **OMVS.PRV.DCELFS.AGGR.ROOT.DFS** was created. The data set comprises the logical volume that will be associated with the device name **/dev/lfs1** and the aggregate name **lfs1**.

5. **Create a devtab File for root.dfs**

   To export an aggregate, you need to create and/or update the **/opt/dfslocal/var/dfs/devtab** file. Use OMVS **OEDIT** to update the **devtab** file.

   The following is an example of the contents of a **devtab** file that defines the linear data set name that comprises the logical volume associated with the **root.dfs** fileset and the device name **/dev/lfs1/**.

   Note: The device name **/dev/lfs1/** will be assigned the DCE Local File System aggregate name **lfs1** in the **dfstab** entry (see below).

   ```
   * Logical Volume - DCE LFS (root.dfs) - Device Name /dev/lfs1
   define_lfs 1
   OMVS.PRV.DCELFS.AGGR.ROOT.DFS
   *
   ```

   Refer to the *OS/390 DFS Administration Guide and Reference*, for further information about the **devtab** file.

6. **Create a dfstab File for root.dfs**

   An **/opt/dfslocal/var/dfs/dfstab** file needs to be created and/or updated in order to export the aggregate that will contain the **root.dfs** fileset. Use OMVS **OEDIT** to update the **dfstab** file.

   The example **dfstab** file entry shown below for the **root.dfs** fileset:

- Associates the device name **/dev/lfs1/** with the DCE Local File System aggregate name **lfs1**,
- Defines the aggregate type **lfs**,
- Defines the aggregate ID **1**, and
- Identifies that the aggregate should be exported when the file is read by the DFS File Server.

The example of a **dfstab** file entry for the **root.dfs** fileset is:

```
/dev/lfs1           lfs1    lfs  1
```

Refer to the *OS/390 DFS Administration Guide and Reference*, for further information about the **dfstab** file.

7. **Export the root.dfs Aggregate**

   To enable the aggregate and its filesets to be accessed by DFS clients and used for the **root.dfs** fileset, the aggregate needs to be exported.

   To export aggregates that have entries in the **devtab** and **dfstab**, issue the following command from the DFS host OS/390 system operator's console:

   ```
   modify dfs,start export
   ```

   Refer to Chapter 11, “Starting and Stopping DFS Components” on page 113 or the *OS/390 DFS Administration Guide and Reference*, for further information about the **modify** command for DFS.

8. **Create the root.dfs Fileset**

   You now need to create and define the **root.dfs** fileset by issuing the following **fts create** command. The command will create the read-write fileset and create the FLDB entries for the fileset. These entries include a unique ID number assigned by the **flserver** for the read-write, read-only (for replication of DCE Local File System filesets), and backup filesets.

   The following shows the syntax for creating the **root.dfs** fileset. The **-server** *machine* is the name of the OS/390 server where **root.dfs** resides and **-aggregate** *name* is the name of the aggregate (for further information regarding this command, see the *OS/390 DFS DFS Administration Guide and Reference*).

   The following example assumes that the DCE host name for the OS/390 system is **GDLCSST** and creates the fileset named **root.dfs** in the aggregate named **lfs1**. A unique aggregate name (**-aggregate** specification) must be assigned by the location and is also specified in the second field of the associated **dfstab** file entry.

   ```
   fts create -ftname root.dfs -server /.:/hosts/GDLCSST -aggregate lfs1
   ```

   An example of the output from issuing this command would be:

   ```
            readWrite   ID 0,,1  valid
            readOnly    ID 0,,2  invalid
            backup      ID 0,,3  invalid
    number of sites: 1
       server           flags     aggr   siteAge principal      owner

   gdlcsst.endicott.ib RW       lfs1    0:00:00 hosts/GDLCSST  <nil>
         Fileset 0,,40 created on aggregate lfs1 of GDLCSST

   Fileset 0,,1 created on aggregate lfs1 of GDLCSST
   ```

   Note: Because this is the **root.dfs** fileset, it will automatically be mounted as the directory **/:/**. This may take several minutes for this to take effect on your system.

9. **Create the Read/Write Mount Point for root.dfs**

   In order to replicate **root.dfs**, an explicit read/write mount point must be created before replicating **root.dfs**. Issue the following command to create a read/write mount point for the **root.dfs** fileset:

```
fts crmount .rw root.dfs -rw
```

10. **Set Replication Type for root.dfs**

    In order to replicate **root.dfs**, the replication type must be established. Issue the following command to accomplish this:

    ```
    fts setrepinfo -fileset root.dfs -release
    ```

    An example of the output from issuing this command would be:

    ```
    fts setrepinfo: Using default value for maxage of 2:00:00
    fts setrepinfo: Using derived value for failage of 1d0:00:00
    fts setrepinfo: Using default value for reclaimwait of 18:00:00
    ```

11. **Add Replication Site for root.dfs**

    You must add the replication site for **root.dfs** to the Fileset Location Database (FLDB). The following example can be issued for an OS/390 host system with the DCE host name of **GDLCSST**:

    ```
    fts addsite -fileset root.dfs -server /.:/hosts/GDLCSST -aggr lfs1
    ```

    An example of the output from issuing this command would be:

    ```
    Added replication site GDLCSST lfs1 for fileset root.dfs
    ```

12. **Initiate Release Replication of root.dfs**

    Initiate replication of **root.dfs** by issuing the following command:

    ```
    fts release -fileset root.dfs
    ```

    An example of the output from issuing this command would be:

    ```
    Released fileset root.dfs successfully
    ```

Notes:

1. After completing the definition of the **root.dfs** fileset, if you are unable to **cd** to **/.../***dcecellname***/fs/.rw** from the DFS client (**DFSCM**) system, issue the following commands from the DFS client:

   ```
   cm flush
   cm flushfile
   cm checkf
   ```

2. On OS/390, if the DFS Client (**DFSCM**) was configured and started, these commands can be issued from OMVS.

Creating Mount Points for Filesets

The **root.dfs** fileset must be defined in the DCE cell's filespace in order to define the mountpoints needed to export any other filesets from a DFS File Server. Refer to “Setting Up the root.dfs Fileset” on page 88 for more information.

A DFS mount point appears and functions like a regular directory but, structurally, it is a symbolic link which indicates the name of the fileset associated with a mount point. Mount points make the contents of a fileset visible and accessible to users in the DCE namespace.

To create mount points for filesets, use the following procedure:

1. Locate and change your directory to the junction to the DFS filespace, **root.dfs**. The junction is defined at **/.../***cellname***/fs**

   ```
   $ cd /.../abc.com/fs
   ```

2. Create directories for related filesets such as *user* for all user data sets or *src* for source files. The following example creates a directory called **user**, a user fileset, and a mount point for the fileset. If the fileset on which the aggregate resides has been exported to the file server, you can access the data in that fileset by changing to the directory of the newly created mount point.

   ```
   mkdir user
   cd user
   fts create user.abc.com lfs1 -verbose
   fts crmount -fileset user.abc.com -dir user.abc
   cd abc
   ```

3. If you plan to use the DCE Local File System replication feature for filesets, create a read-only version of the **root.dfs** fileset. This is necessary as the Cache Manager will traverse a path name to locate a file, beginning with **root.dfs**, and will access the read-only version of the fileset where possible. If *any* fileset in the path name does *not* have a read-only version, the Cache Manager will access the read-write version and will *never* access a read-only version for any filesets it traverses for the remainder of the path.

   Before replicating a **root.dfs** fileset, an explicit read-write mount point must first be created. If this is not done, it becomes impossible to access the read-write version of **root.dfs**. To anticipate the possible need for read-only filesets, create a read-write mount point for **root.dfs**. In the following example, **.rw** is used as the newly created read-write mount point. The **-rw** option specifies the type of mount point as read-write.

   ```
   $ fts crmount .rw root.dfs -rw
   ```

   Once you have replicated **root.dfs**, create additional mount points for other filesets by specifying the read-write path as follows: In the following, *name*|*ID* specifies the complete name or fileset number of the fileset to be mounted:

   ```
   $ fts crmount -fileset name|ID -dir /:/.rw/user/name|ID
   ```

For further information regarding mount points, see the *OS/390 DFS Administration Guide and Reference*.

Steps to Create and Export a DCE Local File System Aggregate

This section describes how to allocate, define, and export a DCE Local File System aggregate on OS/390. It also describes how to define a fileset in the DCE Local File System aggregate.

Refer to the *OS/390 DFS Administration Guide and Reference*, for further information on defining filesets.

1. **Logon to OS/390 and OMVS**

   Logon to OS/390 and OMVS.

   Optionally, logon to OS/390 and OMVS as **root** user with **UID = 0**.

   Note: Unless otherwise noted, commands described in this section should be issued from OMVS.

2. **dce_login as cell_admin**

   Login to DCE as a user with DCE cell administrator authorization by issuing the following command:

   ```
   dce_login cell_admin
      or
   dce_login userid
   ```

3. **Create VSAM Data Sets for the DCE Local File System Aggregate for root.dfs**

   To create a DCE Local File System aggregate on OS/390, you need to allocate VSAM linear data set(s) for the logical volume that will be associated with the device name for the aggregate.

To do this, you can make the necessary changes to the example control statements in the installation data set member SYS1.SIOESAMP(NEWAGGR) and submit the NEWAGGR job for execution.

Note: The following examples assume that the data sets OMVS.PRV.DCELFS.AGGR001.LDS00001 and OMVS.PRV.DCELFS.AGGR001.LDS00002 were created for the DCE Local File System aggregate.

4. **Update the devtab File for the DCE Local File System Aggregate**

   In order to export the aggregate, you need to update the **/opt/dfslocal/var/dfs/devtab** file. Use OMVS **OEDIT** to update the **devtab** file.

   Below is an example of the contents of a **devtab** file that defines the linear data set names that makes up the logical volume associated with the device name **/dev/lfs2/**.

   Note: The device name **/dev/lfs2/** will be assigned the DCE Local File System aggregate name **lfs2** in the **dfstab** (see below).

   The following is an example of the contents of a **dfstab** file that defines the logical volumes for two DCE Local File System aggregates with the device names **/dev/lfs1** and **/dev/lfs2**:

```
* Logical Volume - DCE LFS (root.dfs) - Device Name /dev/lfs1
define_lfs 1
OMVS.PRV.DCELFS.AGGR.ROOT.DFS
*
* Logical Volume - DCE LFS - Device Name /dev/lfs2
define_lfs 2
OMVS.PRV.DCELFS.AGGR001.LDS00001
OMVS.PRV.DCELFS.AGGR001.LDS00002
```

5. **Update the dfstab File for the DCE Local File System Aggregate**

   The **/opt/dfslocal/var/dfs/dfstab** file needs to be updated in order to export the aggregate. Use OMVS **OEDIT** to update the **dfstab** file.

   An example of the **dfstab** file entry is shown below:

   - Associates the device name **/dev/lfs2/** with the DCE Local File System aggregate name **lfs2**,
   - Defines the aggregate type **lfs**,
   - Defines the aggregate ID **2**, and
   - Identifies that the aggregate should be exported when the file is read by the DFS File Server.

   The following example **dfstab** file entries define two DCE Local File System aggregates (**lfs1** and **lfs2**):

```
/dev/lfs1           lfs1    lfs  1
/dev/lfs2           lfs2    lfs  2
```

6. **Export the DCE Local File System Aggregate**

   To enable DFS clients to access the filesets in the new DCE Local File System aggregate, the DFS File Server must export the aggregate.

   To export aggregates that have entries in the **devtab** and **dfstab**, issue the following command from the OS/390 system operator's console:

```
modify dfs,start export
```

   Or, issue the following command on OMVS while logged on as a **root** user with **UID = 0**:

```
dfsexport lfs2
```

7. **Create a Fileset for the DCE Local File System Aggregate**

   The following example command can be issued for a DFS host OS/390 system with the DCE host name of **GDLCSST** to create the fileset named **episet1** in the new DCE Local File System aggregate

named **lfs2**. The fileset name and aggregate must be unique in the location and is also used as the second field of the associated **dfstab** file entry.

```
fts create -ftname episet1 -server /.:/hosts/GDLCSST -aggregate lfs2 -verb
```

An example of the output from issuing this command would be:

```
------- Creating a new FLDB entry for episet1 -------
Created the FLDB entry for fileset episet1
        readWrite   ID 0,,4   valid
        readOnly    ID 0,,5   invalid
        backup      ID 0,,6   invalid
number of sites: 1
   server           flags     aggr   siteAge principal      owner

gdlcsst.endicott.ib RW       lfs1    0:00:00 hosts/GDLCSST  <nil>

Fileset 0,,4  created on aggregate lfs2 of GDLCSST
```

8. **Create a DFS Mount Point for the DCE Local File System Fileset**

   The following is an example of the commands that can be issued on a DFS host OS/390 system to create a mount point for the **episet1** fileset:

   ```
   cd /:/.rw
   fts crmount -fileset episet1 -dir mvsepimtpt
   ```

9. **Set Replication Type for DCE Local File System Fileset**

   In order to replicate the **episet1** fileset defined for the new DCE Local File System aggregate, the following command can be issued:

   ```
   fts setrepinfo -fileset episet1 -scheduled -maxage 1h -failage 2h \
                  -reclaimwait 5h -minrepdelay 5m
   ```

   An example of the output from issuing this command would be:

   ```
   fts setrepinfo: Using given value for maxage of 1:00:00
   fts setrepinfo: Using given value for failage of 2:00:00
   fts setrepinfo: Using given value for reclaimwait of 5:00:00
   fts setrepinfo: Using given value for minrepdelay of 0:05:00
   ```

10. **Add Replication Site for DCE Local File System Fileset**

    Add the replication site for the fileset to the File Set Location Database (FLDB). The following command can be issued for a DFS host OS/390 system with the DCE host name of **GDLCSST**:

    ```
    fts addsite -fileset episet1 -server /.:/hosts/GDLCSST \
                -aggr lfs2 -maxsiteage 30m
    ```

    An example of the output from issuing this command would be:

    ```
    Added replication site GDLCSST lfs2 for fileset episet1
    ```

11. **Initiate Schedule Replication for the DCE Local File System Fileset**

    Initiate replication of the fileset defined in the DCE Local File System aggregate. The following command can be issued for a DFS host OS/390 system with the DCE host name of **GDLCSST**:

    ```
    fts update -fileset episet1 -server /.:/hosts/GDLCSST -verbose
    ```

    An example of the output from issuing this command would be:

    ```
    Calling REP_UpdateSelf(gdlcsst.endicott.ibm.com, {268458673,,1888327310}
    {0,,56}, ...)...
    fts update: Repserver on gdlcsst.endicott.ibm.com requested to update
    fileset 0,56
    ```

Steps to Create and Export an HFS Aggregate

This section describes how to allocate, define, and export an HFS data set as a DFS aggregate on OS/390.

Note: An HFS data set defined as a DFS aggregate contains only a single DFS fileset.

Refer to the *OS/390 DFS Administration Guide and Reference*, for further information about defining filesets and the commands issued in the following instructions.

1. **Logon to OS/390 and OMVS**

   Logon to OS/390 and OMVS.

   Optionally, logon to OS/390 and OMVS as **root** user with **UID = 0**.

   Note: Unless otherwise noted, commands described in this section should be issued from OMVS.

2. **dce_login as cell_admin**

   Login to DCE as a user with DCE cell administrator authorization by issuing the following command:

   dce_login cell_admin
   or
   dce_login *userid*

3. **Create a Data Set**

   In order to export an HFS data set, you need to allocate a data set of type **HFS** that will be defined as a DFS aggregate.

   Or, if an HFS data set already exists, then you can export it.

   The examples in this section assume that the name of the HFS data set name used for the DFS aggregate is **OMVS.PRV.HFS.DATASET**.

4. **Update the devtab File for the HFS Aggregate**

   To export the HFS data set as a DFS aggregate, you need to update the **/opt/dfslocal/var/dfs/devtab** file. Use OMVS **OEDIT** to update the **devtab** file.

   The following is an example of the contents of a **devtab** file that defines two DCE Local File System logical volumes and the HFS logical volume **/dev/ufs010** that includes the data set **OMVS.PRV.HFS.DATASET**:

   ```
   * Logical Volume - DCE LFS (root.dfs) - Device Name /dev/lfs1
   define_lfs 1
   OMVS.PRV.EPISODE.AGGR.ROOT.DFS
   *
   * Logical Volume - DCE LFS - Device Name /dev/lfs2
   define_lfs 2
   OMVS.PRV.EPISODE.AGGR001.LDS00001
   OMVS.PRV.EPISODE.AGGR001.LDS00002
   *
   * Logical Volume - HFS  - Device Name /dev/ufs010
   define_ufs 10
   OMVS.PRV.HFS.DATASET
   ```

5. **Create the FLDB Entry for the HFS Aggregate**

   Create the Fileset Location Database (FLDB) entry for the HFS aggregate by issuing an **fts crfldbentry** command. The **fts crfldbentry** command assigns the fileset name and creates the fileset and FLDB entry for the HFS aggregate. It also assigns a unique aggregate ID number that must be used as the fourth field of the associated **dfstab** file entry.

