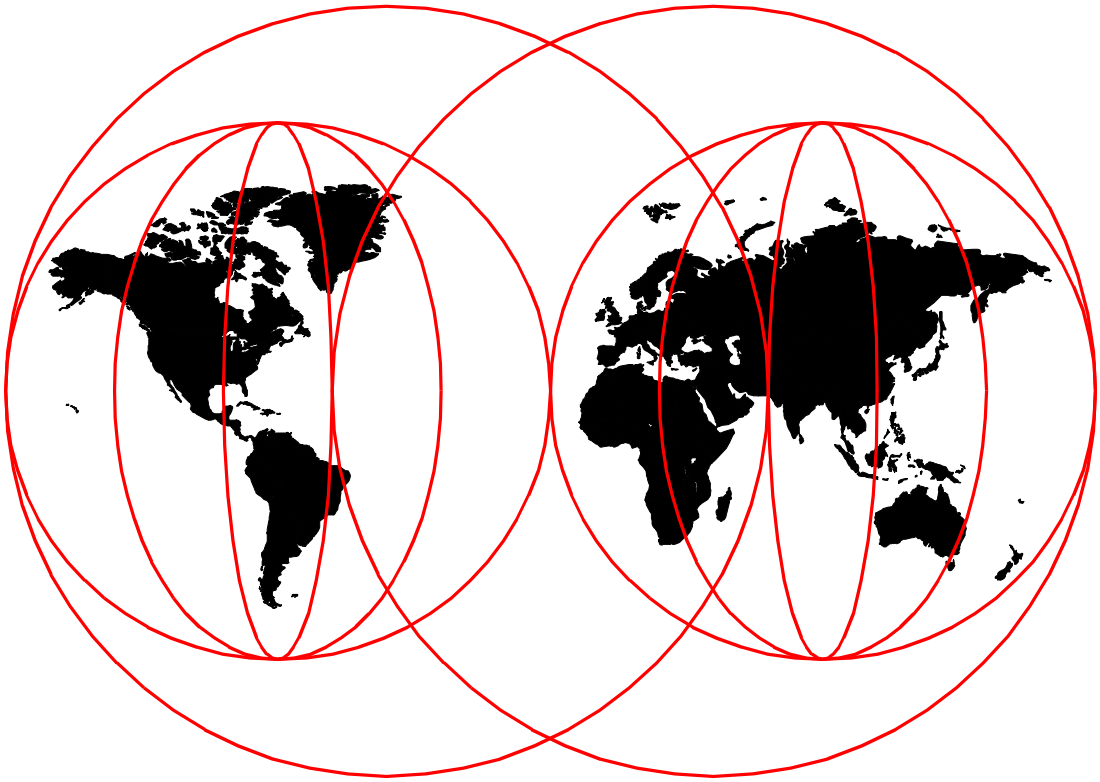
P390plex: A Technology Demonstration

Bill Ogden



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Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix B, “Special Notices” on page 57.

First Edition (July 1999)

The software referenced in this redbook applies to the OS/390 Application Development CD-ROM V2R6 that is available to members of the S/390 Partners in Development organization. The hardware described in this document is experimental and is not available as an IBM product.

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IBM Corporation, International Technical Support Organization
Dept. HYJ Mail Station P099
522 South Road
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Preface

This redbook describes the implementation of a P/390-based system as a self-contained Parallel Sysplex environment. The system described does not represent an IBM product. The purpose of this demonstration is to illustrate potential uses of P/390 technology.

This redbook is intended for readers quite knowledgeable in S/390 and OS/390 areas. It uses common S/390 and OS/390 terms and acronyms without further explanation. Furthermore, this document assumes readers are familiar with general P/390 usage and terminology, and these are discussed without preliminary descriptions.

Author and Contributors

The author of this document is **Bill Ogden**. He is a retired IBM Systems Engineer who likes to work with P/390 systems and with customers and developers who are new to OS/390 and related areas. Bill has been with the ITSO for many years. Since his retirement he participates part-time with the ITSO, and also works as an independent consultant.

Contributors:

Ron Hill, with the P/390 development group, provided the basic implementation for using Coupling Facility technology in the P/390 environment. This included the emulated CF channels, Parallel Sysplex microcode, and the emulation of ETR clocks.

Chuck Berghorn, with the P/390 development group, provided the design of the P/390 technology necessary for use of multiple P/390 adapters in a single system.

Paola Bari is a member of the Parallel Group in S/390 development. She provided the skills needed to convert the AD CD-ROM R6 system to a Parallel Sysplex environment, with the minimum number of changes to the base OS/390 system.

Lou Voerman, with the P/390 development group, provided the enhancements to the emulated CKD device manager to permit the use of shared (emulated) DASD in the P390plex system. Altering existing CKD emulation (also written by Lou) to provide shared DASD was one of the key steps required for a useful P390plex system.

Martin Ziskind, with the P/390 development group, constructed several test systems used for this project. He has also demonstrated the basic technology at Share.

Dick Buckey, with the P/390 development group, provided most of the CF console support.

Reza Kaffashan, with the S/390 Partners in Development group, helped establish the requirements for this project and the technology it demonstrates.

David Clitherow, on assignment at the ITSO from IBM UK, helped us cobble together several earlier test versions of Parallel Sysplex systems for our P/390s.

Karen Miller is with S/390 Customized Solutions. Karen builds the AD system that provides the starting point for the OS/390 used in this project. She helped us design an implementation that required the minimum number of alternations to the base AD system.

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Chapter 1. Introduction and Overview

This document describes a technology demonstration produced by a small team at IBM. *It does not describe an IBM product.* The Parallel Sysplex system described in this document is not available as a formal IBM product. The purpose of this document, and of the system it describes, is to illustrate aspects of IBM technology leadership.

This document discusses an advanced use of OS/390 (for Parallel Sysplex) and an advanced use of P/390 technology. It is not intended as an introduction to these topics. We assume the reader has a systems programming level of skill for OS/390 and is generally familiar with P/390 technology. We use terms and acronyms associated with these areas without further introduction or definition.

Practically all OS/390 customers are familiar with general Parallel Sysplex concepts and these general concepts and advantages will not be reviewed here. Many OS/390 installations are in the process of migrating to a Parallel Sysplex environment. Several of the challenges involved in this migration involve the need for “test” Parallel Sysplex systems, for a variety of reasons, including:

- Operator training. A Parallel Sysplex environment can be a complex operational environment, especially if all the potential failure and recovery scenarios might be used. Extending the necessary training to a large pool of operators can be a substantial task.
- Systems programming testing. The control parameters for major subsystems exploiting Parallel Sysplex capabilities can be complex, and considerable development and testing may be required to obtain the best combinations.
- Applications testing. Enhancing applications to exploit Parallel Sysplex capabilities can be complex, especially if the applications will use the more advanced multisystem recovery modes available. Testing such recovery modes can be difficult.

A test environment for Parallel Sysplex usage can be constructed using several LPARs and Integrated Coupling Facilities (ICFs), based on any of the larger, current S/390 machines. However, the resources needed to do this (in processor overhead, main storage, channels, and dedicated DASD) are not trivial. In addition, many of the potential test scenarios, especially those involving more exotic hardware failures, might disturb production operations if not handled correctly.

A completely separate, low-cost Parallel Sysplex system would address these concerns and help installations migrate more quickly to full exploitation of the Parallel Sysplex capabilities. P/390 technology could be used to provide such a system.

1.1 Brief P/390 Review

P/390 systems have been available for several years. All are based on the P/390 adapters. These are adapter cards for PCs or RS/6000 systems. The current version of the adapter is the P/390E, which uses a PCI interface to the underlying server. The most common underlying servers have been PC Server 330-PB0 units and RS/6000-F50 units. The same technology is used in the S/390 Integrated Server model B01, where a PC server is integrated “under the covers”.

PC and Integrated Server systems use the OS/2 operating system in the underlying server. The work described in this document is not relevant to RS/6000-based systems, and we will not mention them again here.

The current P/390E adapter is a complete S/390 processor and memory on one PCI adapter card. The processor provides about 7 MIPS processing power and the adapter card contains 256 MB of S/390 storage. The storage is completely independent of whatever PC storage is available on the underlying server.

In this redbook, as in most discussions involving these systems, we will use the collective term “P/390” to include systems based on PCs and S/390 Integrated Server model B01s. However, please note that the target system we describe later, which we call a *P390plex*, is based *only* on a S/390 Integrated Server model B01. The technology we describe is not appropriate for existing PC Server-based machines.[1] Therefore, *in this document*, when we discuss the P390plex system we implemented, we are implying use of S/390 Integrated Server model B01 machines. The same technology might be used with PC Servers, given a sufficient number of full-length PCI slots with suitable characteristics, but we do not attempt to discuss possible PC packages.

A P/390 adapter contains a S/390 processor and S/390 storage. It does not emulate or simulate a S/390--it *is* a S/390, with one exception: the P/390 adapter cannot perform any I/O operations. It has absolutely no S/390 I/O capabilities. Whenever a S/390 I/O operation is executed, such as an SSCH instruction, the P/390 processor interrupts the underlying server and the server, using OS/2 programs, then emulates the I/O operation.

P/390 systems (including Integrated Server B01s) use the *P/390 support programs*. These are the OS/2 programs that emulate mainframe I/O devices and operations. These support programs are essential for the operation of any P/390-based system. The majority of the programs are *device managers*. There is, for example, a device manager to emulate 3380 and 3390 disk drives, using normal SCSI or SSA hard drives on the underlying PC server.

A P/390 system can connect to mainframe I/O devices through ESCON and parallel channel connections. Such connections require appropriate adapters on the P/390 systems. These adapters are also driven by OS/2 device managers; these adapters do not *directly* connect the P/390 adapters to the mainframe channels.

P/390-based systems use normal S/390 software. A standard OS/390, without any special modifications for a P/390, can be used. IBM provides, at the time of writing, two packages of OS/390 that are specially intended for P/390 systems. These are contained on CD-ROMs. However, these packages are for convenience and contain no special modifications to OS/390 and the other products on the CDs.

One of the CD packages is known as the Application Development (AD) system. This includes OS/390 and a number of program products (CICS, DB2, various compilers, and so forth) with the necessary customization to make the system immediately useful. The AD system is available only to IBM’s S/390 Partners-in-Development members. It is, however, typical of a basic OS/390

[1] One of the practical reasons is that there are not enough full-length PCI slots available in a typical PC-based P/390 system.

installation. All the examples in this document will assume the use of the AD system, in order to provide specific examples. Any reasonably experienced OS/390 systems programmer should be able to transfer the examples to another basic OS/390 environment.

1.2 The P390plex

The remainder of this redbook describes a Parallel Sysplex system based on multiple P/390E adapters in a S/390 Integrated Server model B01. As previously mentioned, we have informally named this a P390plex. We will describe the system in several steps:

- Hardware and special software (device managers, OS/2 icons, CF code) needed to create the Parallel Sysplex hardware image
- Additions and changes to the normal OS/390 AD CD-ROM (release 6) system to produce an initial Parallel Sysplex environment
- Initial operation
- Brief discussions of additional topics and a review of common questions about this P390plex environment.