Following is an example of the **fts crfldbentry** command when DFS is on an OS/390 system with a DCE host name of **GDLCSST**, the fileset name **OMVS.PRV.HFS.DATASET** is selected for the HFS aggregate, and the aggregate ID **10** is specified by the **-aggrid** value. The fileset name (**-ftname** specification) is assigned by the location but the use of the HFS data set name is recommended as shown in the example.

```
fts crfldbentry -ftname OMVS.PRV.HFS.DATASET \
                -server /.:/hosts/GDLCSST -aggrid 10
```

An example of the output from issuing this command would be:

```
        readWrite   ID 0,,22  valid
        readOnly    ID 0,,23  invalid
        backup      ID 0,,24  invalid
number of sites: 1
   server           flags     aggr   siteAge principal      owner

gdlcsst.endicott.ib RW        10     0:00:00 hosts/GDLCSST  <nil>

FLDB entry created for fileset hfsset1 (0,,22) on aggregate 10 of
     GDLCSST
```

Note: The ID number for the **readWrite** entry (**0,,22**) shown above is the number that is to be used in the **dfstab** file entry for the HFS fileset (see step 6, **Update the dfstab File for the HFS Aggregate**).

6. **Update the dfstab File for the HFS Aggregate**

   The **/opt/dfslocal/var/dfs/dfstab** file must be updated to export the fileset assigned to the HFS aggregate. Use OMVS **OEDIT** to update the **dfstab** file.

   The following is an example of the contents of the **dfstab** showing the HFS fileset entry with device name **/dev/ufs010**, aggregate name **ufs10**, and the fileset ID number **0,,22**:

   ```
   /dev/lfs001         lfs1    lfs  1
   /dev/lfs002         lfs2    lfs  2
   /dev/ufs010         ufs10   ufs  10    0,,22
   ```

7. **Create an MVS Mount Point for the HFS Aggregate**

   If you want to access the HFS data set used for the DFS aggregate from OMVS, create a mount point for it and mount it in the local file system as you would for any other HFS data set.

8. **Export the HFS Aggregate**

   In order to allow the DFS client to access the HFS aggregate, the aggregate needs to be exported. In order to export aggregates that have entries in the **devtab** and **dfstab**, issue the following command from the operator's console:

   ```
   modify dfs,start export
   ```

   Or, issue the following command from OMVS while logged on as a **root** user with **UID = 0**.

   ```
   dfsexport ufs10
   ```

9. **Create a DFS Mount Point for the (HFS) Fileset**

   In order to create a DFS mount point for the fileset assigned to the HFS aggregate, an **fts crmount** command must be issued.

   The following is an example of the commands that can be used to mount the HFS fileset named **OMVS.PRV.HFS.DATASET** at the mount point **/:/.rw/mvshfsmtpt**:

   ```
   cd /:/.rw
   fts crmount -fileset OMVS.PRV.HFS.DATASET -dir mvshfsmtpt
   ```

Steps to Create and Export an RFS Aggregate

This section describes how to define and export an RFS data set as a DFS aggregate on OS/390.

Note: An RFS data set defined as a DFS aggregate contains only a single DFS fileset.

Refer to the *OS/390 DFS Administration Guide and Reference*, for further information about defining filesets and the commands issued in the following instructions.

1. **Logon to OS/390 and OMVS**

   Logon to OS/390 and OMVS.

   Optionally, logon to OS/390 and OMVS as **root** user with **UID = 0**.

   Note: Unless otherwise noted, commands described in this section should be issued from OMVS.

2. **dce_login as cell_admin**

   Login to DCE as a user with DCE cell administrator authorization by issuing the following command:

   dce_login cell_admin
   or
   dce_login *userid*

3. **Update the devtab File for the RFS Aggregate**

   To export the HFS data set as a DFS aggregate, you need to update the **/opt/dfslocal/var/dfs/devtab** file. Use OMVS **OEDIT** to update the **devtab** file.

   The following is an example of the contents of a **devtab** file that defines two DCE Local File System logical volumes, an HFS logical volume and the RFS logical volume **/dev/ufs020** that includes the data set **OMVS.PRV.RFS.DATASET**:

   ```
   * Logical Volume - DCE LFS (root.dfs) - Device Name /dev/lfs1
   define_lfs 1
   OMVS.PRV.EPISODE.AGGR.ROOT.DFS
   *
   * Logical Volume - DCE LFS - Device Name /dev/lfs2
   define_lfs 2
   OMVS.PRV.EPISODE.AGGR001.LDS00001
   OMVS.PRV.EPISODE.AGGR001.LDS00002
   *
   * Logical Volume - HFS  - Device Name /dev/ufs010
   define_ufs 10
   OMVS.PRV.HFS.DATASET
   *
   * Logical Volume - RFS  - Device Name /dev/ufs020
   define_ufs 20 rfs
   OMVS.PRV.RFS.DATASET
   ```

4. **Create the FLDB Entry for the RFS Aggregate**

   Create the Fileset Location Database (FLDB) entry for the RFS aggregate by issuing an **fts crfldbentry** command. The **fts crfldbentry** command assigns the fileset name and creates the fileset and FLDB entry for the HFS aggregate. It also assigns a unique aggregate ID value that must be used as the fourth field in the associated **dfstab** file entry.

   Following is an example of the **fts crfldbentry** command when DFS is on an OS/390 system with a DCE host name of **GDLCSST**, the fileset name **-ftname OMVS.PRV.RFS.DATASET** is selected for the RFS aggregate, and the aggregate ID **-aggrid 20** is assigned. The fileset name (**-ftname** specification) is assigned by the location but the use of the HFS data set name is recommended as shown in the example.

```
fts crfldbentry -ftname OMVS.PRV.RFS.DATASET \
                -server /.:/hosts/GDLCSST -aggrid 20
```

An example of the output from issuing this command would be:

```
        readWrite   ID 0,,19  valid
        readOnly    ID 0,,20  invalid
        backup      ID 0,,21  invalid
number of sites: 1
   server           flags     aggr   siteAge principal      owner

gdlcsst.endicott.ib RW       20      0:00:00 hosts/GDLCSST  <nil>

FLDB entry created for fileset hfsset1 (0,,19) on aggregate 20 of
     GDLCSST
```

Note: RFS aggregate and returns a fileset unique ID number to be used in the **dfstab** file. The ID number for the **readWrite** entry (**0,,19**) shown above is the number that is to be used in the **dfstab** file entry for the HFS fileset (see step 5, **Update the dfstab File for the RFS Aggregate**).

5. **Update the dfstab File for the RFS Aggregate**

   The **/opt/dfslocal/var/dfs/dfstab** file must be updated to export the fileset assigned to the RFS aggregate. Use OMVS **OEDIT** to update the **dfstab** file.

   The following is an example of the contents of the **dfstab** showing the RFS fileset entry with device name **/dev/ufs020**, aggregate name **ufs20**, and the fileset ID number **0,,19**:

```
/dev/lfs1           lfs1    lfs  1
/dev/lfs2           lfs2    lfs  2
/dev/ufs010         ufs10   ufs  10    0,,22
/dev/ufs020         ufs20   ufs  20    0,,19
```

6. **Export the RFS Aggregate**

   In order to allow DFS client to access the HFS aggregate, the aggregate needs to be exported. In order to export aggregates that have entries in the **devtab** and **dfstab**, issue the following command from the operator's console:

```
modify dfs,start export
```

   Or, issue the following command from OMVS while logged on as a **root** user with **UID = 0**.

```
dfsexport ufs10
```

7. **Create a DFS Mount Point for the RFS Fileset**

   In order to create a DFS mount point for the fileset assigned to the RFS aggregate, an **fts crmount** command must be issued.

   The following is an example of the commands that can be used to mount the HFS fileset named **OMVS.PRV.HFS.DATASET** at the mount point **/:/.rw/mvshfsmtpt**:

```
cd /:/.rw
fts crmount -fileset OMVS.PRV.HFS.DATASET -dir mvshfsmtpt
```

Chapter 10. Deconfiguring DFS

Important Note to Users

Before deconfiguring any OS/390 DFS Client or Server processes on an OS/390 DCE host system, be sure to stop the DFS processes on that system (see Chapter 11, “Starting and Stopping DFS Components” on page 113).

Certain situations require that you deconfigure or remove configuration files for all of DFS or for a particular DFS component from an OS/390 DCE host system where DFS is configured.

Selected DFS components may require deconfiguration. If you want to reconfigure a particular component with new parameters, you must deconfigure it, removing the existing configuration, before setting up the new configuration. Or, for example, if a configuration of a component failed and it is only partially configured, you must remove the partial configuration before attempting configuration again.

Situations may require that you deconfigure all DFS components from the server. For example, if you want to transfer a server from one cell to another, you must remove the configurations for the old cell from the server before setting up the configurations for the new cell.

You may want to deconfigure an entire DCE cell. If you choose to do this, you should also unregister the DCE cell's name from the global namespace. Before deconfiguring DCE, you should always deconfigure the DFS Client and Servers.

Exercise caution in deconfiguring DFS components, especially if you are removing components which perform services required by other components. Deconfiguring a component partially or completely disables other components which are dependent upon it. For example, deconfiguring all Fileset Location Database servers, the basis of any cell's DFS system, disables the DFS functions for the cell.

To deconfigure you must set up a TSO user ID (see “Set Up the DFSCONF Administrator TSO User ID” on page 39) and make sure you are logged in to DCE (see “DCE Login Panel” on page 39) as a user with DCE cell administrator (**cell_admin**) authority.

DFS should be deconfigured prior to deconfiguring DCE on the host system. After DFS is deconfigured, you can deconfigure DCE. After DCE is reconfigured, you can then configure DFS on the host system following the steps described in Chapter 7, “Configuring DFS” on page 31. Special actions are required if DFS is configured on a host system and DCE is deconfigured and configured on the same host system with a different DCE host name (see “DFS Deconfiguration Steps for DCE Host Name Change” on page 110).

Note: Before any DFS deconfiguration is done, you should review the “DCE Deconfiguration Considerations for DFS” on page 100 and “Update (upserver) Deconfiguration Considerations” on page 100.

The actions associated with deconfiguring a DFS component are described in this chapter. The chapter includes:

- "Using DFSCONF to Deconfigure DFS Servers" on page 106
- "Using DFSCONF to Deconfigure the DFS Client" on page 108
- "Removing DFS Servers from a Host System" on page 109
- "Remove the DFS Client from a Host System" on page 109
- "DFS Deconfiguration Steps for DCE Host Name Change" on page 110.

Note: It is recommended that you follow the deconfiguration steps outlined in "DFS Component Deconfiguration" on page 101.

DCE Deconfiguration Considerations for DFS

The following considerations apply to deconfiguring DFS on an OS/390 system:

1. If you need to reconfigure (deconfigure and configure) DCE on an OS/390 system, and DFS is also configured on the OS/390 system, you need to reconfigure both DFS and DCE. It is recommended that the reconfiguration steps be done in the following order:
   - Deconfigure DFS
   - Deconfigure DCE
   - Configure DCE
   - Configure DFS.
2. If DCE is reconfigured while DFS remains configured on an OS/390 DCE host system, it is recommended that DFS be reconfigured on that system.
3. It is recommended that you do not change the DCE host name when reconfiguring the DCE client if DFS is configured on an OS/390 system. Special DFS reconfiguration steps are required if the DCE host name is changed (see "DFS Deconfiguration Steps for DCE Host Name Change" on page 110).
4. After DFS is configured on a DCE host system, you can not reconfigure all the DCE Security Servers or all DCE Cell Directory Servers in a DCE cell without destroying the DFS authorization. The content of all the DFS administrative list file and ACL data for DCE Local File System files is invalidated. File data may not be accessible through DFS even if DFS is reconfigured. You should copy DCE Local File System data to another file system before you deconfigure the DCE Security Servers in a DCE cell.

   If all the DCE Security Servers and DCE Cell Directory Servers reconfigure, you can attempt to re-establish DFS operations by:

   a. Deconfiguring the DFS servers using DFSCONF if this was not done prior to deconfiguring DCE.

   b. Configuring the DFS servers using DFSCONF.

   c. Deleting the DFS administrative list files and re-creating the them as described in Chapter 8, "Defining DFS Administrators and Users" on page 67. All the required DFS administrator principals and groups must also be added to the the DFS administrative list files.

   d. Redefining all DFS file ACL data as described in the *OS/390 DFS Administration Guide and Reference*.

Update (upserver) Deconfiguration Considerations

The **upserver** deconfiguration considerations in this section only apply if you have an **upserver** running on the OS/390 host system. Before deconfiguring all DFS servers or just the DFS **upserver** from an OS/390 DCE host system, you may need to configure the **upserver** on another DCE host system in the DCE cell if DFS runs on more than system in the DCE cell.

You can ignore these **upserver** related instructions if:

- DFS is configured on a single DCE host system in the DCE cell.
- There is no **upserver** running in the DCE cell.
- The **upserver** is running on another DCE host system in the DCE cell.
- If the **upserver** remains configured on this OS/390 system after other components of DFS are deconfigured.

If the DFS **upserver** is running on the OS/390 system where DFS including the **upserver** is being deconfigured, the following steps must be taken before any further DFS deconfiguration steps are performed:

1. Stop the **upserver** on the OS/390 host system.
2. Stop the Update Clients on the other DFS host systems in the DCE cell.
3. Configure and start an **upserver** on another DCE host system in the DCE cell.
4. Start an **upclient** on the other DCE host systems in the DCE cell (on a system other than where the **upserver** is now running), identifying the new **upserver** when an **upclient** is started.

DFS Component Deconfiguration

This section identifies the DFS components that can be deconfigured on a OS/390 DCE host system and the sequence in which DFS component deconfiguration can be performed.

Deconfigure the DFS Client (DFSCM)

The DFS Client (**DFSCM**) can be deconfigured independent from DFS servers.

To deconfigure the **DFSCM** on the OS/390 system with DCE host name *dcehostname*, the following steps should be performed:

1. Use **DFSCONF** to deconfigure the **DFSCM** (see “Using DFSCONF to Deconfigure DFS Servers” on page 106).
2. If you plan to remove the **DFSCM** from the DCE host system, you may want to perform the additional steps described in “Remove the DFS Client from a Host System” on page 109.

Deconfigure DFS Servers

All DFS servers are dependent on the configuration of the DFS File Server on the DCE host system. The DFS File Server should be deconfigured last.

The Backup Database Server (**bakserver**) including the Backup Tape Coordinator (**BUTC**) Servers, the Fileset Location Database Server (**flserver**), and the Fileset Server (**ftserver**) can be deconfigured independently and only depend on the configuration of the DFS File Server on the DCE host system.

It is recommended that DFS servers be deconfigured as described in the sections referenced in the following list:

1. Deconfigure the Backup Database Server (**bakserver**) including the Backup Tape Coordinator (**BUTC**) Servers (see “Deconfigure Backup Database Server (bakserver)” on page 102).
2. Deconfigure the Fileset Location Database Server (**flserver**) (see “Deconfigure the Fileset Location Database Server (flserver)” on page 103).
3. Deconfigure the Fileset Server (**ftserver**) (see “Deconfigure the Fileset Server (ftserver)” on page 105).

4. Deconfigure the DFS File Server (see “Deconfigure the DFS File Server” on page 105).
5. If you plan to remove DFS servers from the DCE host system, you may want to perform the additional steps described in “Removing DFS Servers from a Host System” on page 109.

After DFS is deconfigured using **DFSCONF**, any DFS administrative list files and the **BosConfig** file still exist in the directory **/opt/dcelocal/var/dfs**. If you reconfigure DFS, these files are re-used by DFS unless you rename, move, or delete them.

Deconfigure Backup Database Server (bakserver)

To deconfigure the Backup Database Server (**bakserver**) and any Backup Tape Coordinator (**BUTC**) servers, the following steps should be performed:

1. Insure that the **boserver** is running on the host system.
2. Insure that the **bakserver** is running on the host system or in the DCE cell.
3. If any of the **butc01** through **butc08** servers are running the host system, issue the following OS/390 operator command:

   modify dfs,stop butc*nn*

   where: *nn* equals **01** through **08**.
4. Login as a user ID with DCE **cell_admin** authority from OMVS.
5. Issue the following command for each **BUTC**nn server configured on the DCE host system:

   bak rmhost -tcid *n*

   where *n* = the value 0-7 that identifies the **BUTC** process. Note that the **BUTC** process identifier values **0** through **7** relate to the **BUTC01** through **BUTC08** servers.

   See “Completing the DFS Backup Tape Coordinator Configuration” on page 53 for more information on identifying **BUTC** servers.