The discussion of P/390 hardware is unique to P/390-based systems, of course. Once past this, the remaining discussion and description of a minimal Parallel Sysplex implementation could apply to any small S/390, and is not unique to P/390-based systems.

Our particular implementation has several limitations:

- It is designed for only two OS/390 members in the Parallel Sysplex. A design for more members would almost certainly be done differently (and would use symbolic parameters to control PARMLIB functions, which we are not doing with the implementation described here).
- It permits OS/390 TCP/IP to run on only the first OS/390 member. This is due to current P/390 limitations. Likewise, SNA LAN or WAN connections are permitted only on the first OS/390 member.[2]
- Only the first OS/390 system will have useful OpenEdition functions. The current HFS implementation does not permit sharing of the HFS files between OS/390 systems and we elected not to create a duplicate set of HFS files for our second OS/390 system.

[2] When we say "first OS/390 member", we are implying the use of the first P/390 adapter, known as adapter "zero" or P/390-0. A number of existing device managers, such as LCS3172, SNA7172, and WAN3172, will operate only with the first P/390 adapter.

Chapter 2. P390plex Hardware and Support Programs

The hardware for our P390plex system consisted of the following:

- A standard S/390 Integrated Server model B01, which includes one P/390E adapter (containing the 7 MIPS S/390 processor and 256 MB of S/390 storage)
- Three 18GB SSA disk drives in the Integrated Server, in a RAID 5 array. This provided about 35 GB of useful disk space. We required about 12 GB for our OS/390 volumes.
- Three additional P/390E adapter cards (with a S/390 processor and 256 MB S/390 storage on each) to be placed in the Integrated server.

As a separate technology experiment, IBM has produced a few copies of P/390E adapters with 1 GB of S/390 storage on the adapter boards. These could be used for OS/390 or for the CFs. We found that the standard P/390E adapters, with 256 MB storage, were sufficient for all the OS/390 processing and CF structures that we needed, and we will not further mention the 1GB versions of the P/390E adapters.

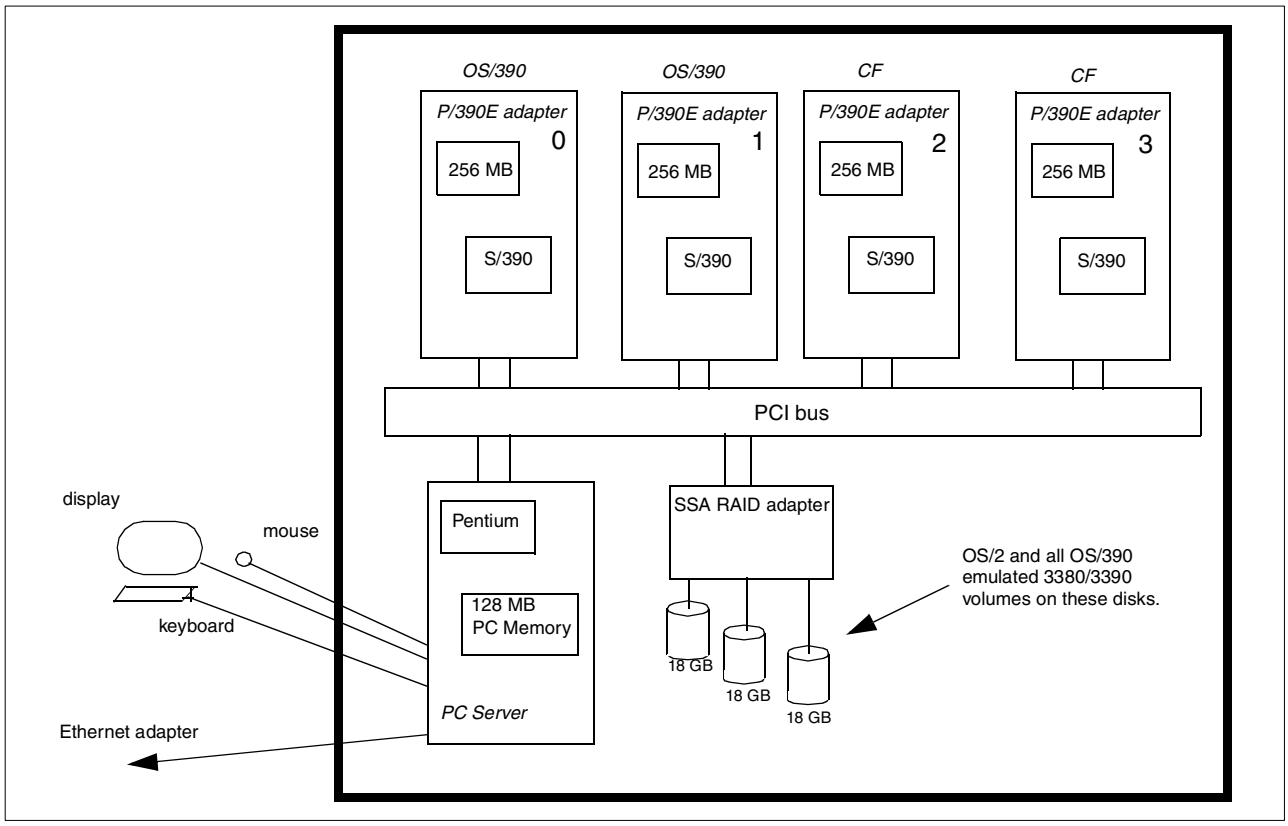

Figure 1. S/390 Integrated Server B01, with Three Extra P/390E Adapters Installed

Figure 1 provides a conceptual view of the system. The four P/390E adapters, the internal PC, and an SSA disk adapter all are connected to the PCI bus. The PC, running OS/2, accesses the disks and the display/keyboard/mouse interface. The PC also can access an integrated Ethernet adapter. The P/390E adapters are

numbered 0 to 3. (The numbers are assigned from low slot address to high slot address.) We will run OS/390 in adapters 0 and 1, and run the CF code in adapters 2 and 3. It should be possible to work with other configurations, such as three OS/390 processors and one CF. However, the system described in detail in this redbook assumes the use of two OS/390 systems and two CFs.

The additional P/390E adapter cards were placed in slots 9, 10, and 11 of the planar board in the Integrated Server, with the original P/390E adapter in slot 12.

Note that the four P/390E adapters are independent S/390 processors. They do not share any S/390 storage, for example. These multiple P/390E adapters *do not* create a multiprocessor (shared memory) S/390.

We intend to share all our emulated 3380 and 3390 drives with both OS/390 systems, and we will use a single DEVMAP to do this. As seen later, we intend to have both OS/390 systems share a single copy of OS/390 libraries, with only a few data sets unique to each OS/390 processor.

2.1 Installing Additional Support Programs

Once we installed the additional P/390E adapters, we needed to replace a few of the original P/390 support programs with new versions. These new versions contained additional logic to deal with multiple P/390E adapters. We also needed to install the CF program (usually termed “CF LIC” (Licensed Internal Code) or “CF microcode”).[1]

These additional programs and LIC were packaged on three diskettes (two for the CF LIC, and one for the OS/2 programs). The installation went as follows:

1. End all running P/390 programs. (Use the *P/390 END* icon).
2. Copy all the files on the Files for Sysplex diskette to the P390 directory.
3. Restore the CF LIC using the command `RESTORE A: C:` (where C is the drive letter for the drive containing the P390 directory) and the two other diskettes.
4. While in the P390 directory, unzip the CF LIC with the following command:
   `PKUNZIP2 AWSP390.ZIP`

2.2 P390 Configurator Changes

After installing the programs discussed in the previous paragraphs, several other changes are needed:

1. From an OS/2 window, while in the P390 directory, issue the following command: `AWSPROF`. This will indicate the full path name of the current DEVMAP (device map). For our system, it was E:\OS390\DEVMAP.MVS. This information may be needed later.
2. Using the P/390 Configurator icon in the P/390 window, start the configurator. We will modify several parameters by replacing an existing character with a question mark. When the P/390 support programs encounter these parameters, they will replace the question mark with the P/390 adapter number (which is in the range 0 to 3). This will provide different parameters,

[1] Note that the CF program is a licensed internal element of a CF processor. A proper IBM license is required to obtain and use it. It is not considered a program product and is not available through normal program product channels.

depending on which P/390 adapter is requesting service from a device manager.[2]

3. Go to the F4 panel in the configurator. (This is the panel where the user can set the default IPL address and so forth.) We needed to change our CPU ID in this panel, and it should not be all zeros. Our original CPU ID was 000001. We changed this to 00001?. This will produce CPU ID 000010 for the first P/390 adapter, CPU ID 000011 for the second adapter, and so forth.
4. In the F4 panel, change the Local Area NetID such that the name includes a question mark somewhere in the name. Exit (F10) from this panel.
5. While viewing the device list (F2) in the configurator, press F12. This will display general parameters for various device managers. For device manager LAN3274, change the'7490 parameter to 749? and press Enter. (This will cause the tn3270 server in device manager LAN3274 to listen on port 7490 for connections to P/390 adapter 0 and listen on port 7491 for connections to P/390 adapter 1.)
6. Still in the F12 list, add the parameter `/SHARE` to the line for device manager AWSCKD. (There should be a space separating this parameter from any previous ones.) Press Enter, then press F10 to exit from the general parameter list and return to the device list.
7. In the device list (F2), check for any printer entries. These are typically at addresses 00E and 00F. These entries may contain file names in the parameter fields. If so, change the file names to contain a question mark. In our case we changed device 00E from `D:\PRINTER.00E` to `D:\PRINTER?.00E` and made the same change for a printer at address 00F. The specific file names do not matter as long as a question mark is used to generate different names for different P/390 adapters.
8. In the same way, check for a card reader (2540) definition. If it exists, change the parameter to something like D:\RDR*?.JCL. And, yes, the syntax is a little odd. Remember that the ? is converted to a number (0 or 1, in our case) before the string is used as an OS/2 directory name.
9. If any OS/2 file names are defined for AWSTAPE devices, change the names to include a question mark; for example, E:\TAPE?.580.
10. We will later require additional DASD volumes for OS/390. This is a good time to add them. We added the following volumes, with the indicated parameters:

    - `130  3380  SCPMV6  1000C  2  E:\SCPMV6.130`
    - `A90  3390  PLEX01   100C  2  E:\PLEX01.A90`
    - `A91  3390  PLEX02   100C  2  E:\PLEX02.A91`

    - This means, for example, that a new 3380 volume (volume serial SCPMV6) is created at address 130, containing 1000 cylinders. The '2' parameter indicates that it is used with device manager AWSCKD, and the OS/2 file name is E:\SCPMV6.130. Our system had ample space on the E drive. One must always specify the fully qualified file name, beginning with a back slash, when specifying file names in the P390 configurator.
    - We will later initialize these volumes under OS/390.
11. Exit from the configurator with F10, followed by F6.