   For additional detailed information about the **bak rmhost** command, see *OS/390 DFS Administration Guide and Reference*.
6. Optionally update the DFS Backup Tape Management file. For more information, refer to “Completing the DFS Backup Tape Coordinator Configuration” on page 53, step 6 on page 55.
7. Optionally update the **BUTC**nn **envar** files to reflect the IBM supplied values. For more information, refer to “Completing the DFS Backup Tape Coordinator Configuration” on page 53, step 5 on page 54.
8. If the **bakserver** is running on the host system, issue the following command from OMVS:

   bos stop /.:/hosts/*dcehostname* **bakserver**
9. Issue the following command:

   bos delete /.:/hosts/*dcehostname* **bakserver**

   For additional detailed information about the **bos delete** command, see *OS/390 DFS Administration Guide and Reference*.
10. Use **DFSCONF** to deconfigure the Backup Database Server (**bakserver**) on the OS/390 DCE host system (see “Using DFSCONF to Deconfigure DFS Servers” on page 106).
11. Complete the **bakserver** deconfiguration (see “Completing the Backup Database Server Deconfiguration” on page 103).

Completing the Backup Database Server Deconfiguration

The section describes additional deconfiguration steps that must be performed after using **DFSCONF** to deconfigure the Backup Database Server (**bkserver** or **bakserver**) (see “Using DFSCONF to Deconfigure DFS Servers” on page 106).

The additional steps that are required to complete the deconfiguration of the (**bkserver**) are:

1. Use the **dcecp -c rpcentry show /.:/subsys/dce/dfs/bak** command to update the entry for the RPC server group **/.:/subsys/dce/dfs/bak**. The command forces CDS to update information that it caches from the entry for the group in the namespace.
2. Stop and restart the Backup Database Server process (**bakserver**) on each database server of that type. Restarting the existing database server processes causes the processes to read the updated RPC server group. This ensures that each Ubik coordinator agrees on the number and identities of the other database servers of its type, which is vital to Ubik's use of a quorum of database servers to maintain database consistency.
3. Remove the DFS server principal for the **admin.bak** list.

   If there is only a single DCE host system in the DCE cell where DFS has been configured or if there is no DFS **upserver** running on another DCE host system in the DCE cell, you can skip this step. Refer to “Update (upserver) Deconfiguration Considerations” on page 100 for more information.

   If there is an **upserver** running on another DCE host system in the DCE cell, use the **bos rmadmin** command to cause the DCE cell System Control machine where the **upserver** is running to remove the abbreviated DFS server principal **hosts/***dcehostname***/dfs-server** for this DCE host system from it's **admin.bak** administrative list. The **upserver** then distributes the updated list to the Update Clients in the DCE cell.

   If you previously chose to add the full or abbreviated DFS server principal to a security group and included the group in the **admin.bak** list, you can use the **dcecp group remove** command to remove the DFS server principal from the group. Note that **DFSCONF** has already removed the abbreviated DFS server principal **hosts/***dcehostname***/dfs-server** from the security group **subsys/dce/dfs-bak-servers**.
4. Remove the **admin.bak** administrative list from the **/opt/dcelocal/var/dfs** directory on the database server to be removed. Modify the Update Server as necessary if the list is propagated from the cell's System Control machine.

For additional detailed information, see *OS/390 DFS Administration Guide and Reference*.

After performing the actions described in this section, you should proceed to the next step described in “DFS Component Deconfiguration” on page 101.

Deconfigure the Fileset Location Database Server (flserver)

To deconfigure the Fileset Location Database Server (**flserver**) on the OS/390 system with DCE host name *dcehostname*, the following steps should be performed:

1. Insure that the **boserver** is running on the host system.
2. Login as a user ID with DCE **cell_admin** authority from OMVS.
3. If the **flserver** is running on the host system, issue the following command from OMVS:

   bos stop /.:/hosts/*dcehostname* **flserver**
4. Issue the following command:

   bos delete /.:/hosts/*dcehostname* **flserver**

For additional detailed information about the **bos delete** command, see *OS/390 DFS Administration Guide and Reference*.

Note: After issuing the **bos delete** command for the **flserver**, if another **flserver** does not exist in the DCE cell, the **fts** commands shown for deconfiguring the DFS File Server (see "Deconfigure the DFS File Server" on page 105) can not be issued.

5. Use **DFSCONF** to deconfigure the Fileset Location Database Server (**flserver**) on the OS/390 DCE host system (see "Using DFSCONF to Deconfigure DFS Servers" on page 106).
6. Complete the **flserver** deconfiguration (see "Completing the Fileset Location Database Server Deconfiguration").

Completing the Fileset Location Database Server Deconfiguration

The section describes additional deconfiguration steps that must be performed after using **DFSCONF** to deconfigure the Fileset Location Database Server (**flserver**), (See "Using DFSCONF to Deconfigure DFS Servers" on page 106 for more information.)

The additional steps that are required to complete the deconfiguration of the **flserver** are:

1. Use the **dcecp rpcentry show** command on the Fileset Database Server to update the entry for the appropriate RPC server group from CDS. The command forces CDS to update information that it caches from the entry for the group in the namespace.
2. Stop and restart the Fileset Database Server process (**flserver**) on each database server of that type. Restarting the existing database server processes causes the processes to read the updated RPC server group. This ensures that each Ubik coordinator agrees on the number and identities of the other database servers of its type, which is vital to Ubik's use of a quorum of database servers to maintain database consistency.
3. Remove DFS server principal for the **admin.fl** list

   If there is only a single DCE host system in the DCE cell where DFS has been configured or if there is no DFS **upserver** running on another DCE host system in the DCE cell, you can skip this step. Refer to "Update (upserver) Deconfiguration Considerations" on page 100 for more information.

   If there is an **upserver** running on another DCE host system in the DCE cell, use the **bos rmadmin** command to cause the DCE cell System Control machine where the **upserver** is running to remove the abbreviated DFS server principal **hosts/***dcehostname***/dfs-server** for this DCE host system from it's **admin.fl** administrative list. The **upserver** then distributes the updated list to the Update Clients in the DCE cell.

   If you previously chose to add the full or abbreviated DFS server principal to a security group and included the group in the **admin.fl** list, you can use the **dcecp group remove** command to remove the DFS server principal from the group. Note that **DFSCONF** has already removed the abbreviate DFS server principal **hosts/***dcehostname***/dfs-server** from the security group **subsys/dce/dfs-fs-servers**.
4. Remove the **admin.fl** administrative list from the **/opt/dcelocal/var/dfs** directory on this DCE host system. Modify the Update Server as necessary if the list is propagated from the cell's System Control machine.

For additional detailed information, see *OS/390 DFS Administration Guide and Reference*.

After performing the actions described in this section, you should proceed to the next step described in "DFS Component Deconfiguration" on page 101.

Deconfigure the Fileset Server (ftserver)

To deconfigure the DFS Fileset Server (**ftserver**), the steps shown in this section should be performed.

Note: You can skip the steps that require an **fts** command to be issued if the Fileset Location Database Server (**flserver**) has already been deconfigured on this host system and there is no other **flserver** running in the DCE cell. Refer to "Deconfigure the Fileset Location Database Server (flserver)" on page 103 for more information.

The steps to deconfigure the **ftserver** on an OS/390 system with DCE host name *dcehostname* are:

1. Insure that the **boserver** is running on the host system.
2. Insure that the **ftserver** is running the host system.
3. Login as a user ID with DCE **cell_admin** authority from OMVS.
4. List fileset entries from the Fileset Location Data Base (FLDB) for the host using the following command:

   fts lsfldb -server /.:/hosts/*dcehostname*
5. Delete each fileset entry from the FLDB for *dcehostname* using the following command:

   fts delfldbentry -fileset *abc.fileset* **-server {***ipaddress* **| /.:/hosts/***dcehostname***}**
6. Delete the server entry from the FLDB for *dcehostname* using the following command:

   fts delserverentry -server {*ipaddress* **| /.:/hosts/***dcehostname***}**
7. Delete the DFS customable files described in Table 6 on page 133.
8. If the **ftserver** is running on the host system, issue the following command from OMVS:

   bos stop /.:/hosts/*dcehostname* **ftserver**
9. Issue the following command:

   bos delete /.:/hosts/*dcehostname* **ftserver**

For additional detailed information about the **bos** and **fts** commands, see *OS/390 DFS Administration Guide and Reference*.

After performing the actions described in this section, you should proceed to the next step described in "DFS Component Deconfiguration" on page 101.

Deconfigure the DFS File Server

To deconfigure the DFS File Server the steps shown in this section should be performed.

Note: You can skip the steps that require an **fts** command to be issued if the Fileset Location Database Server (**flserver**) has already been deconfigured on this host system and there is no other **flserver** running in the DCE cell. Refer to "Deconfigure the Fileset Location Database Server (flserver)" on page 103 for more information.

The steps to deconfigure the DFS File Server on an OS/390 system with DCE host name *dcehostname* are:

1. Login as a user ID with DCE **cell_admin** authority from OMVS.
2. Verify that the DFS server entry for DCE host name *dcehostname* still exists by issuing the command:

   $ **fts lsserverentry -all**

3. If it exists, delete the server entry from the FLDB for *dcehostname* using the following command:

   $ **fts delserverentry -server {***ipaddress* | **/.:/hosts/***dcehostname***}**

4. Use **DFSCONF** to deconfigure the DFS File Server (see "Using DFSCONF to Deconfigure DFS Servers").

After performing the actions described in this section, you should proceed to the next step described in "DFS Component Deconfiguration" on page 101.

Using DFSCONF to Deconfigure DFS Servers

Note: Refer to "Using the DFS Configuration Program (DFSCONF)" on page 37 for information on how to use **DFSCONF** to DCE login as a cell administrator and select the option to **Deconfigure DFS Servers** from the DFSCONF Main Menu.

Using the **DFSCONF** panels to deconfigure your system automates some of the deconfiguration process. It is recommended that you use the **DFSCONF** panels to deconfigure DFS on your OS/390 DCE host system system.

If you plan to completely deconfigure your system, it is recommended that the Backup Tape Coordinator, Backup Database server, and Fileset Database server be deconfigured before the DFS File Server is deconfigured. The DFS Client can be deconfigured before or after any of the DFS servers are deconfigured.

Selecting Deconfigure DFS Servers from the DFSCONF Main Menu displays the panel shown in Figure 9.

```
IOEBDCFG---------------- DECONFIGURE DFS SERVERS -----------------------------

COMMAND ===>

DCE Cell Name         ===> dcecellname

DCE Host Name         ===> dcehostname


Options:

  DFS File Server               ===> N
  DFS Backup Server             ===> N
  DFS Fileset Database Server   ===> N

Enter END COMMAND to return to previous menu.









F1=HELP      F2=SPLIT     F3=END       F4=RETURN    F5=RFIND     F6=RCHANGE
F7=UP        F8=DOWN      F9=SWAP     F10=LEFT     F11=RIGHT    F12=RETRIEVE
```

Figure 9. Deconfiguring DFS Servers Panel

The menu items are:

Menu Item	Description
DCE Cell Name	This is the DCE cell name used to previously configure DCE on this OS/390 system and is obtained from the DCE configuration file **/opt/dcelocal/dce_cf.db**. It normally should not be changed on this panel and is displayed for information purposes only.
DCE Host Name	This is the DCE host name currently defined by the DCE configuration on this OS/390 system and is obtained from the DCE configuration file **/opt/dcelocal/dce_cf.db**. It normally should not be changed on this panel but if you want to deconfigure the DFS servers using a different DCE host name you can change it. The DCE host name value is case-sensitive.
DFS File Server	To deconfigure the DFS File Server, change the option from **N** to **Y**. To initiate the deconfiguration of this server, press <**Enter**> after selecting other options.
Backup Server	To deconfigure the Backup Database Server (**bakserver**), and Backup Tape Coordinator (**butc**) servers, change the option from **N** to **Y**. To initiate the deconfiguration of this server, press <**Enter**> after selecting other options.
DFS Fileset Location Database Server	To deconfigure the Fileset Location Database server (**flserver**), change the option from **N** to **Y**. To initiate the deconfiguration of this server, press <**Enter**> after selecting other options.

After deconfiguration processing is initiated (by pressing <**Enter**>) for the selected servers, the servers are deconfigured in order, starting with the bottom option working up the list.

The program begins issuing the DCE administration commands that deconfigure the server (see Appendix A, “Example DFS Server Configuration Log File (dfsconf.log)” on page 123).

If not interrupted, and if successfully completed, the program displays a server Deconfiguration Ended....SUCCESSFULLY message for each selected server.

If interrupted, or if deconfiguration was not successful for a server, a server Deconfiguration Ended....UNSUCCESSFULLY message is displayed for the server.

To determine where the error occurred that caused the deconfiguration to fail, examine the **dfsconf.log** file, which by default is in your home directory, or at the location specified by the environment variable **_IOE_CFG_LOG_FILE**. Refer to Appendix A, “Example DFS Server Configuration Log File (dfsconf.log)” on page 123 for an example output of a **dfsconf.log** file. If the **dfsconf.log** file already exists, **DFSCONF** appends messages to the end of the log file.

When **DFSCONF** processing is complete, if you want to now (re-)configure the DFS server or servers on the DCE host system, refer to “DFS Configuration Main Menu” on page 40.

If you intend to remove the DFS Fileset Location Database Server (**flserver**) from this DCE host system, refer to “Completing the Fileset Location Database Server Deconfiguration” on page 104.

If you intend to remove the DFS Backup Database Server (**bkserver** or **bakserver**) from this DCE host system, refer to “Completing the Backup Database Server Deconfiguration” on page 103.

If you want to remove all DFS servers from the DCE host system, after completing the instructions in “Completing the Fileset Location Database Server Deconfiguration” on page 104 and “Completing the Backup Database Server Deconfiguration” on page 103, you should refer to “Removing DFS Servers from a Host System” on page 109.

After following the previous instructions in this section, DFS server deconfiguration is complete.

Using DFSCONF to Deconfigure the DFS Client

Note: Refer to “Using the DFS Configuration Program (DFSCONF)” on page 37 for information on how to use **DFSCONF** to DCE login as a cell administrator and select the option to **Deconfigure DFS Client** from the DFSCONF Main Menu.

The DFS client (**DFSCM**) should be deconfigured to remove it from a DCE host system.

Note: If you intend to simply change the form of **DFSCM** caching (e.g from memory caching to disk caching), there is no need to deconfigure the **DFSCM** before changing the disk configuration values. See “DFSCM Disk Caching” on page 59 for more information.

As the **DFSCM** does not require any DFS servers to be running on the same OS/390 system, the deconfiguration process for **DFSCM** is handled separately from the DFS servers.

Selecting DFS Client from the DFSCONF Main Menu displays the panel shown in Figure 10.

```
IOEBDCL---------------- DECONFIGURE DFS CLIENT ------------------------

COMMAND ===>

DCE Cell Name  ===> dcecellname

DCE Host Name  ===> dcehostname


Options:

  DFS Client   ===> N

Enter END COMMAND to return to previous menu.







F1=HELP      F2=SPLIT     F3=END       F4=RETURN    F5=RFIND     F6=RCHANGE
F7=UP        F8=DOWN      F9=SWAP     F10=LEFT     F11=RIGHT    F12=RETRIEVE
```

Figure 10. Deconfiguring the DFS Client (DFSCM) Panel

The menu items are:

Menu Item	Description
DCE Cell Name	This is the DCE cell name used to previously configure DCE on this OS/390 system and is obtained from the DCE configuration file **/opt/dcelocal/dce_cf.db**. It normally should not be changed on this panel and is displayed for information purposes only.

DCE Host Name	This is the DCE host name currently defined by the DCE configuration on this OS/390 system and is obtained from the DCE configuration file **/opt/dcelocal/dce_cf.db**. It normally should not be changed on this panel but if you want to deconfigure the DFS client using a different DCE host name you can change it. The DCE host name value is case-sensitive.
DFS Client	To initiate the deconfiguration of the **DFSCM**, change the DFS Client option from **N** to **Y** and press <**Enter**>.

Note: After the **DFSCM** is deconfigured as described above, you should not restart the DFS client as described in "Starting and Stopping the DFS Client (DFSCM)" on page 113 before the **DFSCM** is (re)configured as described in Chapter 7, "Configuring DFS" on page 31.

When DFSCONF processing is complete, if you want to now (re-)configure the **DFSCM** on the DCE host system, refer to "DFS Configuration Main Menu" on page 40.

Or, if you intend to remove the **DFSCM**, from your system, refer to "Remove the DFS Client from a Host System."

Removing DFS Servers from a Host System

To remove DFS servers from a OS/390 DCE host system, you should:

1. Deconfigure all the DFS servers as outlined in "DFS Component Deconfiguration" on page 101
2. Insure all the DFS customable files described in Table 6 on page 133 are deleted
3. Delete any DCE LFS filesets allocated on the OS/390 host system for exporting to DFS clients.

Remove the DFS Client from a Host System

After deconfiguring DFS Client (**DFSCM**) as described in "Deconfigure the DFS Client (DFSCM)" on page 101, you can perform the following actions to remove the **DFSCM** from a host system:

If you intend to remove the **DFSCM** from your system, perform the following actions:

1. Remove the **BPXPRM*xx* FILESYSTYPE TYPE(DFSC)** entry in the data set that is allocated to the IEFPARM DD statement in the OS/390 system start-up procedure. Once removed, OS/390 does not attempt to start the DFS client during the next OS/390 initialization (IPL).
2. Delete the **/opt/dcelocal/etc/CacheInfo** file.
3. Delete the **/opt/dfslocal/home/dfscm/envar** file.
4. If a DCE Local File System aggregate was allocated during the initial configuration for DFS client disk caching, de-allocate the aggregate or re-use the aggregate for other purposes as needed.

Note: After the **DFSCM** is fully deconfigured and removed from your system, you should not restart the DFS client as described in "Starting and Stopping the DFS Client (DFSCM)" on page 113 before OS/390 is re-IPL'ed.

DFS Deconfiguration Steps for DCE Host Name Change

To change a DCE host name for an OS/390 system, DCE must be reconfigured. If DFS is configured on a OS/390 DCE host system, it is recommended that DFS be deconfigured before DCE is deconfigured. Then DCE and DFS can then be configured using the new DCE host name.

Additionally, certain DFS administrative files must be changed and re-created to reflect the new DCE hostname. This section describes how to change the DCE hostname and the DFS configuration to reflect the new DCE host name. It includes the following:

- "Recommended Reconfiguration Steps When Changing DCE Host Name"
- "DCE Host Name Change While DFS is Configured"
- "DCE Host Name Change While DFS is Configured."

Unless otherwise noted, more information on the commands and files referred to in this section can be found in the *OS/390 DFS Administration Guide and Reference*.

Also, it is recommended that the command parameter specification **/.:/hosts/***dcehostname* should be used instead of the *ipaddress* parameter whenever possible.

If you need more information on deconfiguring DCE and reconfiguring DCE see the *OS/390 DCE Configuring and Getting Started* book. If you need more information on the DCE commands shown in this section (for example, **dcecp** and **cdscp**), see the *OS/390 DCE Command Reference*.

For additional information on how to deconfigure DFS using **DFSCONF**, see Chapter 10, "Deconfiguring DFS" on page 99.

Recommended Reconfiguration Steps When Changing DCE Host Name

The recommended sequence of DFS and DCE reconfiguration steps are:

1. Use **DFSCONF** to deconfigure DFS using the current DCE host name.

   Note: The DCE host name displayed on the DFSCONF panels is the DCE host name that must be used for the DFS deconfiguration in this scenario.

2. Deconfigure DCE.
3. Configure DCE using a new DCE host name.
4. Configure DFS using the new DCE host name.

   Note: The new DCE host name that must be used for DFS configuration is displayed appropriately on DFSCONF panels.

5. Complete DFS deconfiguration by removing the DFS entries from various configuration files that contain the previous DCE host name and creating new configuration files entries that contain the new DCE host name (see "DCE Host Name Change While DFS is Configured").

DCE Host Name Change While DFS is Configured

Although not recommended, if DCE is deconfigured and reconfigured with a new DCE host name (*newdcehostname*) while DFS remains configured on an OS/390 system with the previous DCE host name (*olddcehostname*), DFS does not operate properly.

Note: Make sure you review, "DCE Deconfiguration Considerations for DFS" on page 100, before you proceed with the following.

To restore DFS to an operational status, DFS must be reconfigured on the OS/390 DCE host system using the following sequence of DFS reconfiguration steps:

1. **Deconfigure DFS**

   Use **DFSCONF** to deconfigure all DFS components that are configured on the OS/390 system.

   Note: The DCE host name displayed on the DFSCONF panels is the *newdcehostname*. It must be replaced with the *olddcehostname* used for the DCE configuration. You can ignore any errors that occurred while running **DFSCONF**.

2. **Configure DFS**

   Use **DFSCONF** to configure all DFS components that are required on the OS/390 system.

   Note: It is the *newdcehostname* that must be used for this DFS configuration. Change the DCE host name on the panel if the new DCE host name is not displayed.

3. **Start DFS Servers**

   At this time, you must start the DFS servers that were previously configured on this DCE host system using the OS/390 system operator command **start dfs**. Since the DFS administrative list files in the directory **/opt/dfslocal/var/dfs** and the **/opt/dcelocal/var/dfs/BosConfig** file should be intact from the previous configuration of DFS, the DFS servers initialize successfully.

4. **Complete DFS deconfiguration**

   You must complete the DCE host name change for DFS by removing the DFS entries from various configuration files that contain the previous DCE host name, and by creating new configuration file entries that contain the new DCE host name.

   The steps to complete DFS deconfiguration and reconfiguration after DCE is configured using the new DCE host name are listed below. Some of the steps to establish the DFS configuration file entries for the *newdcehostname* are the same as the additional steps used to complete the configuration of the DFS components that are described in Chapter 7, “Configuring DFS” on page 31.

   The steps to complete DFS deconfiguration and reconfiguration after a DCE host name change are:

   a. Verify the correct DCE host name by issuing the following command:

      dcecp -c host catalog | grep *newdcehostname*

      Note: The **dcecp** command is described in the *OS/390 DCE Configuring and Getting Started* book.

   b. You must determine the TCP/IP address (*ipaddress*) that corresponds to the *newdcehostname* using the following command:

      cdscp show object /.:/hosts/*newdcehostname***/self | grep ncadg**

      Note: The **cdscp** command is described in the *OS/390 DCE Configuring and Getting Started* book. Also, it is recommended that you remember the *ipaddress* in case you may required it at a later time.

   c. Using the TCP/IP address list fileset entries from the Fileset Location Data Base (FLDB) for the DCE host system using the following command:

      fts lsfldb -server *ipaddress*

      Note: You must remember the fileset names and fileset IDs for the filesets displayed if you have HFS or RFS filesets and you did not name your HFS or RFS filesets using the MVS data set name (*mvsdatasetname*) allocated for the fileset. In step 4i on page 112, you need to refer to this list to determine the correct fileset name to use for HFS or RFS filesets.

   d. Delete each fileset entry from the FLDB for the DCE host system using the following command:

      fts delfldbentry -fileset *abc.fileset* **-server** *ipaddress*

e. Remove the entry from the Fileset Location Database (FLDB) for the DFS servers that were configured on the OS/390 host system using the *olddcehostname*. Delete the server entry using the following command:

   fts delserverentry -server *ipaddress*

f. Add the server entry for *newdcehostname* using the following command:

   fts crserverentry -server /.:/hosts/*newdcehostname* **-principal hosts/***newdcehostname*

g. Synchronize the FLDB with the fileset IDs using the following command:

   fts syncfldb -server /.:/hosts/*newdcehostname*

   Note: The **fts syncfldb** command sets HFS and RFS fileset names to the MVS data set name (*mvsdatasetname*) allocated for the fileset. HFS and RFS fileset names that are different from the MVS data set name are not propagated by the **fts syncfldb** command.

h. Display FLDB to see the current fileset names and fileset IDs using the following command:

   fts lsfldb

   Note: The HFS and RFS fileset names displayed are the MVS data set names from the **devtab** file (**/opt/dcelocal/var/dfs/devtab**).

i. If you do not name your HFS or RFS filesets using the MVS data set name (*mvsdatasetname*) allocated for the fileset, you must now rename the HFS or RFS filesets.

   First, you must determine the fileset name that was previously used for each fileset before DFS was reconfigured. In step 4c, you listed and saved the previous fileset entries from the FLDB for the DCE host. This list is referred to as the `previous FLDB list`. In step 4h, you displayed the current fileset entries from the FLDB for all DCE hosts in the cell where DFS is exporting filesets. This display is referred to as the `current FLDB list`. Now, to rename the HFS or RFS filesets follow these steps:

   1) In the `current FLDB list`, look in the **aggr** column to determine the aggregate name.

   2) Look in the **dfstab** file to determine if the aggregate name has a file system type of **ufs**.

   3) If the aggregate has a file system type of **ufs**, locate the aggregate name in the `previous FLDB list` and use the associated fileset name as the *previousfilesetname*. The *previousfilesetname* is used as the **-newname** specification below.

   4) In the `current FLDB list` entry for this aggregate name, you can determine the current fileset name which was set to the *mvsdatasetname* by the **fts syncfldb** command issued in step 4g. The *mvsdatasetname* is used as the **-oldname** specification below.

   5) Now, you can rename the HFS or RFS fileset in the FLDB using the following command:

      fts rename -oldname *mvsdatasetname* **-newname** *previousfilesetname*

Chapter 11. Starting and Stopping DFS Components

This chapter describes the procedures necessary to start and stop the DFS client (**DFSCM**) and the DFS servers on OS/390 DFS. On OS/390 DFS, the DFS client is implemented as a physical file system running as a colony address space, **DFSCM**. The DFS servers run in the DFS address space, **DFS**. A separate **DFSKERN** address space may optionally exist to provide better recovery capability for the server processes running in the **DFS** address space.

This chapter discusses the following topics:

Starting and Stopping the DFS Client (DFSCM)

This section discusses the DFS client (**DFSCM**) address space and various ways of starting and stopping the DFS client on OS/390 DFS. It contains the following topics:

Who Can Start and Stop DFSCM?

A user with OS/390 operator privileges is the only one who can start or stop the DFS client (**DFSCM**).

DFSCM Initialization

The **DFSCM** is started as part of OS/390 initialization and can be stopped and restarted without stopping OS/390. Other OS/390 DFS servers do not need to be running on the local OS/390 system with the **DFSCM**. **DFSCM** is a colony address space that is automatically started by OMVS as a physical file system during system IPL when OMVS is started. The DFS client is identified as a physical file system in the system parmlib **BPXPRM***xx* member **FILESYSTYPE TYPE(DFSC)** entry that is read during system initialization.

Note: The variable, *xx*, is a suffix used to uniquely identify system parmlib members.

On OS/390, the **FILESYSTYPE TYPE(DFSC)** entry in the system parmlib member **BPXPRM***xx* causes OS/390 to initialize the **DFSCM**. Information is passed from the **FILESYSTYPE TYPE(DFSC)** entry to the **DFSCM**. Refer to "System Parmlib Member BPXPRMxx Entry for the DFSCM" on page 56 for more information.

In OS/390, the DFS client runs in the colony address space, **DFSCM**. **DFSCM** daemons **ioecmini**, **ioedfsd**, and **ioelogin** run as processes within the **DFSCM** address space and can not be controlled separately.

When initializing the **DFSCM**, OS/390 UNIX issues the **ioecmini** process. The **ioecmini** process performs several functions including:

- Starting the **ioedfsd** process which in turn, creates various worker threads.

- Mounting the HFS file system name specified in the system parmlib member **BPXPRM***xx* **FILESYSTYPE TYPE(DFSC)** entry for the DFS client.
- Returning to OS/390 UNIX before it has completed initialization.
- Waiting for DCE to initialize before completing initialization and notifying OS/390 UNIX that the DFS client is available as a physical file system.

After **DFSCM** notifies OS/390 UNIX that the DFS client is available as a physical file system, **ioecmini** is subsequently invoked by OS/390 UNIX in cross memory mode by a program call as a result of a file system interface request when an OMVS user or application references a directory or file in the DFS (**/...**) namespace. More information on the DFS namespace follows.

The **ioecmini** process queues work for the **ioedfsd** process which does not run in cross memory mode. The **ioedfsd** process and its threads perform the necessary work to service the request and returns information to the **ioecmini** process which in turn, returns the information to OS/390 UNIX and the OMVS user or application. Additionally, requests are queued to the **ioelogin** process by the **ioedfsd** process to perform DCE login services.

Important Note to Users

The **ioedfsd** process is also unique in OS/390 in that it combines the functions of the traditional Cache Manager **dfsd** and **dfsbind** processes. The **dfsd** and **dfsbind** command options are described in the *OS/390 DFS Administration Guide and Reference*.

During initialization, the **DFSCM** also reads parameters from the local HFS **/opt/dcelocal/etc/CacheInfo** file and the **/opt/dfslocal/home/dfscm/envar** file. A parameter specified in the **CacheInfo** file is overridden by the same parameter specified in the **envar** file. Refer to “Completing the DFS Client (DFSCM) Configuration” on page 56, for more information on the **CacheInfo** and **envar** file.

Important Note to Users

DFSCM information specified in the system parmlib member **BPXPRM***xx* only takes effect for the **DFSCM** when OMVS is started. Also, the **DFSCM _EUV_HOME** environment variable must be specified in the system parmlib **BPXPRM***xx* **FILESYSTYPE TYPE(DFSC)** entry.

Initialization processing for the **DFSCM** waits until DCE initialization processing is completed. The initialization process for the **DFSCM** assumes that the local directory, **/...**, exists and mounts the DFS global namespace, identified locally by an OS/390 Hierarchical File System (HFS) file system name, at this directory. The HFS file system does not need to physically exist but the file system name should be unique as it identifies the DFS global namespace on the local OS/390 host system. Any information previously mounted or accessed using the **/...** pathname is overlaid and unavailable while the **DFSCM** is running. Refer to the *OS/390 Program Directory* or to the *OS/390 DFS Administration Guide and Reference* for more information on the local HFS file system used for DFS.

Starting the DFS Client (DFSCM)

DFSCM is started automatically, during the system IPL, as part of OMVS initialization. After the initialization has completed successfully you receive the following message:

```
IOEC04183I DFSD: initialization complete
```

In OS/390, you can customize and control several DFS client features by specifying **DFSCM** initialization parameters in the **/opt/dcelocal/etc/CacheInfo** file and **_IOE_CM_PARMS** environment variable (located

in **/opt/dfslocal/home/dfscm/envar**). For more information, see “DFSCM Initialization” on page 113 and “Completing the DFS Client (DFSCM) Configuration” on page 56.

Stopping and Restarting the DFSCM

To **stop** the **DFSCM** address space, use the **stop** operator command. (Refer to *OS/390 MVS System Commands* book, GC28-1781, for more information on the **stop** operator command.)

```
stop dfscm
```

To **restart** the **DFSCM** address space, reply to the OS/390 operator console message:

```
*nn BPXF014D FILESYSTYPE DFSC TERMINATED.  REPLY 'R' WHEN READY TO RESTART.
```

DFSCM Relationship to DCE and DFS Servers

To configure and use the **DFSCM**, DCE must be running on the same host system. **DFSCM** waits for DCE to start before completing initialization. If DCE stops while the **DFSCM** is running, the **DFSCM** processing fails.

Starting and Stopping the DFS Servers

Note: In OS/390 DFS, the DFS servers are sometimes referred to as ***daemons***.

This section describes the procedures necessary to start and stop the DFS servers or daemons on OS/390 DFS. For an overview of the DFS servers and processes, see “DFS Address Space and Processes” on page 13.

This section includes the following topics:

Who Can Start and Stop DFS Server and boserver Processes?

There are two types of users who can start or stop the DFS server OS/390 address space and the processes controlled by **DFSCNTL**, (see “Controlling DFS Server Processes with System MODIFY Command” on page 117):

- A user with OS/390 operator privileges.
- A user who has update privilege to the **DFSKERN.START.REQUEST** RACF facility. This facility is created during the installation of DFS. For more information on this RACF facility, refer to the *OS/390 Program Directory*.

The **boserver** process itself is controlled by the **DFSCNTL** process. But it, in turn, controls sub-processes (see “Starting the boserver Processes from OMVS” on page 118, for more information on these processes). To start or stop the **boserver** sub-processes from OMVS using the **bos create** or **bos stop** command, the issuer must be logged into DCE with DCE principal or DCE group that is listed in the **admin.bos** file on the DCE host where the **boserver** sub-process is running. (Note, you can also issue

bos commands with the **-localauth** option when you are logged on the OS/390 system as **root** user with **UID=0**. For further information, see the *OS/390 DFS Administration Guide and Reference*.)

Order of Starting DFS Daemons

When DFS starts, the DFS daemons that are started automatically are controlled by the configuration type in the **/opt/dfslocal/etc/ioepdcf** file.

When DFS daemons are started manually, the successful start-up of some daemons depends on the availability of services provided by other daemons. This implies that the DFS daemons must be started in a particular order.

The following is the sequence in which DFS daemons should be started on a DCE host system:

1. **dfskern**
2. **export**
3. **boserver**
4. **bakserver**
5. **butc***nn*
6. other DFS servers controlled by the **boserver** can be started in any order.

For example to start the **boserver**, the **dfskern** daemon must already be up and running.

If the DFS daemons are started using the **modify dfs,start all** OS/390 system operator command, DFS ensures that the correct starting order is followed.

Note that if the **/opt/dfslocal/etc/ioepdcf** file indicates that a **butc** daemon should be started automatically, and a **bakserver** is not already running in the DCE cell, the **butc** daemon fails to start automatically. If the **bakserver** is run on the same DCE host system with a **butc** daemon, the **butc** daemon must be started using the **modify dfs,start butc***nn* command.

Make sure that the passwords of the DFS daemons are valid before starting them up. If the passwords have expired, the daemons cannot be started. For further information, see the *OS/390 DFS Administration Guide and Reference*.

Starting DFS Server with System START Command

The OS/390 system command, **start**, is used to start DFS in OS/390 DFS (for detailed information regarding this command, see *OS/390 DFS DFS Administration Guide and Reference*).

To start **dfs**, issue the following command:

```
start dfs
```

A message written by **dfsexport** specifies each aggregate that you have exported and that is attached to the file system. If there are problems in exporting an aggregate, **dfsexport** issues a message identifying the aggregate that failed to attach.