[2] We will use P/390E adapters 0 and 1 for OS/390. This means the ? characters in the configurator will resolve to 0 or 1.

2.3 Updating PCOM

As delivered, the Integrated Servers are provided with the eNetwork Personal Communications product, which supplies the 3270 emulators needed for OS/390. For our P390plex system, we needed four emulator sessions, as follows:

- Two sessions using IP address 127.0.0.1 and using port 7490
- Two sessions using IP address 127.0.0.1 and using port 7491

This is, in effect, two 3270 sessions for each of the two processors that will run OS/390. Each processor will have one session for the MVS master console and one session for TSO.

One can modify PCOM sessions in a number of ways to obtain the required sessions. Again, the requirement is simply to have two sessions using the loopback address (127.0.0.1) and port 7490, and another two sessions using the same loopback address and port 7491. (We could create more than two sessions for each system, of course, but the minimum workable environment requires two sessions for each system.)

We found the PCOM customization that came with the Integrated Server to be somewhat confusing. We deleted all the predefined sessions and then defined new ones.[3] This was not necessary, provided we somehow modified at least two of the originally defined sessions to connect to port 7491.

2.3.1 Defining New PCOM Sessions

After deleting the original PCOM sessions, we defined four new sessions (named A, B, C, and D) as follows:

1. Open the primary PCOM icon on the OS/2 desktop. This should display a number of icons within the PCOM folder. Double click **Start/Configure Session** in the PCOM folder. This starts the process of defining a new 3270 emulator session.
2. The first screen (when defining a new session) configures the connection method, using GUI selection models. Select **PC -> LAN -> TCP/IP -> S/390** on this screen, and then select **CONFIGUR***E*.
3. Select screen size 32x80; this is not required, of course, but is the most commonly selected screen size. Then select **CONFIGURE LINK**.
4. Set the IP address to 127.0.0.1, and then select **ADVANCED SETUP**.
5. Change the port number to 7490 or 7491 and select **AUTO-RECONNECT**. We used port 7490 for sessions A and B, and port 7491 for sessions C and D. We suggest removing the LU=OP parameter, if you find it in a session definition, and the corresponding /R=OP parameter in the DEVMAP.[4] (There is nothing wrong with the /R= function, but it is an additional complexity in an already complex environment.)
6. Select the **OK** buttons until the 3270 screen appears.

[3] We deleted the original sessions by deleting the icons with labels P390SESSIONS, P390 OPERATOR, and ALL PCOM SESSIONS.

[4] Recent versions of AWS3274/LAN3274 will accept an /R= parameter in the DEVMAP. This specifies an arbitrary name that was used as an LU name in an emulator session definition. This provides a mechanism to assign a particular emulator session to a particular S/390 address. If this /R= mechanism is not used, the P/390 functions will use the next available 3278 address for the next emulator session; we used this method.

7. Select SAVE in the FILE menu. This should produce a pop-up screen asking the user to provide a file name. We used the name A.WS for the first session. (For later sessions, we used B.WS, C.WS, and D.WS.)
8. When the user supplies the WS file name and presses Enter, PCOM will offer to create an icon for the session. Reply `Yes` to this offer. (The icon is created in the PCOM folder.)
9. Do not end the session just created. Instead, return to the PCOM folder and select **Start/Configure Session** again. This will start the process to configure the next session. By leaving previous sessions running, the next new session will be assigned the next available session letters and the four sessions will have internal names of A, B, C, and D.
10. Continue the process until four sessions are defined.
11. Close all the sessions (by double-clicking on the top left button of each session).
12. Go to the PCOM folder. There should be icons for the four sessions just defined. Use the RMB (right-hand mouse button) to click on the session A icon. Select **Create Shadow**. Then select the option to place the shadow on the OS/2 desktop. Do this for all four sessions. This should result in four icons on the OS/2 desktop for the four PCOM 3270 sessions. One can double-click on each of these to start the associated session. (One can also create multiple sessions from any of the icons simply by using it several times.)
13. The Integrated Server display is quite busy when the P390plex is running. We suggest that the 3270 sessions be labelled to reduce potential confusion during operation. The next steps illustrate how to do this.
14. Start session A. Select **Appearance** in the tool menu. Select the **Window Setup** suboption. This should provide a display containing several options. We selected the **Short Session ID** and the **Session Name** options. In the Session Name field we entered `P390(0)`. Exit from this panel, and note the name field (the top line of the emulator session) change.
15. Make similar changes for sessions B, C, and D. For session B, use the Session Name P390(0). For sessions C and D, use the name P390(1). These names will help associate the sessions with the related P/390 adapter number and with the OS/390 running on that adapter.

Again, we stress that redefining the PCOM sessions is optional.

2.4 Line Commands and Initial Tests

We could now test the CF LIC and the two P/390 adapters used for it. We later add icons to the P/390 icon folder to do this, but for initial test purposes we elected to use direct commands.

The P/390 support programs include a file named IPL.CMD. The P/390 IPL icon executes this command file. The IPL command can also be entered from an OS/2 command line, and we used the command this way. The IPL command reads the DEVMAP file and obtains the default IPL address and IPL PARAMETER value from it. However, these default values (from the DEVMAP) can be overridden by specifying other values on the command line. The general syntax of the IPL command is as follows:

```
IPL  A80  /CP 0  /PARM 0122CS
```

where A80 and 0122CS are examples of parameters. A80, in this example, is the IPL address. If the IPL address or IPL parameter are not specified, they are taken from the current DEVMAP. If they are specified, then that element in the DEVMAP is ignored. The CP parameter defaults to 0, and refers to which P/390 adapter is being IPLed.

The diskette containing the additional sysplex files provided the SYSPLEX.CMD file. Its purpose is to condition the system for Sysplex use. For example, it assigns the last two P/390 adapters as CF units, and the first two as S/390 units, activates the microcode to provide ETR timers, and so forth. This command does not produce any visible external results, but it must be run before any other sysplex activity starts.

From an OS/2 window issue the following commands, with pauses between each command to permit the obvious processing to complete:

```
SYSPLEX  ALL
IPL   /CP 2
IPL   /CP 3
```

This should result in starting two CF processors. A P/390 System Activity Display (SAD) window (the P/390 “speedometer”) will be displayed for each CF processor. A CF console is opened for each CF processor. In normal usage, the CF consoles are not used much, and one can shrink the two CF console sessions on the OS/2 desktop. The SAD indicators will always register 100% CPU supervisor state utilization; this is normal for a CF. The two IPL commands did not specify an IPL address; it was unnecessary because the SYSPLEX command assigned P/390 processors 2 and 3 as CF units and no IPL address is needed for a CF unit. Instead, the IPL commands loaded the CF LIC in both P/390 adapters.

The commands to terminate the CF processors are:

```
AWSEND  /CP 2
AWSEND  /CP 3
```

Each of these commands produces a pop-up window asking permission to end the relevant P/390 operation. Reply `Yes` for each pop-up. The CF console window will disappear when its CF processor is terminated.

The CFs can be IPLed and ENDed multiple times. That is, the sysplex environment persists once the SYSPLEX command has been issued.

The following command will remove the sysplex environment and return to normal P/390 operation:

```
ENDPLEX  ALL
```

The SAD displays always “float” to the foreground of the OS/2 display. That is, they will overlay any other window. This can be a problem, especially with the many windows open in P390plex operation. One can remove this “floating to the top” attribute by editing CONFIG.SYS and adding a line similar to the following:

```
SET AWSSAD=/SIO 300
```

This example will calibrate the yellow bar (in the P/390 System Activity Displays) such that full scale represents 300 I/O operations per second. Changes to CONFIG.SYS are effective only when OS/2 is rebooted, of course.

2.5 Coupling Facility Details

The P390plex Coupling Facility units always have the following characteristics:

```
The first CF is CF01
Assigned to CHPID F0 with CUID F000 and device addresses F000 and F001
Node descriptor 009000.IBM.PK.P39000390344
Partition 0, CPCID 00

The second CF is CF02
Assigned to CHPID F1 with CUID F100 and device addresses F002 and F003
Node descriptor 009000.IBM.PK.P39000390345
Partition 0, CPCID 00

The receiver CHPIDS are:
CHPID 10 for the first OS/390 system (P/390 adapter 0)
CHPID 11 for the second OS/390 system (P/390 adapter 1)
```

These parameters (except for the CF01 and CF02 names, which are assigned by later jobs) are fixed and cannot be changed. The DEVMAP should not have any definitions for the CFs or the receiver channels. These values are, in effect, added to the DEVMAP after OS/390 is started. The OS/390 coupling definitions should have the node descriptors shown here. (This will be illustrated later.)

2.6 P390plex, the DEVMAP, and Device Managers

The P390plex implementation described in this redbook uses a single DEVMAP for both OS/390 processors (in P/390 adapters 0 and 1). That is, all disk drives, tape drives, displays, and so forth, used by either system must be defined in one DEVMAP. The implications behind this can be complex, depending on which P/390 device manager is involved. We will briefly describe several of the device managers and their functioning in a P390plex environment.

AWSCKD is the device manager that emulates 3380 and 3390 disk drives. Multiple copies of the device manager emulate all the DASD used by both OS/390 systems. The multiple copies emulate shared DASD, including the emulation of RESERVE and RELEASE CCWs. The DEVMAP[5] must contain definitions for all DASD units used by either OS/390 system, and all units are seen as shared. The `/SHARE` option for AWSCKD *must* be specified in the DEVMAP (in the "F12" display).

LAN3274 is the device manager that converts tn3270 sessions through OS/2 TCP/IP to appear as local 3270 terminals to OS/390. (The AWS3274 device manager that appears in the DEVMAP is, in effect, an alias for LAN3274.) When a new tn3270 connection is sensed (via OS/2 TCP/IP), LAN3274 will assign it to the next available 3270 address defined in the DEVMAP (starting with the lowest address in the DEVMAP). LAN3274 normally “listens” for tn3270 sessions on port 7490 of the OS/2 TCP/IP.

[5] The implementation we are describing has a single DEVMAP that is shared by both OS/390 systems. It is possible to build a P390plex in which each OS/390 processor has its own DEVMAP; in this case the DEVMAPs could contain different entries. We will ignore this possible alternate implementation is this document.

For P390plex, two copies of LAN3274 are used, listening on two port numbers. The two port numbers are assigned to the two different OS/390 systems on P/390 adapters 0 and 1. (Changing the default port address from 7490 to 749?, as described previously, causes one LAN3274 to listen on port 7490 and the other LAN3274 to listen on port 7491.) Each OS/390 can have a 3270 defined and in use at address 701, for example. A 3270 emulator session connects to the desired OS/390 system by using the appropriate port address. This can result in some confusion -- there can be two different TSO sessions at address 701, for example, but on the two different OS/390 systems. In other words, *each* OS/390 can have a terminal session on *all* the 3270 devices defined in the DEVMAP.