Stopping the DFS Server with System STOP Command

To stop the DFS address space, use the **stop** operator command to ensure the normal shutdown of the address space.

To stop the DFS address space and all DFS daemons, enter the following OS/390 operator commands:

```
modify dfs,start unexport (optional)
stop dfs
```

Note: You can issue the **modify** command with the **unexport** option to perform an orderly shutdown of the DFS server. The **modify dfs,start unexport** command insures updates to files made by DFS clients are written to the DFS server and makes the files in exported aggregates unavailable to the DFS clients. It is not necessary to issue the command if a normal DFS shutdown is being performed using the **stop dfs** command. It is shown here for your information. The **modify dfs,start export** command can be used to instruct the DFS file server to re-export aggregate file data. Refer to "Controlling DFS Server Processes with System MODIFY Command" for more information.

Controlling DFS Server Processes with System MODIFY Command

Once the DFS address space is started, the DFS Control Task, **DFSCNTL**, is running. Processes under its control can be stopped, restarted, or queried by issuing the OS/390 system command, **modify** (for detailed information regarding this command, see the *OS/390 DFS DFS Administration Guide and Reference*). Processes that run under **DFSCNTL** are: **dfskern**, **dfsexport** (which includes the **export** and **unexport** processes), **boserver**, and **butc01** through **butc08**.

Note: In OS/390 DFS, the following subprocesses run under the control of the **boserver** process: **bkserver**, **flserver**, **ftserver**, **rpserver**, **upserver**, and **upclient**. These processes are started and stopped differently (see "Starting the boserver Processes from OMVS" on page 118 and "Stopping All the boserver Processes from OMVS" on page 121).

For example, to start the **butc01** daemon, enter the following:

```
modify dfs,start butc01
```

To start all the daemons, enter the following:

```
modify dfs,start all
```

Do not use the **modify** command to start additional DFS daemons while the DFS address space is still initializing. During initialization, **DFSCNTL** attempts to start all the processes that run under its direct control that have been configured on the OS/390 host system and have the appropriate configuration type in the **/opt/dfslocal/etc/ioepdcf** file (for further information, see "Customizing the ioepdcf File" on page 62). If you issue the **modify** command while DFS is initializing, the DFS daemons may be started out of order or stopped erroneously. This may lead to unexpected errors during initialization and cause DFS to end abnormally.

Note: You must wait until DFS has issued a log message indicating that DFS initialization has completed before using additional **modify** commands.

To stop the DFS daemons that run under **DFSCNTL** (**dfskern**, **export**, **unexport**, **boserver**, **butc01** thru **butc08**) but not the DFS address space, use the **stop all** command. For example:

```
modify dfs,stop all
```

The **stop all** command causes **DFSCNTL** to stop all daemons that it controls. The **boserver** is stopped, causing all daemons controlled by it to also be stopped.

You can use the **modify dfs** system command to stop any specific daemon that runs under **DFSCNTL**. For example, to stop the **boserver** and all its sub-processes, enter:

```
modify dfs,stop boserver
```

Starting the boserver Processes from OMVS

The **boserver** process, like all processes that run under the control of the Control Task, can be started automatically during system initialization. This can be done by specifying a **Y** for the **boserver's** configuration type in the **/opt/dfslocal/etc/ioepdcf** file (for further information, see “Customizing the ioepdcf File” on page 62). Processes that run under the control of the **boserver** are started using the **bos create** command and are automatically started when the **boserver** starts. These processes are:

- **bkserver**
- **flserver**
- **ftserver**
- **rpserver**
- **upserver**
- **upclient**.

Starting the **boserver** creates empty **/opt/dfslocal/var/dfs/BosConfig** and **/opt/dfslocal/var/dfs/admin.bos** files if the files do not exist.

Prior to starting any of the processes controlled by the **boserver**, consult the following:

- If you plan to start the **bkserver**, refer to “Completing the Backup Database Server (bakserver) Configuration” on page 51.
- If you plan to start the **flserver**, refer to “Completing the FLDB Server (flserver) Configuration” on page 45.
- If you plan to start the **ftserver**, refer to “Completing Fileset Server (ftserver) Configuration” on page 47.
- If you plan to start the **rpserver**, refer to “Completing Replication (repserver) Server Configuration” on page 49.
- If you plan to start the **upclient**, refer to “Completing Update Client (upclient) Configuration” on page 49.
- If you plan to start the **upserver**, refer to “Completing Update Server (upserver) Configuration” on page 50.

Important Note to Users

Do not run the **upserver** and **upclient** daemons on the same OS/390 machine.

To start any of the **boserver's child** processes, use the **bos create** command. To direct **STDOUT** and **STDERR** from the **child** processes to their own output DD name, a redirection parameter is needed for the **bos create** command. The parameters must also include the definition of an environment variable to define the program's home directory. This allows the server running under DCE to find the proper **krb5ccname** file and to perform its own dce_login. The path for the program must be substituted with the partitioned data set member name of the program to be run.

Besides starting the **child** process, the **bos create** command updates the **/opt/dfslocal/var/dfs/BosConfig** file and cause the **child** process to be started each time the **boserver** is restarted.

In the following example, of starting the **ftserver**, **/.:/hosts/DFSMVS** identifies the OS/390 host running the DFS server started task. The **ftserver simple** entry specifies the server process name and process type. The **ftserver** entry immediately following the first **"** (double quote) is the name of the member in the SIOELMOD data set in the OS/390 MVS partitioned data set (PDS) load library (the SIOELMOD data set was created during OS/390 DFS installation). For further information, refer to the *OS/390 Program Directory*. The portion of the command in double quotes specifies the program, **ftserver**, to be executed, sets a runtime parameter, **envar**, and redirects **STDOUT** for this process to the OS/390 ddname

dd:ftserver. In OS/390 DFS, **envar**, the runtime parameter, must include **_EUV_HOME** which points to that process' home directory. The slash, **/**, before **>dd:ftserver** separates the runtime parameters from the OS/390 DFS program parameters. A redirection parameter to the server's own output ddname must be specified in OS/390 DFS. In this example, the redirection of **STDOUT** to **DDNAME=FTSERVER** and the redirection of **STDERR** to **STDOUT** is specified by: **dd:ftserver 2>&1**. It is important to note that OS/390 DFS may, depending on the processes to be created, require additional parameters.

```
$ bos create /.:/hosts/DFSMVS ftserver simple "ftserver \
    envar('_EUV_HOME=/opt/dfslocal/home/ftserver')/ >dd:ftserver 2>&1"
```

The process automatically begins on OS/390 after issuing this command and whenever the **boserver** is restarted.

Example of Creating, Starting, and Stopping the ftserver: An example command to create and start the **ftserver** process on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos create /.:/hosts/DFSMVS ftserver simple "ftserver \
  envar('_EUV_HOME=/opt/dfslocal/home/ftserver')/ >dd:ftserver 2>&1"
```

The **bos create** command updates the **/opt/dfslocal/var/dfs/BosConfig** file. As a result, the **ftserver** process starts on the OS/390 system and whenever the **boserver** is restarted.

An example command to stop the **ftserver** process on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos stop /.:/hosts/DFSMVS ftserver
```

An example command to restart the **ftserver** process on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos start /.:/hosts/DFSMVS ftserver
```

Example of Creating, Starting, and Stopping the bakserver: An example command to create and start the **bkserver** process (also known as the **bakserver**) on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos create /.:/hosts/DFSMVS bakserver simple "bkserver \
  envar('_EUV_HOME=/opt/dfslocal/home/bakserver')/ >dd:bkserver 2>&1"
```

Note: Enter the previous command by specifying **bakserver** and **bkserver** exactly as shown.

The **bos create** command updates the **/opt/dfslocal/var/dfs/BosConfig** file. As a result, the **bakserver** starts on the OS/390 system and whenever the **boserver** is restarted.

An example command to stop the **bakserver** process on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos stop /.:/hosts/DFSMVS bakserver
```

An example command to restarting the **bakserver** process on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos start /.:/hosts/DFSMVS bakserver
```

Example of Creating, Starting, and Stopping the flserver: An example command to create and start the **flserver** process on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos create /.:/hosts/DFSMVS flserver simple "flserver \
  envar('_EUV_HOME=/opt/dfslocal/home/flserver')/ >dd:flserver 2>&1"
```

The **bos create** command updates the **/opt/dfslocal/var/dfs/BosConfig** file. As a result, the **flserver** process starts on the OS/390 system and whenever the **boserver** is restarted.

An example command to stop the **flserver** process on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos stop /.:/hosts/DFSMVS flserver
```

An example command to restart the **flserver** process on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos start /.:/hosts/DFSMVS flserver
```

Example of Creating, Starting, and Stopping the repserver: An example command to create and start the **rpserver** process (also known as the **repserver**) on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos create /.:/hosts/DFSMVS repserver simple "rpserver \
  envar('_EUV_HOME=/opt/dfslocal/home/repserver')/ >dd:rpserver 2>&1"
```

Note: Enter the previous command by specifying **repserver** and **rpserver** exactly as shown.

The **bos create** command updates the **/opt/dfslocal/var/dfs/BosConfig** file. As a result, the **repserver** starts on the OS/390 system and whenever the **boserver** is restarted.

An example command to stop the **repserver** on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos stop /.:/hosts/DFSMVS repserver
```

An example command to restart the **repserver** on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos start /.:/hosts/DFSMVS repserver
```

Example of Creating, Starting, and Stopping the upserver: Here is an example of creating and starting an **upserver** process and enabling it to act as the system control machine for the specified administrative files. In this example, the administrative files (**admin.bak**, **admin.bos**, **admin.ft**, **admin.fl**, and **admin.up**) all reside in the directory **/opt/dcelocal/var/dfs/**. To create and start an **upserver** on an OS/390 system with a DCE host name of **DFSMVS**, issue the following command from OMVS:

```
$ bos create /.:/hosts/DFSMVS upserver simple "upserver \
  envar('_EUV_HOME=/opt/dfslocal/home/upserver')/ >dd:upserver 2>&1 \
  /opt/dcelocal/var/dfs/ admin.bak admin.bos admin.ft admin.fl \
  admin.up"
```

The **bos create** command updates the **/opt/dfslocal/var/dfs/BosConfig** file. As a result, the **upserver** process starts on the OS/390 system and whenever the **boserver** is restarted.

An example command to stop the **upserver** on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos stop /.:/hosts/DFSMVS upserver
```

An example command to restart the **upserver** on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos start /.:/hosts/DFSMVS upserver
```

Example of Creating, Starting, and Stopping the upclient: Here is an example of creating and starting the **upclient** process when the **upclient**, the **boserver**, and the **ftserver** are on the OS/390 system with a DCE host name of **DFSMVS** and the **upserver** is on the system with a DCE host name of *dcehostnameups*. To create and start the **upclient** from OMVS, issue the command:

```
$ bos create /.:/hosts/DFSMVS upclient simple "upclient \
  envar('_EUV_HOME=/opt/dfslocal/home/upclient')/ >dd:upclient 2>&1 \
  /.:/hosts/dcehostnameups /opt/dcelocal/var/dfs/admin.bos  \
  /opt/dcelocal/var/dfs/admin.ft -f UpCLog"
```

The **bos create** command updates the **/opt/dfslocal/var/dfs/BosConfig** file. As a result, the **upclient** process starts on the OS/390 system and whenever the **boserver** is restarted.

An example command to stop the **upclient** on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos stop /.:/hosts/DFSMVS upclient
```

An example command to restart the **upclient** on the system with a DCE host name of **DFSMVS** from OMVS is:

```
$ bos start /.:/hosts/DFSMVS upclient
```

Stopping All the boserver Processes from OMVS

Processes controlled by **boserver** can be shut down using the **bos stop** and **bos shutdown** commands from OMVS. The following command instructs the BOS Server running on **fs3** to stop all **child** processes and continue to run itself:

```
$ bos shutdown /.../abc.com/hosts/fs3
```

For further information, see the *OS/390 DFS DFS Administration Guide and Reference*.

DFS Server Relationship to DCE

To configure and use the DFS server, DCE must be running on the same host system. The DFS server cannot successfully start if DCE is not running. If DCE processing fails after the DFS server is initialized, the DFS server processing fails.

Appendix A. Example DFS Server Configuration Log File (dfsconf.log)

This appendix shows an example of the contents of an OS/390 DFS configuration log file **dfsconf.log** that is created in the home directory of the user running DFSCONF. The example shows the output of a DFS server configuration, DFS server deconfiguration, DFS client configuration and DFS client deconfiguration in that order. The output shown here is for reference only and the actual output that is created by DFSCONF in the **dfsconf.log** file may not be exactly as shown.

```
--------------------------------------------------------------------------
Notice:  DFSCONF started at Fri Dec 19 15:37:13 1997.

Notice:  Option IOEBMAIN.1 selected.
IOED01033I DFS configuration initiated at Fri Dec 19 15:37:18 1997.

Notice: Panel Data:
        <cellname>    = !nomyn.endicott.ibm.com!
        <host name>   = !DCEDFS7!
        <dfs server>  = !1!
        <backup tape> = !1!
        <backup db>   = !1!
        <fileset db>  = !-2024565684!

IOED01016I Login for cell_admin at Fri Dec 19 15:37:22 1997.
dce_login cell_admin
EUVS24588I Attention - change current password.
EUVS24577I Login successful.
dce_login cell_admin admin

Beginning configuration of DFS server machine.

IOED01022I Configure Initial Registry Information

IOED01019I Adding necessary principals to registry database for DCEDFS7.
dcecp -c group catalog

dcecp -c group create subsys/dce/dfs-admin -inprojlist yes

dcecp -c group catalog

dcecp -c group create subsys/dce/dfs-fs-servers -inprojlist yes


dcecp -c group list subsys/dce/dfs-admin

dcecp -c group add subsys/dce/dfs-admin -member cell_admin

IOED01023I Creating Security Group
IOED01019I Adding necessary principals to registry database for DCEDFS7.
dcecp -c principal create hosts/DCEDFS7/dfs-server

IOED01020I Creating the dfs-server principal for DCEDFS7.
rgy_edit -up

IOED01021I Modify ACL for DCEDFS7.
dcecp -c acl modify
```

```
 /.../nomyn.endicott.ibm.com/sec/principal/hosts/DCEDFS7/dfs-server
 -add {group subsys/dce/dfs-admin rcDnfmag}

IOED01024I Configure Initial Name Service Information
Modifying the namespace for DFS server operation
dcecp -c directory create /.:/subsys/dce/dfs

Setting ACLs on the new entries for DFS server operation
dcecp -c acl modify /.:/subsys/dce/dfs
 -ic -add {group subsys/dce/dfs-admin rwcidta}

dcecp -c acl modify /.:/subsys/dce/dfs
 -io -add {group subsys/dce/dfs-admin rwcdt}
dcecp -c acl modify /.:/subsys/dce/dfs
 -add {group subsys/dce/dfs-admin rwcdta}

dcecp -c acl modify /.:/fs -e
 -add {group subsys/dce/dfs-admin rwcdt}

dcecp -c acl modify /.:/fs -e
 -add {group subsys/dce/dfs-fs-servers rwcdt}

Setting Security ACLs
acl_edit
 -addr 50d6e004-2b8f-1f97-95dc-001234567890@ncacn_ip_tcp:9.130.79.230
  group/subsys/dce/dfs-admin -m group:acct-admin:rctDnfmM

acl_edit
 -addr 50d6e004-2b8f-1f97-95dc-001234567890@ncacn_ip_tcp:9.130.79.230
  group/subsys/dce/dfs-fs-servers -m group:acct-admin:rctDnfmM

acl_edit
-addr 50d6e004-2b8f-1f97-95dc-001234567890@ncacn_ip_tcp:9.130.79.230
 group/subsys/dce/dfs-fs-servers -m group:subsys/dce/dfs-admin:rctDnfmM

Configure Registry Information              .
dcecp -c group add subsys/dce/rpc-server-group
 -member hosts/DCEDFS7/dfs-server

Update Name Service Database
Exporting the DFS server endpoint mapper host binding.
dcecp -c rpcentry export /.../nomyn.endicott.ibm.com/hosts/DCEDFS7/self
 -i {e1af8308-5d1f-11c9-91a4-08002b14a0fa,3.0}
 -b {ncadg_ip_udp:9.130.79.230ff135“}

Setting ACL for DFSTRACE Command Suite
dcecp -c acl modify /.../nomyn.endicott.ibm.com/hosts/DCEDFS7
 -add {user hosts/DCEDFS7/dfs-server rwdtcia}

End configuration of DFS File Server.