AWS2821 is the device manager that emulates 1403 and 3211 printers. If printer output is directed to an OS/2 file, there must be unique file names for each copy of OS/390 in use. This can be accomplished by using a ? character in the file name. If AWS2821 is directed to the OS/2 spooling system, no special action is needed.

AWSTAPE is the device manager that emulates 3422 tape drives, using OS/2 disk files as the storage media. If an OS/2 file name is hardcoded in the configurator, it should include a ? character in the name; this will generate a unique name for each OS/390 copy. AWSTAPE devices are commonly used in conjunction with the AWSMOUNT command. The AWSMOUNT command, at the time this was written, has not been extended to use a /CP parameter. To use the AWSTAPE command, the following sequence, or something similar, is needed (working in an OS/2 window):

```
set p390card=1
awsmount 580 E:\TAP23.DAT /C
```

The `set p390card=n` command determines which P/390 adapter will be the target of the next command. In our case, n will be either 0 or 1. The AWSMOUNT command is fully documented in the DOC files included with the P/390 support diskettes.

LAN3172, WAN3172, MGR3172, and *LCS3172* are device managers that provide LAN and WAN connections for SNA and OS/390 TCP/IP. At the time of writing, these device managers do not support multiple P/390 processors. They will work with P/390 processor 0. All LAN/WAN connections (other than LAN3274 emulation of local 3270 terminals via OS/2 TCP/IP) must go only to the P/390 0 processor.

AWSICE is the device manager that drives S/390 parallel and ESCON channel adapters, using the *parca* and *escimo* adapters. Multiple copies of this device manager can connect to multiple P/390 adapters, but a given channel adapter can be used with only one P/390 adapter. That is, a given channel must be associated with only one of the OS/390 systems. We did not use any S/390 channel adapters in our tests and do not discuss their potential operation here.

2.6.0.1 DEVMAP Defaults

The DEVMAP contains (in the F4 display) the default IPL address and default IPL parameter. These values are used when the IPL icon is clicked. In our Parallel Sysplex environment, we used different IPL parameter values to differentiate between the two OS/390 systems being used. Only one IPL parameter can be placed in the DEVMAP. We could change the DEVMAP between IPLs, but we

usually overrode the default IPL parameter value by entering the IPL command from an OS/2 command line and supplying the desired IPL parameter value.

The IPL parameter value in DEVMAP also can use the ? character to differentiate between the P/390 processors. The ? character resolves to the value 0 or 1 for the first two P/390 processors. If the desired IPL parameter values are sufficiently well organized so that this mechanism can be used to automatically select the correct IPL parameter, then this technique can be used. (Our work was not this well organized. In practice, we normally entered IPL commands from the OS/2 command line instead of using an IPL icon.)

Some of the same comments apply to the P/390 END function. The END icon, in the P/390 folder, will end operation on P/390 adapter 0. One can easily add additional icons to apply to the other processors. In practice, we tended to use the `AWSEND /CP n` command from an OS/2 window.

2.7 CF Console Commands

In normal Parallel Sysplex operation, the CF consoles are seldom used. For those unfamiliar with CF console operation, the following CF commands might be a starting point:

```
HELP
HELP DISPLAY
DISPLAY LEVEL
DISPLAY MODE
DISPLAY CHPID
HELP CONFIGURE
CONFIGURE 11 OFF          (for recovery testing !)
CONFIGURE 11 ON
```

The CHPIDs displayed by the CF are the *receiver* CHPIDs, and will always have the addresses 10 (first processor connection) and 11 (second processor connection) in the P390plex environment described here.

Chapter 3. OS/390 Parallel Sysplex Setup

There are many ways to implement Parallel Sysplex operation. We selected one way and will describe only that way in this document. Our selection was driven by three key considerations:

- We assumed that the AD CD-ROM implementation of OS/390 will be used. (In particular, we assumed the use of the North American version of the OS/390 V2R6 AD CD-ROM, although the process described should work with other releases).
- We wanted to change the base AD system as little as possible. In particular, we wanted to be able to IPL the AD system, in its original IPL modes, at any time--ignoring any sysplex elements.
- Keep the whole project as simple as possible.

This second consideration resulted in a fundamental decision not to use MVS symbolic parameters to control the sysplex IPL process. Using symbolic parameters would result in changes to the original AD parmlib (and IPLPARM) members and we wanted to avoid this.

Instead, we elected to use different PARMLIB (and IPLPARM) members for the two OS/390 systems that are run in Sysplex mode. The different PARMLIB members point to different paging data sets, different LOGRECs, and so forth. This method (using different PARMLIB members instead of using symbolic parameters) is not typical of production Parallel Sysplex environments, but it met our requirements and resulted in a fairly simple implementation of a small Parallel Sysplex environment.[1] If the original AD system had used symbolic parameters for naming its unique data sets, we would have used symbolic parameters for our Parallel Sysplex implementation.[2]

Do not make some, or all, of the following changes and attempt to IPL a processor in Parallel Sysplex mode without reading the next chapter. The first startup in Parallel Sysplex mode requires special actions.

This chapter describes several jobs we submitted and data set changes we made. For this work a TSO userid having RACF SPECIAL and RACF OPERATIONS authority was used. This avoided any need to grant data access authorization for the various jobs. (The userid *P390*, as supplied with the AD system, was used.)

[1] Remember, when we mention PARMLIB we mean the collective concatenation of the PARMLIBs in the system. For the AD CD-ROM V2R6, SYS1.ADCD06.PARMLIB and SYS1.PARMLIB are concatenated, in that order. All the members we altered or added were placed in SYS1.ADCD06.PARMLIB. You *must* understand how PDS concatenation works before working with more than one PARMLIB.

[2] This is not a criticism of the AD system. There is no need to use symbolic controls in a system intended for a single, basic P/390 environment, and symbolics would have simply made the base system more complex to understand.

3.1 Volume Layout

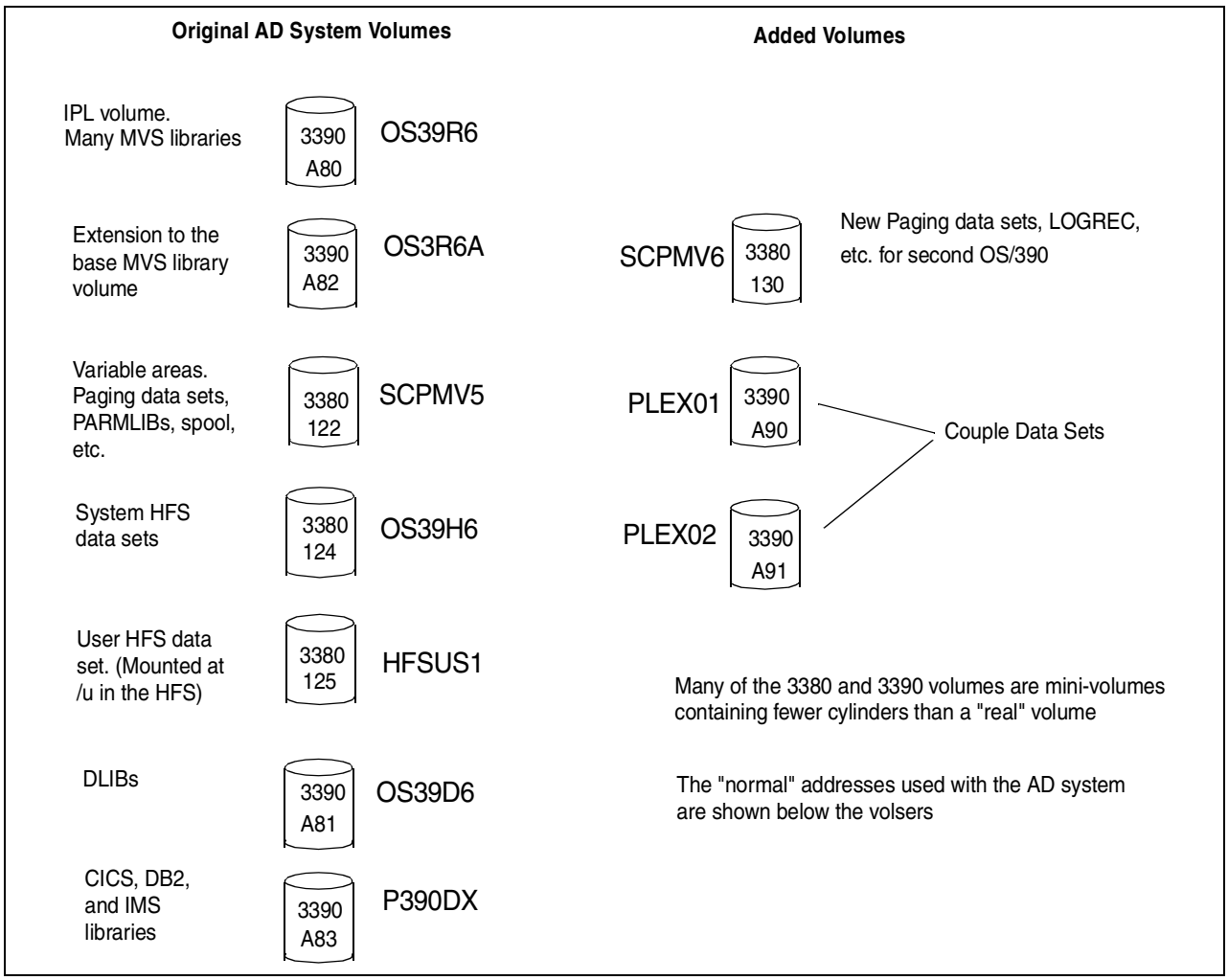

Figure 2. Volume Layout

The normal AD system volume arrangement (for the V2R6 release) is shown on the left of the figure. We added the three volumes shown on the right side. Two of the new volumes are for couple data sets, and one is for paging data sets and other “instance” data sets that are unique to each OS/390 image. The “instance” data sets on the original SCPMV5 volume (as delivered with the AD system) are used for the first OS/390 image and the data sets on the new SCPMV6 volume are used for the second OS/390 image.

3.2 Initial Allocations

We created the SCPMV6, PLEX01, and PLEX02 volumes earlier. We next IPLed our standard AD system (using the CS parameter) and used it for all of the steps described in this chapter.

3.2.0.1 Initialize the New Volumes

A conventional ICKDSF job is used to initialize the three new volumes. The listing for this job is shown in Appendix A. We used the `VARY xxx,OFFLINE` command to vary 130, A90, and A91 offline before submitting the job. After the job completed, we varied the volumes online again. We did not bother to update the VATLST

because the VATLST supplied with the AD system mounts unknown volsers as PRIVATE.

3.2.0.2 Create New Paging Data Sets and Similar Data Sets

We elected to use the high level qualifier SYS2 for the few data sets that will be unique to the second OS/390 system. (The first OS/390 system will use the SYS1 data sets that are supplied with the AD system.) We modified the JCL in P390.POSTINST(SYSALLOC) to do this job. Our job is listed in Appendix A under the job name SYSALLO2. Due to the page data set formatting involved, this job takes a little while to complete. There is nothing special about the SYS2 name; any high-level qualifier can be used. The new data sets, whatever their names, must be cataloged *in the master catalog*.

3.2.0.3 Create SYS2.LOGREC

The LOGREC job, listed in Appendix A, was used to create a new LOGREC data set for use by the second OS/390 system. The data set is placed on the SCPMV6 volume. The first step in this job will have condition code 8 the first time the job is run.

3.3 Changes to the DFSMS Controls

We needed to make two changes to SMS. After some consideration, we decided to change the base AD configuration instead of attempting to use two different SMS configurations. That is, our changes would apply to the standard AD system modes, as well as to the P390plex modes. These changes are very minor, and have no visible effects on the base AD system operation.

The two changes are:

- Alter the system names recognized by SMS to include *P390* and *P391*. The original system recognized only the system name *P390*.
- Add a data class for LOGR data sets, with VSAM share options (3,3). There is nothing special about the name LOGR, as used here. Another name could be used instead. Whatever name is used must match the name used when defining the associated logger policy.

Both changes are made using the ISMF panels available under ISPF. In the AD system, the ISMF panels are started from the M extension to the ISPF primary menu. You can follow this process:

- From the M menu, select option **2** (ISMF)
- If option 6 is not shown on the primary ISMF menu, do the following steps:
  - Select option **0** (ISMF profile)
  - Select option **0** (user mode)
  - Select option **2** (storage administrator)
  - Use F3 to back completely out of ISMF and start ISMF again.
- Select option **4** (Data Class)
  - Set CDS Name = `'SYS1.SCDS'`
  - Set Data Class = `LOGR`
  - Select option **3** to define a data class and press Enter
  - In the Data Class Define panel, set:

```
     RECORG=LS
     Space Avgrec = M
     Avg Value = 1
     Primary = 1
     Secondary = 1
(Scroll down to the next screen)
     Shareoptions Xregion = 3
                  Xsystem = 3
```

- Press F3 to save and exit. Return to the Primary ISMF menu.

- Select option **8** (Control Data Set) from the Primary ISMF menu
  - Set CDS Name = `'SYS1.SCDS'`
  - Select option **3** (SCDS Base Alter)
  - Use F8 to scroll down
  - Select option **1** to Add New System
  - Enter `P391` in Specify System Name field
  - Press F3 to save and exit.
  - Return to the Primary ISMF menu
- Select option **8** (Control Data Set) again
  - Set CDS Name = `'SYS1.SCDS'`
  - Select option **4** (Validation)
    - Specify SCDS name again as `'SYS1.SCDS'`
    - Check message and use F3 to return
  - Select option **5** (Activate)
    - Set CDS = `'SYS1.SCDS'`
    - Enter / to select option to perform activation (use a single forward slash)
  - Use F3 to exit from ISMF. You should receive an asynchronous message that a new SCDS was activated.

This process is done only once and the resulting new CDS is used by both OS/390 systems in the P390plex and by the original ADCD (single image) OS/390 system.

The SMS changes must be done before the job to define LOGR policy is run.

3.3.1 RACF Authorization

The existing RACF data base will be used for the P390plex modes. One RACF update is needed to give user *P390* authority to administer sysplex policy functions.

From the TSO command line (or ISPF option 6, or using the RACF ISPF panels) issue the following commands (while logged on with a userid having SPECIAL authority):

```
RDEF  FACILITY  MVSADMIN.XCF.CFRM  UACC(NONE)
PERMIT  MVSADMIN.XCF.CFRM  CLASS(FACILITY)  ID(P390)  ACC(ALTER)
SETROPTS RACLIST(FACILITY) REFRESH
```

This RACF update is required before the jobs defining the couple data sets can be run.

3.4 System Names

An OS/390 system has multiple names. Names are found in IEASYSxx members, in NJE definitions, in DFSMS controls, in SMF definitions, in TCP/IP, in VTAM, and elsewhere. The more important names are in the IEASYSxx member and in the SMFPRMxx member of PARMLIB. The names in these two PARMLIB members are normally recommended to be the same.

The original AD system uses the name *P390* in these PARMLIB members. We retained this name for our first processor and assigned the name *P391* for the second processor. The specific PARMLIB changes are described later.

Throughout our P390plex implementation we created several names (PARMLIB members, system names, and so forth) that contain the digit 0 or the digit 1. These are intended to correspond to P/390 processor 0 (for the first OS/390) and P/390 processor 1 (for the second OS/390). An exception is that SYS2 names are used for the unique data sets associated with the second OS/390, while SYS1 names are used for unique data sets associated with the first OS/390 and also for the common shared data sets. Of course, many existing PARMLIB member names also contain 0 and 1 in their names, so our naming convention is rather fuzzy, at best.

3.5 Couple Data Sets and Policies

The AD system contains several sample jobs for creating couple data sets and related policies. These are found in SYS1.SAMPLIB(IXC...) members. We copied, modified, and ran several of these jobs. The five jobs we used are listed in the Appendix. The first four jobs described here should be run before Parallel Sysplex mode is attempted; the CFs need not be active. The fifth job must wait until the system is in Parallel Sysplex mode, connected to the CFs.

The first job (IXCSYSPF) allocates and initializes two base sysplex couple data sets, on volumes PLEX01 and PLEX02. The data set names are SYS1.XCF.CDS0n, where n is 1 and 2. The sysplex name is defined as *P390PLEX*.

The second job (IXCCFRMF) allocates and initializes two couple data sets for basic CF usage. The same volumes are used (in reverse order) and the data set names are SYS1.CFRM.CDS0n.

The third job (IXCCFRMP) defines a configuration policy for the two CFs that will be used.

The fourth job (IXCLOGRF) allocates and initializes two couple data sets for the system logger function. The data set names are SYS1.LOGR.CDS0n.

The fifth job (IXCLOGRP) defines various structures and controls for the system logger functions. We included basic CICS logs, as well as OPERLOGs and EREP. *This job should not be run* until after the first OS/390 is started in Parallel Sysplex mode. We will note this in the next chapter, during the description of the first IPL in Parallel Sysplex mode.

3.6 VTAM Changes

The VTAMs in a Parallel Sysplex communicate with each other, and each VTAM should have unique names. There are at least two levels involved here. The basic VTAM definitions (SSCP name, subarea number, and so forth) are the initial consideration. These can be changed in the ATCSTRxx member of SYS1.VTAMLST. The default member is ATCSTR00; we created a new member, ATCSTR10 for use on the second OS/390. This member is listed in the Appendix. Our new member changed the SSCPID and HOSTA values to 7, changed the SSCPNAME to P391SSCP, and so forth. This new member is activated by specifying a LIST=10 parameter when starting VTAM. (The new VTAM start command is contained in the new COMMNDxx members described later.) *The NETID name was changed to P391, but this may not be appropriate; we may eventually want the same NETID for both OS/390 systems.*

A second level of VTAM changes involve APPL names, cross-system definitions allowing each VTAM to automatically connect appropriate APPL requests to the other VTAM, extensions to USSTAB entries to allow easy access to additional VTAM applications, and so forth. These changes are important for effective use of a Parallel Sysplex, but are not required for initial work. A later chapter will briefly discuss possible approaches to this second level of VTAM adjustments.

3.7 SYS1.PROCLIB Changes

We added two new members to SYS1.PROCLIB. Each new member involved copying an existing member and making a minor change to it.

The AD system uses a system-provided application (VTAMAPPL) to issue additional commands during IPL. There is a SYS1.PROCLIB member to start this application. We created member VTAMAPP1 in SYS1.PROCLIB. It is a copy of member VTAMAPPL, but with symbolic parameter M=VTAMAPPL changed to M=VTAMAPP1. The VTAMAPP1 procedure will be used *only* on the second OS/390 system in out P390plex operation; the original VTAMAPPL procedure will be used only on the first OS/390 system. (We will describe the new VTAMAPP1 member in PARMLIB later.)

Procedure SHUTDOWN is provided with the AD system to help cleanly shut down OS/390. We created member SHUTDOW1 in SYS1.PROCLIB. It is a copy of member SHUTDOWN, but with symbolic parameter M=VTAMAPPL changed to M=VTAMAPP1. The SHUTDOW1 procedure will be used *only* on the second OS/390 system in out P390plex operation; the original SHUTDOWN procedure will be used only on the first OS/390 system.

We did not list these two procedures in the Appendix, because the modifications to the original procedures are so simple. In the two members described here, a new PROCLIB member refers to a new PARMLIB member with the same name. Do not let this confuse you. For example, our new VTAMAPP1 member in SYS1.PROCLIB points to a new member VTAMAPP1 in PARMLIB. We describe the new PARMLIB members later.

3.8 AD CD-ROM IPL Controls

The AD system (OS/390 V2R6), as distributed, contains four IPL parameters:

```
CS - CLPA and cold starts JES2
WS - Warm Start
DC - CLPA (with additional DB2 and CICS libraries) and cold starts JES2
DB - Warm Start (with the additional DB2 and CICS libraries)
```

A full IPL parameter for the AD system might be 0122CS, where 0122 is the address of the volume containing the IODF and the SYS1.IPLPARM data set. The normal AD system uses address 0122 for this purpose, and we will omit this constant from the following discussions. We will refer only to the next two bytes of the IPL parameter, which are used to select a LOADxx member from SYS1.IPLPARM.[3]

Our goal was to leave these parameters (and their intended functions) unchanged, and to add additional IPL parameters for our Sysplex operation, as follows:

MODE---------->	Monoplex	Sysplex	
Processor ---------->	P/390-0	P/390-0	P/390-1
Cold Start	CS	0C	1C
Warm Start	WS	0W	1W
Cold Start (DB2/CICS/IMS)	DC	0D	1D
Warm Start (DB2/CICS/IMS)	DB	0B	1B

In this table the Monoplex column represents the original AD IPL parameters. As shown in the table, we will create eight more IPL parameters and the corresponding SYS1.IPLPARM LOADxx members.

The intention is that, by using any of the original values (CS, WS, DC, DB), the AD system can be IPLed in its (almost) unaltered state. By using the new members (0C, 1C, 0W, and so forth), the system can be IPLed with parameters suitable for use in a Parallel Sysplex environment. The relationship between the IPL members is important. In the original system, the user must IPL with CS before he can IPL with WS. The CS parameter performs the Create Link Pack Area (CLPA) function and this must be done before the system can be warm started. The WS parameter uses the existing LPA (which was created by an earlier CLPA).