Beginning configuration of DFS BAK server machine.

dcecp -c group catalog

dcecp -c group create subsys/dce/dfs-bak-servers -inprojlist yes
```

```
dcecp -c rpcgroup list /.../nomyn.endicott.ibm.com/subsys/dce/dfs/bak

dcecp -c rpcentry create /.../nomyn.endicott.ibm.com/subsys/dce/dfs/bak

dcecp -c rpcprofile add /.../nomyn.endicott.ibm.com/cell-profile
 -member /.../nomyn.endicott.ibm.com/subsys/dce/dfs/bak
 -i {eb814e2a-0099-11ca-8678-02608c2ea96e,4.0} -a bak

dcecp -c acl modify /.:/subsys/dce/dfs/bak -e
 -add {group subsys/dce/dfs-bak-servers rwct}

acl_edit
 -addr 50d6e004-2b8f-1f97-95dc-001234567890@ncacn_ip_tcp:9.130.79.230
  group/subsys/dce/dfs-bak-servers -m group:acct-admin:rctDnfmM

acl_edit
 -addr 50d6e004-2b8f-1f97-95dc-001234567890@ncacn_ip_tcp:9.130.79.230
  group/subsys/dce/dfs-bak-servers -m group:subsys/dce/dfs-admin:rctDnfmM

dcecp -c rpcgroup add /.../nomyn.endicott.ibm.com/subsys/dce/dfs/bak
 -member /.../nomyn.endicott.ibm.com/hosts/DCEDFS7/self

dcecp -c group add subsys/dce/dfs-bak-servers
 -member hosts/DCEDFS7/dfs-server

End configuration of DFS BAK server.

Beginning configuration of DFS FLDB server machine.

dcecp -c rpcgroup add /.../nomyn.endicott.ibm.com/fs
 -member /.../nomyn.endicott.ibm.com/hosts/DCEDFS7/self

dcecp -c group add subsys/dce/dfs-fs-servers
 -member hosts/DCEDFS7/dfs-server

End configuration of DFS FLDB server.

IOED01060I This configuration was successful for this machine.

Notice:  DFSCONF ended at Fri Dec 19 15:43:29 1997.
------------------------------------------------------------------------


Notice:  DFSCONF started at Fri Dec 19 15:16:31 1997.
------------------------------------------------------------------------

Notice:  Option IOEBMAIN.2 selected.
IOED01032I DFS deconfiguration initiated at Fri Dec 19 15:16:39 1997.

Notice: Panel Data:
        <cellname>    = !nomyn.endicott.ibm.com!
        <host name>   = !DCEDFS7!
        <dfs server>  = !1!
        <backup tape> = !1!
        <backup db>   = !1!
        <fileset db>  = !-2024565684!
```

```
IOED01016I Login for cell_admin at Fri Dec 19 15:16:43 1997.
dce_login cell_admin
EUVS24588I Attention - change current password.
EUVS24577I Login successful.
dce_login cell_admin admin


Beginning deconfiguration of DFS FLDB server machine.

dcecp -c rpcgroup remove /.:/fs
 -member /.../nomyn.endicott.ibm.com/hosts/DCEDFS7/self

dcecp -c group remove subsys/dce/dfs-fs-servers
 -member hosts/DCEDFS7/dfs-server


End deconfiguration of DFS FLDB server.


Beginning deconfiguration of DFS BAK server machine.

dcecp -c rpcgroup remove /.../nomyn.endicott.ibm.com/subsys/dce/dfs/bak
 -member /.../nomyn.endicott.ibm.com/hosts/DCEDFS7/self

dcecp -c group remove subsys/dce/dfs-bak-servers
 -member hosts/DCEDFS7/dfs-server

End deconfiguration of DFS BAK server.

Beginning deconfiguration of DFS server machine.

dcecp -c group remove subsys/dce/rpc-server-group
 -member hosts/DCEDFS7/dfs-server

dcecp -c account delete hosts/DCEDFS7/dfs-server

dcecp -c keytab
 remove /.../nomyn.endicott.ibm.com/hosts/DCEDFS7/config/keytab/self
 -member hosts/DCEDFS7/dfs-server

dcecp -c principal delete hosts/DCEDFS7/dfs-server

dcecp -c rpcentry unexport /.../nomyn.endicott.ibm.com/hosts/DCEDFS7/self
 -i {e1af8308-5d1f-11c9-91a4-08002b14a0fa,3.0}


End deconfiguration of DFS File server machine.

IOED01061I This machine has been successfully deconfigured.

Notice:  DFSCONF ended at Fri Dec 19 15:20:20 1997.
------------------------------------------------------------------------

Beginning configuration of DFS Client machine.

IOED01060I This configuration was successful for this machine.

Notice:  DFSCONF ended at Thu Jan  8 15:33:08 1998.
```

```
--------------------------------------------------------------------------

Notice:  DFSCONF started at Thu Jan  8 15:32:34 1998.

Notice:  Option IOEBMAIN.4 selected.
IOED01032I DFS deconfiguration initiated at Thu Jan  8 15:32:48 1998.

Notice: Panel Data:
        <cellname>    = !gdlcsst.endicott.ibm.com!
        <host name>   = !GDLCSST!
        <client>      = !1!


Beginning deconfiguration of DFS Client machine.

IOED01061I This machine has been successfully deconfigured.

--------------------------------------------------------------------------
```

Appendix B. OS/390 DFS Directories and Files

This appendix lists the important OS/390 HFS files and subdirectories shipped as part of the OS/390 DFS product. In addition, symbolic links created during the installation process are identified.

Files and Directories in /opt/dfsglobal

Note: The symbolic link **/opt/dfsglobal** refers to the directory **/usr/lpp/dfs/global**.

Table 2 lists the directories and the files in the **/opt/dfsglobal** directory. It also gives a short description of the directories.

Table 2. OS/390 DFS Files and Directories in /opt/dfsglobal

File or Directory	Created by	Description
/opt/dfsglobal/bin	Installation	Contains commands: bak, bos, dce_error, dfsexport, fts, growaggr, mapid, newaggr, salvage, scout, and udebug.
/opt/dfsglobal/examples	Installation	Contains example files for devtab, dfstab, ioepdcf, and rfstab. Also contains the example envar files for the DFS client and server processes. The directory also contains the following program files: **asc2eb.cmd** and **eb2asc.cmd**. The **asc2eb.cmd** program file is used to convert ASCII characters to EBCDIC characters. The **eb2asc.cmd** program file is used to convert EBCDIC characters to ASCII characters.
/opt/dfsglobal/lib/nls/msg/En_US.IBM-1047	Installation	Contains DFS message catalogs.
/opt/dfsglobal/src/COPYRIGHT.DFS	Installation	Contains the OS/390 DFS copyright information.
/opt/dfsglobal/script/dfs_cpfiles	Installation	Contains the OS/390 shell script for the OS/390 Distributed File Service default configuration files creation program.

OS/390 DFS Symbolic Links to /etc/dfs Created During Installation

Table 3 lists the frequently used symbolic links created during installation.

Table 3 (Page 1 of 2). OS/390 DFS Symbolic Links Created During Installation

Symbolic Link	Linked File
/bin/bak	../usr/lpp/dfs/global/bin/bak
/bin/bos	../usr/lpp/dfs/global/bin/bos
/bin/cm	../usr/lpp/dfs/global/bin/cm
/bin/dfsexport	../usr/lpp/dfs/global/bin/dfsexport
/bin/fts	../usr/lpp/dfs/global/bin/fts
/bin/growaggr	../usr/lpp/dfs/global/bin/growaggr
/bin/mapid	../usr/lpp/dfs/global/bin/mapid
/bin/newaggr	../usr/lpp/dfs/global/bin/newaggr
/bin/salvage	../usr/lpp/dfs/global/bin/salvage

Table 3 (Page 2 of 2). OS/390 DFS Symbolic Links Created During Installation

Symbolic Link	Linked File
/bin/scout	../usr/lpp/dfs/global/bin/scout
/bin/udebug	../usr/lpp/dfs/global/bin/udebug
/etc/ioepdcf	../etc/dfs/etc/ioepdcf
/opt/dcelocal/etc/CacheInfo	../../../etc/dfs/etc/CacheInfo
/opt/dcelocal/var/dfs	../../../etc/dfs/var/dfs
/opt/dfslocal	../etc/dfs
/opt/dfsglobal	../usr/lpp/dfs/global

OS/390 DFS Directories and Files in /opt/dfslocal

Notes:

1. The symbolic link **/opt/dfslocal** refers to the directory **/etc/dfs**.
2. Prior to OS/390 Version 2 Release 6, some DFS symbolic links were created to link to files in the **/usr/lpp/dfs/local** path. These symbolic links must now link to files in the **/etc/dfs** path.

Table 4 lists the directories in **/opt/dfslocal** and a brief description of each. Table 5 on page 131 lists the files in **/opt/dfslocal**.

Table 4 (Page 1 of 2). OS/390 DFS Directories in /opt/dfslocal

Name	Created by	Description
/opt/dfslocal/etc	Installation	Contains the daemon configuration (ioepdcf) file.
/opt/dfslocal/home	Installation	Contains the home directories of the OS/390 DFS daemons (see the following entries).
/opt/dfslocal/home/bakserver	Installation	Home directory of the bakserver process.
/opt/dfslocal/home/boserver	Installation	Home directory of the boserver process.
/opt/dfslocal/home/butc01	Installation	Home directory of the butc01 process.
/opt/dfslocal/home/butc02	Installation	Home directory of the butc02 process.
/opt/dfslocal/home/butc03	Installation	Home directory of the butc03 process.
/opt/dfslocal/home/butc04	Installation	Home directory of the butc04 process.
/opt/dfslocal/home/butc05	Installation	Home directory of the butc05 process.
/opt/dfslocal/home/butc06	Installation	Home directory of the butc06 process.
/opt/dfslocal/home/butc07	Installation	Home directory of the butc07 process.
/opt/dfslocal/home/butc08	Installation	Home directory of the butc08 process.
/opt/dfslocal/home/daemonct	Installation	Home directory of the daemonct process.
/opt/dfslocal/home/dfscm	Installation	Home directory of the dfscm process.
/opt/dfslocal/home/dfscntl	Installation	Home directory of the dfscntl process.
/opt/dfslocal/home/dfsexport	Installation	Home directory of the dfsxport process.
/opt/dfslocal/home/dfskern	Installation	Home directory of the dfskern process.
/opt/dfslocal/home/flserver	Installation	Home directory of the flserver process.
/opt/dfslocal/home/ftserver	Installation	Home directory of the ftserver process.
/opt/dfslocal/home/growaggr	Installation	Home directory of the growaggr command.

Table 4 (Page 2 of 2). OS/390 DFS Directories in /opt/dfslocal

Name	Created by	Description
/opt/dfslocal/home/newaggr	Installation	Home directory of the newaggr command.
/opt/dfslocal/home/repserver	Installation	Home directory of the rpserver process.
/opt/dfslocal/home/salvage	Installation	Home directory of the salvage command.
/opt/dfslocal/home/upclient	Installation	Home directory of the upclient process.
/opt/dfslocal/home/upserver	Installation	Home directory of the upserver process.
/opt/dfslocal/lib/nls/msg	Installation	Contains the DFS message catalogs.
/opt/dfslocal/syscall	Installation	Used to contain the socket for AFS_SYSCALL.
/opt/dfslocal/var/dfs	Installation	Contains administration and configuration files.
/opt/dfslocal/var/dfs/adm	Installation	Contains log files for the DFS client and server processes.
/opt/dfslocal/var/dfs/backup	Installation	Contains error and log files for the bakserver and butc processes

Table 5 (Page 1 of 2). OS/390 DFS Files in /opt/dfslocal

File	Created by
/opt/dfslocal/etc/CacheInfo	Post-installation program dfs_cpfiles
/opt/dfslocal/etc/ioepdcf	Post-installation program dfs_cpfiles
/opt/dfslocal/home/bakserver/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/boserver/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/butc01/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/butc02/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/butc03/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/butc04/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/butc05/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/butc06/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/butc07/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/butc08/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/daemonct/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/dfscm/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/dfscntl/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/dfsexport/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/dfskern/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/flserver/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/ftserver/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/growaggr/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/newaggr/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/repserver/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/salvage/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/upclient/envar	Post-installation program dfs_cpfiles
/opt/dfslocal/home/upserver/envar	Post-installation program dfs_cpfiles

Table 5 (Page 2 of 2). OS/390 DFS Files in /opt/dfslocal

File	Created by
/opt/dfslocal/syscall/rendezvous	Configuration
/opt/dfslocal/var/dfs/admin.bak	Configuration
/opt/dfslocal/var/dfs/admin.bos	Configuration
/opt/dfslocal/var/dfs/admin.fl	Configuration
/opt/dfslocal/var/dfs/admin.ft	Configuration
/opt/dfslocal/var/dfs/admin.up	Configuration
/opt/dfslocal/var/dfs/dfstab	Configuration
/opt/dfslocal/var/dfs/devtab	Configuration
/opt/dfslocal/var/dfs/NoAuth	Configuration
/opt/dfslocal/var/dfs/rfstab	Configuration
/opt/dfslocal/home/bakserver/krb5ccname	DCE LOGIN
/opt/dfslocal/home/boserver/krb5ccname	DCE LOGIN
/opt/dfslocal/home/butc01/krb5ccname	DCE LOGIN
/opt/dfslocal/home/butc02/krb5ccname	DCE LOGIN
/opt/dfslocal/home/butc03/krb5ccname	DCE LOGIN
/opt/dfslocal/home/butc04/krb5ccname	DCE LOGIN
/opt/dfslocal/home/butc05/krb5ccname	DCE LOGIN
/opt/dfslocal/home/butc06/krb5ccname	DCE LOGIN
/opt/dfslocal/home/butc07/krb5ccname	DCE LOGIN
/opt/dfslocal/home/butc08/krb5ccname	DCE LOGIN
/opt/dfslocal/home/dfscm/krb5ccname	DCE LOGIN
/opt/dfslocal/home/dfsexport/krb5ccname	DCE LOGIN
/opt/dfslocal/home/dfskern/krb5ccname	DCE LOGIN
/opt/dfslocal/home/flserver/krb5ccname	DCE LOGIN
/opt/dfslocal/home/ftserver/krb5ccname	DCE LOGIN
/opt/dfslocal/home/repserver/krb5ccname	DCE LOGIN
/opt/dfslocal/home/upclient/krb5ccname	DCE LOGIN
/opt/dfslocal/home/upserver/krb5ccname	DCE LOGIN

Customable Files

Note: The symbolic link **/opt/dfsglobal** refers to the directory **/usr/lpp/dfs/global**. The symbolic link **/opt/dfslocal** refers to the directory **/etc/dfs**.

Table 6 on page 133 summarizes the DFS files that are supplied by IBM and where they are placed so that you can customize them to meet your local DFS requirements.

Most of the IBM supplied files are copied from the **/opt/dfsglobal/examples** directory to the applicable operational directory by the **/opt/dfsglobal/scripts/dfs_cpfiles** program run as part of the DFS post installation processing described in Chapter 6, “Post Installation Considerations” on page 25.

When installing DFS by the **dfs_cpfiles** program it does not replace a file in the operational directory if it already exists.

When installing a new DFS release, you can compare the contents of the IBM supplied files with your current customized files to determine if there are any new optional parameters that you may want to consider specifying.

Table 6. OS/390 DFS Customable Files

IBM Supplied File	Customable File
/opt/dfsglobal/examples/bakserver.envar	/opt/dfslocal/home/bakserver/envar
/opt/dfsglobal/examples/boserver.envar	/opt/dfslocal/home/boserver/envar
/opt/dfsglobal/examples/butc01.envar	/opt/dfslocal/home/butc01/envar
/opt/dfsglobal/examples/butc02.envar	/opt/dfslocal/home/butc02/envar
/opt/dfsglobal/examples/butc03.envar	/opt/dfslocal/home/butc03/envar
/opt/dfsglobal/examples/butc04.envar	/opt/dfslocal/home/butc04/envar
/opt/dfsglobal/examples/butc05.envar	/opt/dfslocal/home/butc05/envar
/opt/dfsglobal/examples/butc06.envar	/opt/dfslocal/home/butc06/envar
/opt/dfsglobal/examples/butc07.envar	/opt/dfslocal/home/butc07/envar
/opt/dfsglobal/examples/butc08.envar	/opt/dfslocal/home/butc08/envar
/opt/dfsglobal/examples/cmattr	(not copied by dfs_cpfiles, refer to envar **_IOE_CM_ATTRIBUTES_FILE**) (not copied, refer to envar **_IOE_HFS_ATTRIBUTES_FILE**)
/opt/dfsglobal/examples/daemonct.envar	/opt/dfslocal/var/dfs/daemonct/envar
/opt/dfsglobal/examples/devtab	/opt/dfslocal/var/dfs/devtab
/opt/dfsglobal/examples/dfs.ioepdcf	/opt/dfslocal/etc/ioepdcf
/opt/dfsglobal/examples/dfscm.CacheInfo	/opt/dfslocal/etc/CacheInfo
/opt/dfsglobal/examples/dfscm.envar	/opt/dfslocal/home/dfscm/envar
/opt/dfsglobal/examples/dfscntl.envar	/opt/dfslocal/home/dfscntl/envar
/opt/dfsglobal/examples/dfsexport.envar	/opt/dfslocal/home/dfsexport/envar
/opt/dfsglobal/examples/dfskern.envar	/opt/dfslocal/home/dfskern/envar
/opt/dfsglobal/examples/dfstab	/opt/dfslocal/var/dfs/dfstab
/opt/dfsglobal/examples/flserver.envar	/opt/dfslocal/home/flserver/envar
/opt/dfsglobal/examples/ftserver.envar	/opt/dfslocal/home/ftserver/envar
/opt/dfsglobal/examples/growaggr.envar	/opt/dfslocal/home/growaggr/envar
/opt/dfsglobal/examples/newaggr.envar	/opt/dfslocal/home/newaggr/envar
/opt/dfsglobal/examples/repserver.envar	/opt/dfslocal/home/repserver/envar
/opt/dfsglobal/examples/rfstab	/opt/dfslocal/var/dfs/rfstab
/opt/dfsglobal/examples/salvage.envar	/opt/dfslocal/home/salvage/envar
/opt/dfsglobal/examples/upclient.envar	/opt/dfslocal/home/upclient/envar
/opt/dfsglobal/examples/upserver.envar	/opt/dfslocal/home/upserver/envar

Appendix C. Environment Variables in DFS

Environment variables affect the behavior of the DFS components. In DFS, the **envar** file of a client or server process can be created to contain the declarations of the environment variables.

The DCE environment variables affect the administration of DFS. This appendix describes the DCE and DFS environment variables DFS server processes and DFS client processes use, and tells you how to set them.

Environment variables are set using the following syntax:

VARIABLE_NAME=*value*

Environment Variables

Table 7 lists the OS/390 DCE and DFS environment variables with their descriptions. See the *OS/390 DCE Administration Guide* for a complete list of DCE environment variables. This table also includes the Distributed File Service environment variables specific for SMB support. You can refer to the *OS/390 Distributed File Service SMB Administration Guide and Reference* for more information.

Notes:

1. Setting these environment variables is optional. In most cases, the default values are used if environment variables are not set.
2. In the following table all the examples should be entered on one line, with no blanks, even though some of them appear on multiple lines.

Table 7 (Page 1 of 16). Environment Variables

Name	Description
DCE Environment Variables	
_EUV_AUTOLOG	Determines if single sign-on processing is ignored when an OS/390 user invokes an application that invokes the DFS client. The valid value is: **NO** Do not enable single sign-on processing. Any other value causes DCE autologin processing to be attempted. **Note:** If _EUV_AUTOLOG=NO is specified, DCE autologin processing does not occur if the DFS namespace is accessed before a **dce_login** is performed. Refer to the *OS/390 DFS Administration Guide and Reference* for more information on DFS client and DFS autologin.
_EUV_ECHO_STDIN	Used by the RPC, CDS, and DTS control programs, as well as the Registry Editor and ACL Editor to echo input commands to the standard output file when these commands are run in batch. The default value is **0** (disabled).
_EUV_ENVAR_FILE	Defines the name of the environment variable file. The default value is *$HOME*/**envar**, where *$HOME* is your home directory.
_EUV_FTRACE	Activates function tracing within DCE or user code compiled with the TEST(NONE) compiler option.
_EUV_HOME	Used to override the home directory value that was specified in the POSIX segment of a RACF user ID. The default value is your home directory.
_EUV_SEC_KRB5CCNAME_FILE	Specifies the file that contains the declaration of the KRB5CCNAME variable. The default value is *$HOME*/**krb5ccname**.

Table 7 (Page 2 of 16). Environment Variables	
Name	**Description**
_EUV_SVC_DBG_MSG_LOGGING	Turns debug tracing off.
_EUV_SVC_MSG_LEVEL	A DCE environment variable that sets the minimum severity level of messages that are displayed. For the Distributed File Service, the value **VERBOSE** is recommended. This is the default value if this **envar** file is not specified. For more information on this environment variable see the *OS/390 DCE Administration Guide*.
_EUV_SVC_MSG_LOGGING	A DCE environment variable used to control where messages are routed and displayed. For the Distributed File Service, the value **CONSOLE_LOGGING** is recommended and supplied in the sample **envar** file for each of the Distributed File Service processes. For more information on this environment variable see the *OS/390 DCE Administration Guide*.
BIND_PE_SITE	Determines whether the Security Server is located using the namespace or by reading the **pe_site** file. The default value is **0**, meaning the Security server is located by using a regular CDS query.
DCE_START_SOCKET_NAME	The path used as the well-known socket name by the DFS servers during daemon initialization. **Default Value** The default value for the DFS server is **/opt/dfslocal/home/dfskern/ioepk.soc** **Expected Value** Character string. **Example** DCE_START_SOCKET_NAME= /opt/dfslocal/home/dfscntl/start.sock **Where Variable is Used** The DFS server daemons.
KRB5CCNAME	Specifies the name of the user's Security credentials cache file. This variable is automatically managed within the DCE library and should not be set by the user. In OS/390 DFS, KRB5CCNAME is not an actual environment variable. However, as KRB5CCNAME is an environment variable in other implementations of DCE, it is included here for reference purposes.
NLSPATH	A POSIX environment variable used by DCE that sets the search path for message catalogs. The default value is: **/usr/lib/nls/msg/En_US.IBM-1047/%N: /usr/lib/nls/msg/%L/%N: /usr/lib/nls/msg/prime/%N**
SVC_CDS_DBG	Sets the CDS component debug level.
SVC_DTS_DBG	Sets the DTS component debug level.
SVC_PLT_DBG	Sets the Platform component debug level.
SVC_RPC_DBG	Sets the RPC component debug level.
SVC_SEC_DBG	Sets the Security component debug level.
TZ	Sets the time zone used by DTS. The default value is **localtime**.
DFS Environment Variables	

Table 7 (Page 3 of 16). Environment Variables

Name	Description
_IOE_BACKUP_TAPE_CAPACITY	Specifies the size, in bytes, of the maximum size backup tape data set that is created during backup. It is desirable that this value equal the actual capacity of your tape volumes (or a little less). **Default Value** 160M (the size of a 3480 tape cartridge) **Expected Value** Size in bytes, of the maximum size backup tape data set. The value may be a whole positive integer followed by a 'K' (denoting kilobytes), or a whole positive integer followed by an 'M' (denoting megabytes). **Example** _IOE_BACKUP_TAPE_CAPACITY=180M **Where Variable is Used** BUTC*nn* (valid entries for *nn* are 01 through 08)
_IOE_BOSERVER_ENVAR	Specifies where to find the environment variable file during a **boserver** restart. **Default Value** ENVAR('_EUV_HOME=/opt/dfslocal/home/boserver') **Expected Value** Character string. **Example** _IOE_BOSERVER_ENVAR=ENVAR('__EUV_HOME=/opt/dfslocal/home/boserver') **Where Variable is Used** BOSERVER
_IOE_BOSERVER_OUTPUTDD	The data definition name (ddname), statically allocated in the DFS JCL procedure, which will receive the **boserver** output (before it switches to its log file). **Default Value** BOSERVER **Expected Value** Character string, eight characters or less. **Example** _IOE_BOSERVER_OUTPUTDD=BOSRV **Where Variable is Used** BOSERVER
_IOE_BOSERVER_PGMNAME	The OS/390 PDS member name of the **boserver** program to be used when restarting the **boserver** process. **Default Value** BOSERVER **Expected Value** Character string, eight characters or less. **Example** _IOE_BOSERVER_PGMNAME=NEWBOSRV **Where Variable is Used** BOSERVER
_IOE_BUTC_DISKUNIT	The unit name to be used when dynamically allocating a data definition for disk data sets. This is the unit name passed to dynamic allocation when allocating the disk device. **Default Value** SYSDA **Expected Value** Character string, six characters or less. **Example** _IOE_BUTC_DISKUNIT=3390 **Where Variable is Used** BUTC*nn* (valid entries for *nn* 01 through 08).

Table 7 (Page 4 of 16). Environment Variables

Name	Description
_IOE_BUTC_DUMP_HLQ	The high level qualifier for the dump (backup) data set names. **Default Value** DFSBKUP **Expected Value** Character string, 17 characters or less. **Example** _IOE_BUTC_DUMP_HLQ=DFSBKUP.VER1 **Where Variable is Used** BUTC*nn* (valid entries for *nn* 01 through 08).
_IOE_BUTC_KSDS	The name of the virtual storage access method (VSAM) DFS tape backup management file. **Default Value** DFSBUTC.KSDS.LABEL **Expected Value** Character string, 44 characters or less. **Example** _IOE_BUTC_KSDS=DFSBKUP.KSDS.LABEL **Where Variable is Used** BUTC*nn* (valid entries for *nn* 01 through 08).
_IOE_BUTC_TAPEUNIT	The unit name to be used when dynamically allocating a data definition for tape drives. This is the unit name passed to dynamic allocation when allocating the tape device. **Default Value** 3490 **Expected Value** Character string, six characters or less. **Example** _IOE_BUTC_TAPEUNIT=CART **Where Variable is Used** BUTC*nn* (valid entries for *nn* 01 through 08).
_IOE_CFG_CELL_ID	Specifies the DCE principal name of the administrator who is performing the OS/390 DFS configuration. **Default Value** cell_admin **Expected Value** Character string, 132 characters or less. **Example** _IOE_CFG_CELL_ID=cell_admin **Where Variable is Used** DFSCONF
_IOE_CFG_INFORM_LEVEL	Specifies the level of information that is displayed on the screen from the configuration of the host system. The valid values are: **0** Only messages regarding the progress of configuration are displayed. **1** Progress messages and the commands used by the configuration written. This is the default value. **2** Progress messages, command, and the output from most commands are written. **Default Value** 1 **Expected Value** 0, 1, or 2. **Example** _IOE_CFG_INFORM_LEVEL=2 **Where Variable is Used** DFSCONF

Table 7 (Page 5 of 16). Environment Variables

Name	Description
_IOE_CFG_LOG_FILE	Specifies the name of the configuration log file. **Default Value** dfsconf.log and is initially located in the home directory of the user running DFSCONF. **Expected Value** Character string, 132 characters or less. **Example** _IOE_CFG_LOG_FILE=/home/dfsadmin/dfsconf.log **Where Variable is Used** DFSCONF
_IOE_CM_ATTRIBUTES_FILE	Specifies the name of the file that contains the definition of file name suffixes that controls whether file data should be translated by the DFS client. **Default Value** None **Expected Value** Character string, 132 characters or less. **Example** _IOE_CM_ATTRIBUTES_FILE=/etc/httpd.conf **Where Variable is Used** DFS client processes **Notes** This file contains AddType statements in the same format as the Domino Go Webserver's httpd.conf file. All statements other than AddType are ignored. IBM supplies an example file in /opt/dfsglobal/examples/cmattr. This file can be copied and modified appropriately.
_IOE_CM_DIRCACHE_SIZE	Specifies the size, in bytes, of the directory cache for the DFS client. **Default Value** 1M **Expected Value** Size, in bytes, of the cache. The value may be a whole positive integer followed by a 'K' (denoting kilobytes), or a whole positive integer followed by an 'M' (denoting megabytes). **Example** _IOE_CM_DIRCACHE_SIZE=2M **Where Variable is Used** DFS client processes. **Notes** The minimum allowable size of the DFS client directory cache is one megabyte. This value will be used for the directory cache even if a lower value is specified. The maximum size is limited only by the virtual storage size of DFSCM. Values for the directory cache size will be rounded upward to a 128K boundary.
_IOE_CM_LOGIN_PROCESSES	The DFS environment variable controls the number of **ioelogin** processes set up to handle DCE login requests. **Default Value** 1 **Expected Value** A number greater than zero. **Example** _IOE_CM_LOGIN_PROCESSES=2 **Where Variable is Used** DFS client processes.

Table 7 (Page 6 of 16). Environment Variables	
Name	**Description**
_IOE_CM_PARMS	The DFS client initialization parameters or options that take effect when the DFS client is started. The possible parameters are a subset of the **dfsbind** and the **dfsd** command options described in the *OS/390 DFS Administration Guide and Reference*. **Default Value** For the default values, see the **dfsbind** and **dfsd** command options in the "Commands" section of the *OS/390 DFS Administration Guide and Reference*. **Expected Value** Character string of DFS client initialization parameters (up to 1024 characters in length). **Example** `_IOE_CM_PARMS=-mountfilesystem IOE_DFS_CLIENT_DATA -cachedir 11` **Where Variable is Used** DFS client processes.
_IOE_CM_REQUEST_THREADS	The DFS environment variable controls the number of **DFSCM ioedfsd** process threads set up to handle file requests. **Default Value** 5 **Expected Value** A number greater than zero. **Example** _IOE_CM_REQUEST_THREADS=7 **Where Variable is Used** DFS client processes.