The CS and WS options go together. Both point to PARMLIB members that do not contain libraries for CICS, DB2, or IMS. Likewise, the DC and DB options go together. The DC option performs a CLPA that includes CICS, DB2, and IMS libraries, and the DB option warm starts using corresponding libraries.

A CS would normally be followed by multiple uses of WS, and a DC would be followed by multiple uses of DB. Which set you use depends on whether or not you want to use CICS/DB2/IMS products. You cannot use CS followed by DB, because the necessary CICS/DB2/IMS modules would not be in LPA. You would normally cold start (CS or DC) only if you altered LPA libraries, or if you must cold start JES2 for some reason.

[3] The use of SYS1.IPLPARM is optional. The LOADxx members could be in SYS1.PARMLIB instead. However, the AD system (release 6) uses SYS1.IPLPARM and we will use it in the implementation described in this document.

Our new IPL parameters, added for P390plex operation, follow the same scheme. Assuming that you do not intend to use CICS/DB2/IMS, you would first cold start P/390-0 using the 0C parameter and then cold start P/390-1 using the 1C parameter. You would then switch to the 0W and 1W parameters for subsequent warm starts. The 0 parameters use PARMLIB members that point to unique data sets (such as paging data sets) for the first OS/390 image and the "1" members use PARMLIB members that point to unique data sets for the second OS/390 image. If you want to use CICS/DB2/IMS, you would use the 0D, 1D, 0B, and 1B members.

When switching between the original AD modes ("monoplex") and any of the sysplex modes, you must perform an appropriate cold start. Likewise, when switching from any of the sysplex modes to a monoplex mode, you must perform a cold start. (Among other things, JES2 is switched between MAS and single-system mode and this requires a JES2 cold start.)

The remainder of this redbook will be confusing if you do not understand the use and intention of these IPL parameters. We urge readers to study this section carefully before continuing with the rest of the document.

We could simplify these IPL parameters, especially if we relaxed the goal of keeping the original AD system unmodified. For our initial P390plex implementation, we elected to keep the IPL structure outlined here. Once the general scheme is understood, it is straightforward and prevents confusion.

3.8.1 Changes to SYS1.IPLPARM

We needed to create eight more LOADxx members in SYS1.IPLPARMS. Our eight new members are listed in the Appendix. We created these by using ISPF to copy existing members:

```
Copy LOADCS to create LOAD0C and LOAD1C
Copy LOADWS to create LOAD0W and LOAD1W
Copy LOADDC to create LOAD0D and LOAD1D
Copy LOADDB to create LOAD0B and LOAD1B
```

We then edited each of the new members to produce the changes shown in the listings in the Appendix. The basic change in each member was to alter the SYSPARM value, so as to use a different IEASYSxx member in PARMLIB.

3.9 Changes to PARMLIB

The AD system has two PARMLIBs, SYS1.ADCD06.PARMLIB and SYS1.PARMLIB, and they are concatenated in this order. All the changes and additions we made were in SYS1.ADCD06.PARMLIB, and we will refer to this data set simply as PARMLIB.[4]

[4] The point here is that the PARMLIB members we changed must be effective. Since concatenated partitioned data sets (such as used for PARMLIBs) are searched in order of concatenation, duplicate member names can be confusing. In our case, SYS1.ADCD06.PARMLIB and SYS1.PARMLIB might both have a member named IEASYS00. Since SYS1.ADCD06.PARMLIB is first in the concatenation, the IEASYS00 member in it is used, and the IEASYS00 member in SYS1.PARMLIB is ignored. All the PARMLIB members we added or altered were placed in the SYS1.ADCD06.PARMLIB to avoid having to work with both PARMLIBS. Other OS/390 implementations might have more than two PARMLIBs.

3.9.0.1 CLOCK10 Member

We created a new CLOCK10 member in PARMLIB. It is listed in the Appendix. The new member is a copy of the original CLOCK00 member, modified to enable the ETR function. The P390plex microcode emulates an ETR clock function. The new CLOCK10 member is used by both OS/390 systems in the P390plex.

3.9.0.2 BPXPRM10 Member

The current OS/390 releases, at the time of writing, cannot effectively share HFS files.[5] To use the HFS files on both OS/390s in our P390plex we would need to create a second copy of all the HFS data sets, with appropriate renaming. At best, this would result in confusion because this would create duplicate HFS file names.

We elected to start only minimal Open Edition functions on the our second OS/390, and not mount any of the HFS files. To do this, we created the new BPXPRM10 member that is listed in the Appendix. BPXPRM10 is used only for the second OS/390. The first OS/390 uses the original BPXPRM00 member.

3.9.0.3 COUPLE10 Member

We created a new COUPLE10 member in PARMLIB. It is listed in the Appendix. The names in the member correspond to the names used when we created our various couple data sets. The COUPLE10 member is used with both copies of OS/390 when in P390plex mode.

3.9.0.4 GRSRNL00 Member

We found that we did not need to alter the GRSRNL00 member included with the AD system. We did add it to our IEASYSxx lists. A listing of GRSRNL00 is included in the Appendix for reference.

3.9.0.5 SMFPRM10 Member

We needed to change the system name used by SMF for our second OS/390. We created a new SMFPRM10 member; it is listed in the Appendix. The SMFPRM10 member is used only for the second OS/390 system. The first OS/390 system uses the original SMFPRM00 member.

3.9.0.6 VTAMAPP1 Member

The original VTAMAPPL member (in the AD system) contains a script of additional START commands that are used during IPL. We created a new VTAMAPP1 member containing a reduced set of START commands for the second OS/390 system. The first OS/390 system uses the original VTAMAPPL member. A reduced set of commands is used for the second system because we did not start TCP/IP or any of its related programs on the second system.[6] A listing of VTAMAPP1 is included in the Appendix.

3.9.0.7 SHUTDOW1 Member

The original SHUTDOWN member (in the AD system) contains a number of commands used to help cleanly shutdown OS/390. A slightly different list is needed for the second OS/390 and we created SHUTDOW1 for this. It is listed in the Appendix. SHUTDOWN is used for the first OS/390 and SHUTDOW1 is used

[5] We intentionally ignore the earlier option of mounting the HFSs as read/write on one system and read-only on the other.

[6] This is because the P/390 device manager used for OS/390 TCP/IP connections, LCS3172, had not been enhanced to work with multiple P/390 adapters.

for the second OS/390. Neither list contains commands specific to Parallel Sysplex operation. *Additional, manually entered operator commands are needed to cleanly shut down sysplex operation.*

3.9.0.8 JES2PARM Member

JES2 is used in Multi-Access Spool (MAS) form for a Parallel Sysplex system. We needed to change one line in the original JES2PARM (to enable MAS) and add two lines to define two MAS members. We copied JES2PARM to JES2MAS (in PARMLIB) and altered the new JES2MAS member. Our alterations are shown in the Appendix. We then specified MEMBER=JES2MAS in all the JES2 start commands used in P390plex mode.

3.9.0.9 IEASYSxx Members

We needed to create eight more IEASYSxx members in PARMLIB. These eight members are listed in the Appendix. We created these by using ISPF to copy existing members:

```
Copy IEASYSCS to create IEASYS0C and IEASYS1C
Copy IEASYS00 to create IEASYS0W and IEASYS1W
Copy IEASYSDC to create IEASYS0D and IEASYS1D
Copy IEASYSDB to create IEASYS0B and IEASYS1B
```

A number of changes were needed to these members and these changes are indicated in the listings in the Appendix.

3.9.0.10 COMMNDxx Members

We created new COMMNDxx members to match the new IPL parameter names. The new members are listed in the Appendix, with the relevant changes highlighted. Note that JES2 is not cold started in any of the COMMNDxx members used for the second OS/390; a JES2 cold start must be done using the first OS/390 system.

3.9.0.11 Duplicate IEASYSxx and COMMNDxx Members

Several of the IEASYSxx and COMMNDxx members listed in the Appendix are exact duplicates of each other. We elected to do this in order to preserve the easily understood convention of using the IPL parameter for the IEASYSxx suffix and the COMMNDxx suffix. For example, IPL parameter 1B uses IEASYS1B and COMMND1B.

3.9.1 Summary of PARMLIB Usage

The original AD system (release 6) contained the following key PARMLIB parameters. We concentrate on the parameters listed here because these are the parameters that are relevant to our Parallel Sysplex implementation. The particular parameters that are especially relevant as we go through the four sets here are shown in bold type. These IPL parameters (CS, WS, DC, and DB) can still be used to run the P/390 in the original (single system) AD configuration after we have added all the sysplex changes.

```
LOAD   PARMLIB      significant parameters

CS     IEASYSCS     CLOCK=00,CMD=CS,CLPA,GRS=NONE,OMVS=00,names SYS1,
                    PROG=00,SMF=00,SMS=00,SYSNAME=P390,LPA=00,SSN=00,
                    SVC=00
       COMMNDCS     S JES2 COLD, S VTAM LIST=00, S VTAMAPPL

WS     IEASYS00     CLOCK=00,CMD=00,GRS=NONE,OMVS=00,names SYS1,
                    PROG=00,SMF=00,SMS=00,SYSNAME=P390,LPA=00,SSN=00,
                    SVC=00
       COMMND00     S JES2, S VTAM LIST=00, S VTAMAPPL

DC     IEASYSDC     CLOCK=00,CMD=DC,CLPA,COUPLE=DB,GRS=NONE,OMVS=00,
                    names SYS1,PROG=DB,SMF=00,SMS=00,SYSNAME=P390,
                    LPA=DB,SSN=DB,SVC=DB
       COMMNDDC     S JES2 COLD, S VTAM LIST=00, S VTAMAPPL

DB     IEASYSDC     CLOCK=00,CMD=DB,COUPLE=DB,GRS=NONE,OMVS=00,
                    names SYS1,PROG=DB,SMF=00,SMS=00,SYSNAME=P390,
                    LPA=DB,SSN=DB,SVC=DB
       COMMNDDC     S JES2, S VTAM LIST=00, S VTAMAPPL
```

The equivalent parameters for P/390 adapter 0 (the first OS/390 system) when in sysplex mode are:

```
0C     IEASYS0C     CLOCK=10,CMD=0C,CLPA,COUPLE=10,GRS=STAR,OMVS=00,SYS1,
                    PROG=00,SMF=00,SMS=00,SYSNAME=P390,LPA=00,SSN=00,
                    SVC=00
       COMMND0C     S JES2,MEMBER=JES2MAS COLD, S VTAM LIST=00, S VTAMAPPL

0W     IEASYS0W     CLOCK=10,CMD=0W,COUPLE=10,GRS=STAR,OMVS=00,SYS1,
                    PROG=00,SMF=00,SMS=00,SYSNAME=P390,LPA=00,SSN=00,
                    SVC=00
       COMMND0W     S JES2,MEMBER=JES2MAS, S VTAM LIST=00, S VTAMAPPL

0D     IEASYS0D     CLOCK=10,CMD=0D,CLPA,COUPLE=10,GRS=STAR,OMVS=00,
                    SYS1,PROG=DB,SMF=00,SMS=00,SYSNAME=P390,
                    LPA=DB,SSN=DB,SVC=DB
       COMMND0D     S JES2,MEMBER=JES2MAS COLD, S VTAM LIST=00, S VTAMAPPL

0B     IEASYS0B     CLOCK=10,CMD=0B,COUPLE=10,GRS=STAR,OMVS=00,
                    SYS1,PROG=DB,SMF=00,SMS=00,SYSNAME=P390,
                    LPA=DB,SSN=DB,SVC=DB
       COMMND0B     S JES2,MEMBER=JES2MAS, S VTAM LIST=00, S VTAMAPPL
```