_IOE_DAEMONS_IN_AS	The DFS environment variable controls whether the DFSKERN process runs in its own address space or in the DFS Server Address Space. **Default Value** The default is ''. If '' is specified or the environment variable is not specified, DFSKERN runs in the DFS Server Address Space. **Expected Value** DFSKERN or '' **Example** _IOE_DAEMONS_IN_AS=DFSKERN In this case, DFSKERN runs in its own address space. **Where Variable is Used** DFSCNTL
_IOE_DFS_MODIFY_PATH	The path used as the well-known socket name by the DFS programs when registering with DFSCNTL to receive modify commands (F DFS,QUERY DFSKERN). **Default Value** The default value of the DFS server is **/opt/dfslocal/home/dfscntl/modify.rendezvous** **Expected Value** Character string. **Example** _IOE_DFS_MODIFY_PATH= /opt/dfslocal/home/dfscntl/test.rendezvous **Where Variable is Used** All programs. If the default is not being used, this environment variable must be coded in the **envar** file for each process.

Table 7 (Page 7 of 16). Environment Variables

Name	Description
_IOE_DIRECTORY_CACHE_SIZE	The number of 512 byte blocks used to cache HFS and RFS directory entries. **Default Value** 768 **Expected Value** The value specified must be a numeric value greater than or equal to 768. **Example** _IOE_DIRECTORY_CACHE_SIZE=1024 **Where Variable is Used** DFSKERN
_IOE_EPI_CACHE_SIZE	The size, in bytes, of the DCE Local File System metadata buffer cache. This environment variable is used to increase the size of the buffer cache and to potentially improve performance. **Default Value** one megabyte. This value is also the minimum value. **Expected Value** Size, in bytes, of the cache. The value expected may be a whole positive integer followed by a 'K' (denoting kilobytes), or a whole positive integer followed by a 'M' (denoting megabytes). **Example** _IOE_EPI_CACHE_SIZE=8M **Where Variable is Used** DFS client processes and DFSKERN **Notes** The minimum allowable size of the DCE Local File System buffer cache is one megabyte. This value will be used for the buffer cache even if a lower value is specified. The maximum size is limited only by the virtual storage size of DFSKERN. Values for the buffer cache size will be rounded upward to a 128K boundary.
_IOE_HFS_ATTRIBUTES_FILE	Specifies the pathname of the **hfsattr** file that contains the definition of file name suffixes that controls whether file data should be translated by the DFS server. **Default Value** None. **Expected Value** Character string, 132 characters or less. **Example** _IOE_HFS_ATTRIBUTES_FILE=/etc/httpd.conf **Where Variable is Used** DFSKERN **Notes** This file contains AddType statements in the same format as the IBM HTTP Server's http.conf file. All statements other than AddType are ignored. IBM supplies an example file in **/opt/dfsglobal/examples/cmattr**. This file can be copied and modified appropriately. (Only one example file is provided for **cmattr** and **hfsattr** since they are the same format.)

Table 7 (Page 8 of 16). Environment Variables

Name	Description
_IOE_HFS_TRANSLATION	A DFS server variable that controls the conversion of HFS data to the appropriate data format. Converts incoming data from ASCII ISO 8859-1 to the local OS/390 code page. Converts outgoing data from the local OS/390 code page to ASCII ISO 8859-1. **Default Value** Off **Expected Value** On, Off, or Auto **On** means that all data will be translated. **Off** means that no data will be translated. **Auto** means that data that is received by (read) or sent to (written) the DFS server is examined to determine if the data is text or not. When data is received by (read) the DFS server, the first 255 bytes of data are compared against a table of valid text (EBCDIC) characters. If all 255 characters are deemed to be valid text characters, the file is marked for translation and all data is translated. Otherwise, the data is not translated. When data is sent from (written) the DFS server, the first 255 bytes of data are compared against a table of valid text (ASCII) characters. If all 255 characters are deemed to be valid text characters, the file is marked for translation and all data is translated. Otherwise, the data is not translated. **Example** _IOE_HFS_TRANSLATION=ON **Where Variable is Used** DFSKERN **Notes** For HFS, the following sequence is used by the DFS server to determine whether to translate file data: If the file exists and has a non-zero file format attribute (ST_FILEFMT) field in the BPXYSTAT structure, then a value of 1 (FTFFBINARY) causes no translation to be done. A value greater than 1 causes translation to be done. If the file does not exist or has a zero file format attribute, then if an **hfsattr** file is specified (by the DFSKERN _IOE_HFS_ATTRIBUTES_FILE environment varible), and the file name suffix matches a directive in the **hfsattr** file, then that controls whether translation occurs. The fileset's **devtab** translation parameter (**text**, **binary**, or **auto**) is used when no **hfsattr** file is specified, or if the file name suffix does not match any of the directives in the **hfsattr** file, or the file name has no suffix. The DFSKERN _IOE_HFS_TRANSLATION environment variable is used if the fileset's **devtab** entry does not have a translation parameter. The ST_FILEFMT field in the BPXYSTAT structure for HFS files is set if it is not already set and either an **hfsattr** file was used to determine whether to translate or **auto** (on the fileset or globally) was used to determine whether to translate. This variable does not apply to OS/390 DFS client processing. DFS client translation is controlled by the **dfsd** command **-translation** option described in the *OS/390 DFS Administration Guide and Reference*.

Table 7 (Page 9 of 16). Environment Variables

Name	Description
_IOE_LFS_SYNC_INTERVAL	The number of seconds between synchronization operations for the DCE Local File System. **Default Value** 30 **Expected Value** Numeric, greater than zero. **Example** _IOE_LFS_SYNC_INTERVAL=60 **Where Variable is Used** DFSKERN
_IOE_MVS_DFSDFLT	The name of the RACF-defined anonymous user that is associated with unauthenticated DCE users attempting access to exported HFS files. This ID must be RACF-defined with an OS/390 UNIX segment. **Default Value** There is no default value for this variable. **Expected Value** Character string, eight characters or less. **Example** _IOE_MVS_DFSDFLT=DFSDFLT **Where Variable is Used** DFSKERN (used when exporting HFS file systems).
_IOE_MVS_IDMAP	The name of the identity mapping output file that establishes the relationship between DCE user IDs and OS/390 user IDs (Resource Access Control Facility (RACF)). **Default Value** There is no default value for this variable. **Expected Value** Character string describing the map file to be used. **Example** _IOE_MVS_IDMAP=/opt/dfslocal/home/dfskern/mapid.out **Where Variable is Used** DFSKERN (used when exporting HFS file systems).
_IOE_MVS_IDMAP_SAF	The DFS Server variable establishes whether a System Access Facility (such as, RACF) is used for UUID to OS/390 ID mapping (YES) or if the identity mapping output file is used (NO). If YES is specified, the _IOE_MVS_IDMAP environment variable is ignored. **Default Value** NO **Expected Value** NO or YES **Example** _IOE_MVS_IDMAP_SAF=YES **Where Variable is Used** DFSKERN
_IOE_MVS_SERVER	The name of the OS/390 server used for identity mapping and registering with OS/390 UNIX as a DFS server. **Default Value** DFS **Expected Value** Character string, maximum 32 characters. **Example** _IOE_MVS_SERVER=MVS/DFS01 **Where Variable is Used** DFSKERN

Table 7 (Page 10 of 16). Environment Variables

Name	Description
_IOE_PROTOCOL_RPC	An environment variable that controls whether the DCE DFS protocol is supported (using DCE RPC). **Default Value** OFF **Expected Value** ON or OFF **Example** _IOE_PROTOCOL_RPC=OFF **Where Variable is Used** DFSKERN
_IOE_PROTOCOL_SMB	An environment variable that controls whether the SMB protocol is supported (using TCP/IP). **Default Value** OFF **Expected Value** ON or OFF **Example** _IOE_PROTOCOL_SMB=ON **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_RFS_ATTRIBUTES_FILE	The name of the file that contains the table for describing the attributes used to manipulate record files in the DFS Server. The value can be the name of the HFS file, a fixed-block partitioned data set, or a fixed-block sequential data set with a record length of 80. **Default Value** /opt/dfslocal/var/dfs/rfstab **Expected Value** Character string describing the attributes file being used (maximum 255 characters). **Example** _IOE_RFS_ATTRIBUTES_FILE=//'NFSADMIN.NFSS(NFSSATT)' **Where Variable is Used** DFSKERN **Notes** This DFS server variable can be overridden for specific filesets in the **devtab** file. For more information, see the *OS/390 DFS Administration Guide and Reference*.
_IOE_RFS_STATUS_REFRESH_TIME	The DFS Server refreshes its cache of exported record data set names and attributes at a regular interval. The time is specified in seconds. **Default Value** 600 seconds (10 minutes) **Expected Value** A number greater than zero. **Example** _IOE_RFS_STATUS_REFRESH_TIME=360 **Where Variable is Used** DFSKERN

Table 7 (Page 11 of 16). Environment Variables

Name	Description
_IOE_RFS_TRANSLATION	A DFS server variable that controls the conversion of RFS data to the appropriate data format. Converts incoming data from ASCII ISO 8859-1 to the local OS/390 code page. Converts outgoing data from the local OS/390 code page to ASCII ISO 8859-1. **Default Value** Off **Expected Value** On or Off **Example** _IOE_RFS_TRANSLATION=ON **Where Variable is Used** DFSKERN **Notes** This DFS server variable can be overridden for specific filesets in the **devtab** file. If an individual fileset is set to binary, in the **devtab** file, no translation will be performed. For more information, see the *OS/390 DFS Administration Guide and Reference*. This variable does not apply to OS/390 DFS client processing. DFS client translation is controlled by the **dfsd** command **-translation** option described in the *OS/390 DFS Administration Guide and Reference*.
_IOE_RFS_WORKER_THREADS	A DFS server variable that controls the number of threads to be started in **dfskern** to service open and close requests for RFS files. **Default Value** 1 **Expected Value** A number greater than zero. **Example** _IOE_RFS_WORKER_THREADS=3 **Where Variable is Used** DFSKERN
_IOE_SERVER_NAME	The network name of the system. This environment variable should be used if there are several network connections on the OS/390 system and the primary connection is not being used for the DFS system. **Default Value** The name that is returned from the TCP/IP function, **gethostname()**. The name is the default name as determined from the TCP/IP **TCPDATA** file and may not reflect the actual network name for the device being used for the DFS network. **Expected Value** Character string containing the network name of the system without a domain (note that TCP/IP returns the name in upper case so this name should be in upper case also). **Example** _IOE_SERVER_NAME=RANDOM **Where Variable is Used** All programs that use the TCP/IP function, **gethostname()**.
_IOE_SMB_BROWSE_INTERVAL	Specifies the Browser announcement interval (in milliseconds). **Default Value** 72000 (1.2 minutes) **Expected Value** A number between 0 and 720000 (12 minutes). **Example** _IOE_SMB_BROWSE_INTERVAL=90000 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.

Table 7 (Page 12 of 16). Environment Variables

Name	Description
_IOE_SMB_CALLBACK_POOL	Specifies the number of secondary pool threads for processing SMB callback requests. **Default Value** 2 **Expected Value** A number greater than 0. **Example** _IOE_SMB_CALLBACK_POOL=3 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_COMPUTER_NAME	Specifies the name to be used by SMB redirectors (that is, clients) to contact this server. If a Windows Internet Naming Service (WINS) server is available (see the _IOE_SMB_PRIMARY_WINS environment variable), the SMB computer name is used to identify this server to the WINS server. **Default Value** The TCP/IP hostname of this system. **Expected Value** Character string, 15 characters or less. **Example** _IOE_SMB_COMPUTER_NAME=OS390DATA1 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_DESCRIPTION	Specifies the description of this server that appears on the PC. **Default Value** None **Expected Value** Character string, 40 characters or less. **Example** _IOE_SMB_DESCRIPTION=OS390 File Server Note in this example, there are embedded blanks. **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_DOMAIN_NAME	Specifies the name to be used as the Domain name for this server. **Default Value** None **Expected Value** Character string, 15 characters or less. **Example** _IOE_SMB_DOMAIN_NAME=OS/390DOMAIN1 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.

Table 7 (Page 13 of 16). Environment Variables

Name	Description
_IOE_SMB_IDMAP	Specifies the location of the **smbidmap** file. The **smbidmap** file contains the mapping of SMB user IDs to OS/390 user IDs. **Default Value** None **Expected Value** Character string specifying the path name of the **smbidmap** file. **Example** _IOE_SMB_IDMAP=/opt/dfslocal/home/dfskern/smbidmap **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_IDLE_TIMEOUT	Specifies how long (in seconds) an SMB session can remain inactive before it is terminated. **Default Value** 400 **Expected Value** A number between 0 and 4294967295. **Example** _IOE_SMB_IDLE_TIMEOUT=4000 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_MAIN_POOL	Specifies the number of primary pool threads for processing SMB requests. **Default Value** 14 **Expected Value** A number greater than 0. **Example** _IOE_SMB_MAIN_POOL=20 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_MAXXMT	Specifies the maximum server buffer size that is returned on the SMB Server Negotiate response. **Default Value** 4356 bytes **Expected Value** A number between 1024 and 65535. **Example** _IOE_SMB_MAXXMT=8192 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_OPLOCK_TIMEOUT	Specifies the Opportunistic Lock Timeout period (in seconds) **Default Value** 300 **Expected Value** A number between 0 and 4294967295. **Example** _IOE_SMB_OPLOCK_TIMEOUT=60 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.

Table 7 (Page 14 of 16). Environment Variables

Name	Description
_IOE_SMB_PRIMARY_WINS	Specifies the IP address of the Windows Internet Naming Service (WINS) server that this server announces itself to and forwards WINS requests to. **Default Value** None **Expected Value** An IP address (*n.n.n.n* where *n* is a number between 0 and 255). **Example** _IOE_SMB_PRIMARY_WINS=9.120.44.55 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_RAW	Specifies whether raw mode is supported in the SMB Server Negotiate response. **Default Value** ON **Expected Value** ON or OFF **Example** _IOE_SMB_RAW=OFF **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_SCOPE	Specifies the Scope ID for the Windows Internet Naming Service (WINS) server. The Scope ID defines a group of computers that recognize a registered NetBOIS name. (This should normally be omitted.) **Default Value** None **Expected Value** Character string, 224 characters or less. **Example** _IOE_SMB_SCOPT=MYDEPARTMENTSCOPE **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_SECONDARY_WINS	Specifies the IP address of the Windows Internet Naming Service (WINS) server that this server announces itself to and forwards WINS requests to if the Primary WINS server does not respond. **Default Value** None **Expected Value** An IP address (*n.n.n.n* where *n* is a number between 0 and 255). **Example** _IOE_SMB_SECONDARY_WINS=9.120.66.77 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.

Table 7 (Page 15 of 16). Environment Variables

Name	Description
_IOE_SMB_TOKEN_FILE_MAX	Specifies the maximum number of files that the SMB token cache should keep tokens for. **Default Value** 1024 **Expected Value** A number greater than or equal to 1024. **Example** _IOE_SMB_TOKEN_FILE_MAX=2048 **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_SMB_WINS_PROXY	Specifies whether this server can act as a Windows Internet Naming Service (WINS) server proxy. WINS requests sent to this server will be forwarded to a WINS server on another computer (see the _IOE_SMB_PRIMARY_WINS environment variable). **Default Value** OFF **Expected Value** ON or OFF. **Example** _IOE_SMB_WINS_PROXY=ON **Where Variable is Used** DFSKERN **Note** This is used for SMB support only.
_IOE_TKM_MAX_TOKENS	Specifies the maximum number of tokens that can be held in the DFS server memory. **Default Value** 1024 **Expected Value** A positive number. The minimum value is 1024. **Example** _IOE_TKM_MAX_TOKENS=2048 **Where Variable is Used** DFSKERN
_IOE_TKMGLUE_SERVER_THREADS	The number of threads to be started in **dfskern** to service token requests from the glue layer. **Default Value** 5 **Expected Value** The value specified must be a numeric value greater than or equal to 5. **Example** _IOE_TKMGLUE_SERVER_THREADS=8 **Where Variable is Used** DFSKERN

Table 7 (Page 16 of 16). Environment Variables

Name	Description
_IOE_VM_CACHE_SIZE	Specifies the size, in bytes, of the virtual memory used by the DFS client and DFSKERN for the DCE Local File System. **Default Value** 1M **Expected Value** A positive number. The value may be a whole positive integer followed by a 'K' (denoting kilobytes), or a whole positive integer followed by an 'M' (denoting megabytes). **Example** _IOE_VM_CACHE_SIZE=2M **Where Variable is Used** Can be specified independently in the DFS client processes and DFSKERN **Notes** The virtual memory is used for data in the DCE Local File System. Metadata for the DCE Local File System is cached under control of the _IOE_EPI_CACHE_SIZE environment variable.
_IOE_VM_MAX_FILES	Specifies the maximum number of files that can be contained in the virtual memory used by the DFS client and DFSKERN for the DCE Local File System. **Default Value** 1024 **Expected Value** A positive number. The minimum value is 1024. **Example** _IOE_VM_MAX_FILES=2048 **Where Variable is Used** Can be specified independently in the DFS client processes and DFSKERN.
_IOE_VNODE_CACHE_SIZE	The size of the HFS and RFS vnode cache, that is, the number of vnodes. **Default Value** 4096 **Expected Value** The value specified must be a numeric value greater than or equal to 2048. **Example** _IOE_VNODE_CACHE_SIZE=6144 **Where Variable is Used** DFSKERN

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Bibliography

This section lists and provides a brief description of each publication in the OS/390 Distributed File Service library. Also listed are publications from the OS/390 DCE library that may be useful.

OS/390 Distributed File Service Publications

This section lists and provides a brief description of each publication in the OS/390 Distributed File Service (DFS) library.

Administration

- *OS/390 Distributed File Service DFS Configuring and Getting Started*, SC28-1722

  This book helps system and network administrators configure the OS/390 Distributed File Service.

- *OS/390 Distributed File Service Administration Guide and Reference*, SC28-1720

  This book introduces the DFS concepts to system and network administrators and provides an in-depth understanding of DFS, its uses and benefits. This book also provides reference information for the commands and files used by system and network administrators to work with DFS.

- *OS/390 Distributed File Service SMB Administration Guide and Reference*, SC24-5882

  This books provides guidance and reference information for system and network administrators to use when they work with the Server Message Block (SMB) support of the IBM OS/390 Distributed File Service base element of OS/390. SMB is a protocol for remote file/print access used by Windows.

Reference

- *OS/390 Distributed File Service DFS Messages and Codes*, SC28-1724

  This book provides detailed explanations and recovery actions for the messages, status codes, and exception codes issued by the OS/390 DFS.

OS/390 DCE Publications

This section lists and provides a brief description of each publication in the OS/390 DCE library.

Overview

- *Distributed Computing Environment: Understanding the Concepts*, GC09-1478

  This book introduces Open Software Foundation (OSF) DCE. It describes the technology components of DCE, from a high-level overview to a discussion of the interdependencies among the components.

- *OS/390 DCE Introduction*, GC28-1581

  This book introduces OS/390 DCE. Whether you are a system manager, technical planner, OS/390 system programmer, or application programmer, it will help you understand DCE, and evaluate the uses and benefits of including OS/390 DCE as part of your information processing environment.

Planning

- *OS/390 DCE Planning*, SC28-1582

  This book helps you plan for the organization and installation of OS/390 DCE. It discusses the benefits of distributed computing in general, and describes how to develop plans for a distributed system in an OS/390 DCE environment.

Administration

- *OS/390 DCE Configuring and Getting Started*, SC28-1583

  This book helps system and network administrators configure OS/390 DCE.

- *OS/390 DCE Administration Guide*, SC28-1584

  This book helps system and network administrators understand OS/390 DCE, and tells how to administer it from the batch, TSO, and shell environments.

- *OS/390 DCE Command Reference*, SC28-1585

  This book provides reference information for the commands that system and network administrators use to work with OS/390 DCE.

- *OS/390 DCE User's Guide*, SC28-1586

  This book describes how to use OS/390 DCE to work with your user account, use the directory service, work with namespaces, and change access to objects that you own.

Application Development

- *OS/390 DCE Application Development Guide Introduction and Style*, SC28-1587

  This book assists you in designing, writing, compiling, linking, and running distributed applications in OS/390 DCE.

- *OS/390 DCE Application Development Guide Core Components*, SC28-1588

  This book assists programmers in developing applications using application facilities, threads, remote procedure calls, distributed time service, and security service.

- *OS/390 DCE Application Development Guide Directory Services*, SC28-1589

  This book describes the OS/390 DCE directory service and assists programmers in developing applications for the cell directory service and the global directory service.

- *OS/390 DCE Application Development Reference*, SC28-1590

  This book explains the DCE Application Program Interfaces (APIs) that you can use to write distributed applications on OS/390 DCE.

Reference

- *OS/390 DCE Messages and Codes*, SC28-1591

  This book provides detailed explanations and recovery actions for the messages, status codes, and exception codes issued by OS/390 DCE.

Security Server Publications

This section lists and provides a brief description of books in the Security Server library that may be needed for the DCE Security Server and for RACF interoperability.

- *OS/390 Security Server (DCE) Overview*, GC28-1938

  This book describes the DCE security server and provides a road map for DCE security server information in the OS/390 DCE library.

- *OS/390 Security Server (RACF) Security Administrator's Guide*, SC28-1915.

  This book explains RACF concepts and describes how to plan for and implement RACF.

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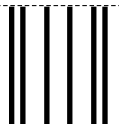

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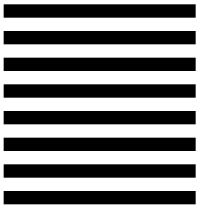

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