The equivalent parameters for P/390 adapter 1 (the second OS/390 system) when in sysplex mode are:

```
1C    IEASYS1C    CLOCK=10,CMD=1C,CLPA,COUPLE=10,GRS=STAR,OMVS=00,SYS2,
                  PROG=00,SMF=00,SMS=00,SYSNAME=P391,LPA=00,SSN=00,
                  SVC=00
      COMMND1C    S JES2,MEMBER=JES2MAS, S VTAM LIST=10, S VTAMAPP1

1W    IEASYS1W    CLOCK=10,CMD=1W,COUPLE=10,GRS=STAR,OMVS=00,SYS2,
                  PROG=00,SMF=00,SMS=00,SYSNAME=P391,LPA=00,SSN=00,
                  SVC=00
      COMMND1W    S JES2,MEMBER=JES2MAS, S VTAM LIST=10, S VTAMAPP1

1D    IEASYS1D    CLOCK=10,CMD=1D,CLPA,COUPLE=10,GRS=STAR,OMVS=00,
                  SYS2,PROG=DB,SMF=00,SMS=00,SYSNAME=P391,
                  LPA=DB,SSN=DB,SVC=DB
      COMMND0D    S JES2,MEMBER=JES2MAS, S VTAM LIST=10, S VTAMAPP1

1B    IEASYS1B    CLOCK=10,CMD=1B,COUPLE=10,GRS=STAR,OMVS=00,
                  SYS2,PROG=DB,SMF=00,SMS=00,SYSNAME=P391,
                  LPA=DB,SSN=DB,SVC=DB
      COMMND1B    S JES2,MEMBER=JES2MAS, S VTAM LIST=10, S VTAMAPP1
```

Chapter 4. Starting Up the Parallel Sysplex

A number of special steps should be taken for the first IPL. The steps we used are described here.

4.1 First IPL

Using our original AD CD-ROM system (not in sysplex mode), we changed the IEASYS0C member in PARMLIB. We changed GRS=STAR to **GRS=TRYJOIN**. (We will later change it back to GRS=STAR.)

At this point we shut down our AD system (which had been running on P/390-0). We then ENDed the P/390 session, using the appropriate icon.

We next started the four PCOM sessions described earlier, and opened an OS/2 command window. We issued the following OS/2 commands:

```
SYSPLEX ALL
IPL /CP 2
IPL /CP 3
              (wait for the CF functions to stabilize.)
             (shrink the CF console windows to remove screen clutter)

IPL A80 /CP 0 /PARM 01220C
```

This should start the OS/390 IPL process. (Do not attempt to IPL the second OS/390 yet.) This first IPL will have a number of error messages related to sysplex details. Ignore these, assuming the IPL process gets past them. Once the IPL has progressed to a stable point (after JES2 is started and TCAS is up and so forth), issue the following MVS commands:

```
D CF           (verify that the CFs exist and are connected)
D XCF,S        (should show Sysplex name = P390plex, etc.)
D XCF,C        (should list the couple data sets we defined)
               (Now issue the command to start the coupling facility
                configuration)
SETXCF START,POLICY,TYPE=CFRM,POLNAME=POLICY1
               (wait for the IXC531 POLICY ACTIVE message)
D XCF,STR      (verify some structures are allocated)
```

Now submit the fifth IXC job; the jobname is IXCLOGRP. This job defines additional structures for the LOGR function. (It will not work correctly if the SMS updates, were not done correctly.) This job must complete with condition code zero. You can rerun only the parts of the job that failed, if there is a problem. This means you must *read the output carefully* (via SDSF) and adjust the input to retry only definitions that failed.

Next issue the commands:

```
D LOGGER,L     (verify the LOGR definitions are active)

SETGRS MODE=STAR
               (wait for the IEE712 SETGRS PROCESSING COMPLETE message)
```

The last command will cause the GRS structures in the couple data sets (and in the CF) to be formatted and used. Now edit SYS1.ADCD06.PARMLIB member

IEASYS0C and change GRS=TRYJOIN to **GRS=STAR**. You will not need to use the TRYJOIN option again unless you completely scratch and reallocate your couple data sets. Once the GRS STAR elements are initialized, they are ready for use across IPLs.

Now IPL the second OS/390 processor. In an OS/2 window issue the command:

```
IPL A80 /CP 1 /PARM 01221C
```

This IPL should proceed normally. After some time, you will see both OS/390 consoles issuing the same messages, indicating a single console function. After this point, issue the following command on both systems:

```
K S       (this will display the console control parameters)
          (overtype MFORM=(T,J) so it is MFORM=(S,T,J) and Enter)
```

This change will cause the console to display an extra field, indicating the name (P390, P391) of the system that originated each console message.

Note that the command `ro P391,D A` could be used to send a command from the first systems's console to the second system. The `ro` or `route` prefix is used to route MVS commands to the appropriate system. If this is not specified, a command is executed on whatever system owns the console that is being used. However, it is possible to reply to an outstanding WTOR from any system without using the route prefix.

4.2 Shutdown

To shut down any Parallel Sysplex member (except the last operational member), use this sequence. Use the SHUTDOWN procedure on the first OS/390 or the SHUTDOW1 procedure on the second OS/390:

```
S SHUTDOW1    (assuming the second OS/390 system)
              (wait for $HASP099 ALL AVAILABLE FUNCTIONS COMPLETE)
$PJES2        (wait for IEF404I JES2 - ENDED)
V XCF,P391,OFFLINE     (assuming system P391)
n,SYSNAME=P391         (reply to message n)
              (wait for P/390 popup message saying that the processor
               is in disabled wait 40A2.  This may take some time.)
n,DOWN        (reply to message n on the surviving system)

              (at some point, issue AWSEND /CP 1 from an OS/2 window)
```

To shut down the last member of the sysplex, simply use normal shutdown procedures. In our case, this means `S SHUTDOWN, $PJES2`, and `Z EOD` (if you are particular about logs). Some systems programmers recommend following this with a `QUIESCE` command, but others do not.

4.3 Routine IPLs and Shutdowns

After the initial IPL and shutdown, subsequent IPLs should be routine. In practice, we usually do not re-IPL the CFs before re-IPLing the OS/390 systems. (This assumes the CFs are still running from earlier work, of course.)

For this small project, we always IPLed OS/390 first, on P/390-0, using one of the 0 IPL parameters (0C, 0W, 0D, 0B), and then followed this by IPLing the second

OS/390, on P/390-1, using one of the 1 IPL parameters. This need not be a fixed relationship; the 0 IPL parameters could be used with processor 1 and vice versa. There are many ways the initial setup could be extended and manipulated, but these are beyond the scope of the small project we are describing here.

In practice, we used the 0W (processor 0) and 1W (processor 1) IPL parameters for most subsequent work. (We were not using CICS/DB2/IMS functions. If we were using these functions, we would have IPLed processor 0 with 0D and then processor 1 with 1D. Subsequent IPLs would have been with 0B and 1B.)

In the P/390 environment, LAN-attached users (using the LAN3274 connection via OS/2) can select which OS/390 to log onto by using the appropriate port number (7490 or 7491) in their tn3270 TCP/IP setup. (This assumes our setup instructions for the P/390 configurator were followed. Specifying the ? character in the F12 option of the system devices function of the configurator is the key.)

4.4 JES2 Cold Starts in Parallel Sysplex Mode

Using the PARMLIB members we defined, the 0C or 0D IPL parameter must be used (on the first processor IPLed) before any other mode. These two parameters will cause JES2 to be cold started, in MAS mode. The 1C and 1D IPL parameters do not include a JES2 cold start. Since the JES2 spool is shared (MAS mode), we could not cold start JES2 when IPLing both OS/390s. We elected to associate the JES2 cold start only with IPLing the first OS/390 (which we normally placed on processor 0).

JES2 *must* be cold started when switching to or from Parallel Sysplex mode. In the original AD system (noted as monoplex mode in this document), JES2 is not specified as being in MAS mode.

4.5 Using SDSF in a Sysplex Environment

When viewing the LOG function in SDSF, one initially sees the MVS log associated with the processor that the user is logged onto. Each processor writes its own LOG; these are not merged.

Once in the LOG function (of SDSF) the command `SYSID P391` would switch to the log for the system named P391. `SYSID P390` would switch to the other log.

Chapter 5. Discussions, Q&A

Thus far, we have described a very simple Parallel Sysplex environment for our P390plex system. This was the goal of this project and demonstration.However, practical use of the system, for operator training or application development, would almost certainly require additional sysplex exploitation.

5.1 Additional Sysplex Exploitation

Exploitation of sysplex capabilities depends on specific product sets and goals for a given installation. These can become somewhat complex, and are beyond the scope of our initial setup project. However, we will briefly discuss improvements that would probably be the next steps in using our P390plex system.

5.1.0.1 JES2 Checkpoint Data Set

The JES2 checkpoint function can be moved to a structure in a CF. This removes contention for the disk containing the checkpoint and can provide substantial improvements in larger systems. In the P/390 environment, this could remove some workload from the AWSCKD device manager in extreme circumstances. It is one of the easier sysplex exploitation steps, and we would place it first on our list of improvements to our base P390plex.

5.1.0.2 VTAM Cross-System Links

As described, our two VTAMs do not interoperate. We should provide cross-system definitions and unique APPLids for the applications on each system. We would probably then update the USSTAB function to recognize unique names (such as TSO1 and TSO2) for the two systems and permit a user connected to either system to log onto the other system.

5.2 Selecting IPL Parameters

A JES2 cold start is required when switching between Parallel Sysplex (P390plex) and non-sysplex modes. The JES2 cold start is required because the P390plex mode uses MAS and the base mode does not. The IPL parameters described in this document (CS, WS, 0C, and so forth) include several described as *cold starts*. These include the CLPA (Create Link Pack Area) function and some include JES2 cold starts. Specifically, the CS, DC, 0C, and 0D parameters will cause a CLPA and a JES2 cold start. The 1C and 1D parameters, while described as *cold starts*, only perform a CLPA and do not include a JES2 cold start.

The OS/390 systems described here assume that they will be IPLed only in one of the following ways (using the IPL parameters to differentiate the various ways):

- A **CS** IPL, followed by any number of **WS** IPLs. (P/390-0 only. No Parallel Sysplex functions.)
- A **DC** IPL, followed by any number of **DB** IPLs. (P/390-0 only. No Parallel Sysplex functions.)
- A **0C** IPL (on P/390-0), then a **1C** IPL (on P/390-1), followed by any number of **0W** and **1W** IPLs. The P/390-0 system is always IPLed first. The P/390-1 system is not IPLed until the P/390-0 system has JES2 started.

- A **0D** IPL (on P/390-0), then a **1D** IPL (on P/390-1), followed by any number of **0B** and **1B** IPLs. The P/390-0 system is always IPLed first. The P/390-1 system is not IPLed until the P/390-0 system has JES2 started.

Other combinations and sequences may produce unexpected results, and should be thought through with some care. Simultaneous IPLs of the two OS/390 systems may work, but we found this sometimes produced deadlocks.

The CF processors should always be IPLed before the OS/390 processors, of course. We generally found it was not necessary to re-IPL the CF processors whenever we re-IPLed one (or both) of the OS/390 processors.

5.3 Additional P390 Icons

The operational procedures described in this redbook are based on OS/2 command line usage instead of icon usage. We could easily add additional icons to the initial set of P/390 icons, and assign OS/2 commands to each of the new icons.

We could add an icon to IPL P/390 processor 0, another icon to IPL processor 1, another icon to initialize the sysplex environment, and so forth. However, there are limitations to this process. The IPL command has several parameters. These parameters are taken from the OS/2 command line; if a parameter is not there, it is taken from the current DEVMAP. Our setup has a single DEVMAP[1] and this means there is a single set of IPL parameters in the DEVMAP. Furthermore, the DEVMAP IPL data has no notion of a CP number, since it was not designed for a system with multiple P/390 adapters.

If we consider a “normal” case (after initial cold start IPLs, in which P/390-0 is routinely IPLed with the 0W parameter and P/390-1 is routinely IPLed with the 1W parameter) then we could use any one of these procedures:

- Use an OS/2 window to enter the commands:

```
IPL A80 /CP 0 /PARM 01220W        (for P/390-0)
IPL A80 /CP 1 /PARM 01221W        (for P/390-1)
```

  In this case, all the information in the DEVMAP is overridden.

- Use two IPL icons, with the /CP and /PARM fields encoded in the icon command text. In this case, the PARM field in the DEVMAP is overridden, but the IPL address is taken from the DEVMAP. (Of course, the IPL address could be included in the icon command text.)
- Change the DEVMAP between IPLs, to contain the appropriate PARM data, and use icons to initiate the IPLs. Two icons would still be necessary because the DEVMAP does not contain the required CP parameter.

The second case listed here provides the most convenient IPL icons. However, if there is a need to use multiple IPL parameters (such as 0C and 1C, for cold starts), it would be necessary to change the parameters "under the icon."

For the purpose of our technology demonstration, we decided to generally ignore the IPL and END icons normally used with P/390 systems and to use line

[1] One could build a P390plex environment with a separate DEVMAP for each processor. This arrangement has its own set of complexities and we will not explore these here.

commands instead. We believed the line commands, containing all the required IPL information, were easier to understand than the use of icons[2] with various parameters hidden under them. However, we recognize that for a semi-production environment (where the "production" is probably application testing or operator training) or for a demonstration environment the use of icons to start and stop the P390plex would be attractive, and there is no reason not to use such icons.

5.4 Q & A

Q: How can I order a P390plex system, or upgrade my S/390 Integrated Server model B01 to a P390plex?

A: At the time of writing there was no method to order the additional hardware (additional P/390E adapter cards) and software (the additional modules placed in the OS/2 P390 directory). This project was done merely to illustrate potential capabilities of P/390 technology. A P390plex is not a supported IBM product.

Q: Will a similar project be done with R/390 systems?

A: No.

Q: Are the emulated CF consoles similar to “real” CF consoles?

A: Yes, although not all command functions are meaningful in our emulated environment.

Q: Might this technology demonstration be expanded to include P/390 attachment to “real” CF channels, so the P/390plex could be part of a “real” Parallel Sysplex?

A: No. Implementing real CF channel connectivity for the P/390 environment would be a significant undertaking, and there is no plan to do so.

Q: Might this system be used to develop and/or test new applications that exploit Parallel Sysplex functions?

A: Yes, this was a primary goal for the P390plex. Testing recovery paths, in a Parallel Sysplex environment, can be complex--especially if the recovery functions include such tasks as rebuilding CF structures in alternate CFs, or using VTAM persistent sessions, or other sophisticated sysplex interfaces. A P390plex could provide an excellent test facility for such work.

Q: Might this system be useful for operator training? Are all failure and recovery modes that we might find in a “real” system available?

A: No, but it is fairly close. A P/390-based system cannot perform alternate CPU recovery, for example. No LPAR-related commands are available. Within obvious limitations such as these, many other operations scenarios could be exercised. Expanded operator training has proven to be a challenge for full-function Parallel Sysplex environments, and a P390plex could be used for large portions of the necessary training.

Q: Will a P390plex perform better than a single P/390 system?

[2] Of course, remembering the syntax of the line commands is more difficult than using an icon, but that is a slightly different issue.

A: In some cases, possibly; in the general case, probably not. The P390plex is not intended for performance. The primary limiting factor is the usable bandwidth to disks (meaning the 3380 and 3390 drives emulated through OS/2). The P390plex has no more disk bandwidth than a single P/390 system.

In cases where CPU processing is a limiting factor, or where multiple ESCON channels are used to connect to “real” DASD units, the P390plex would probably perform better than a single P/390 system, but these tend to be unusual cases.

Q: Could your implementation be extended to include parallel OpenEdition environments?

A: Yes, in the same manner that would be used in any sysplex environment. We did not do it because we wanted to demonstrate the simplest Parallel Sysplex implementation we could devise.

Q: Our sysplex guru claims that 256 MB is not sufficient for a CF processor. Is this correct?

A: We found 256 MB to be more than ample for our purposes, which were to install and use basic Parallel Sysplex functions. However, we did not use any applications that made use of really large CF structures. This is more an issue of scaling than anything else. Moving a large application (probably DB2) to a P/390, without scaling down the size and tuning of the database, might create a problem. We elected not to use the 1 GB P/390E adapters because (a) they are not a formal product, (b) we did not have any, (c) we did not need them for any of the CF structures we used, and (d) they are considerably more expensive than the 256 MB P/390E adapters we used.

Q: I often “crashed” my MVS system (by clicking the *End P390* icon) to end a work session. MVS always restarted without problems. Can I still do this with the P390plex?

A: It is definitely *not recommended*. You should shut down the OS/390 systems properly, although you may be able to crash the *last* OS/390 and restart without too many problems.

Q: I am especially interested in using the P390plex for operator training. What subjects can I *not* cover with this system?

A: The limitations are in these areas:

1. The P/390 appears to have 16 channels, but these do not have the detailed characteristics of real chpids. You cannot exercise detailed chpid reconfigurations or recovery techniques.
2. Emulated control units appear to be on a single channel. You cannot exercise recovery techniques that depend on multiple channel attachments.
3. No LPAR functions are available.
4. No SE or HMC functions are available.
5. A P/390 is a uniprocessor, and has none of the extensive hardware recovery that is part of larger S/390 CPUs. Alternate CPU recovery and manipulation cannot be done.
6. Not all CF console commands and functions are meaningful.

Q: The P390plex hardware (real and emulated) is interesting, but your AD CD-ROM system is not relevant to me. Could I copy my existing OS/390 environment to the P390plex?

A: Probably, but with these considerations:

- You must have the proper licenses for IBM (and non-IBM) program products.
- You may need to adjust scaling factors, such as number of initiators started, size of data sets (paging , spool), and so forth. A P/390-based system is a much smaller system than a typical Parallel Sysplex machine.
- You will need some way to move your disk images. One way is to attach a 3480/3490 tape drive to the S/390 Integrated Server used as the P390plex. (Connecting various types of tape drives to P/390 systems is a sizable subject within itself.) Another way is to install an ESCON channel in the Integrated Server and connect it to your mainframe DASD, and then use this path to restore backups.

Q: Instead of copying disks to the P/390 environment, could I simply use some of my existing disks via ESCON channels?

A: In principle, yes, although we did not try it. Of course, this is no longer an isolated environment. Tests on the P390plex could make unwanted changes on your main disks--just like with any other shared DASD arrangement.

Q: A normal [PCI-based] P/390 system can use extra OS/2 memory as S/390 expanded memory. Among other uses, this can reduce paging rates. Can the P390plex do this?

A: The Integrated Server B01 has only one PC memory size, 128 MB. A portion of this can be used as expanded memory, but *only* for the first P/390 processor (P/390-0). At the time of our project, there was no method to assign a portion of PC memory to the additional P/390 processors. Also, installing additional PC memory in the Integrated Server is not supported by IBM. (There is a slot/connector for one additional PC memory board in the Integrated Server. If you need to call IBM service, there should not be anything (such as a 128 MB or 256 MB memory card) in this slot.)

On other P/390 systems, we have found that using PC memory as S/390 expanded memory has been useful in some circumstances, such as when running mixtures of Java, DB/2, and multiple Web servers. Without the expanded memory (256 MB, in our case), this combination produced substantial paging with an obvious overall system degradation.

Q: Could I configure a P390plex system to use three OS/390 processors and one CF processor? All four for OS/390?

A: Probably. We did not try this, but we assume it would work. However, the available bandwidth to the disk drives (often the limiting factor with a standard, single P/390) would be a severe limitation. If no CF is used (meaning no Parallel Sysplex functions), you would need to manage data set integrity yourself. (In larger systems, you would probably use a GRS ring for this configuration, in a basic sysplex mode.)

Q: How many users can a P390plex support? How do they connect to the system?

A: This is a common question for all P/390 systems. The only answer is “it depends.” It depends on the nature of the users’ workloads and on a variety of timing factors. The author routinely has 15 to 25 students using TSO on a single P/390 system. If they are performing a mixture of editing, SDSF browsing, and moderate job submission, performance is good. If they all submit jobs for substantial C compilations at the same instant, performance is poor. Using a P390plex, and splitting the users between systems, might improve performance to some degree, but it would certainly not double performance or capacity.

Q: How are additional TSO users connected to the P390plex?

A: Using the P390plex system described here, connection is via tn3270 to the OS/2 TCP/IP address. Users would select TCP/IP port 7490 or 7491, depending on which OS/390 system they want to access. These connections (via the LAN3274 device manager) appear as local, non-SNA 3270 devices to OS/390.

The connection options could be expanded by using OS/390 TCP/IP and SNA connections (both to the first P/390) and then using CF links to route work to the other system. We did not implement these links for the project described here because we wanted to produce the simplest possible initial implementation.

Q: You frequently mention that you are using OS/390 V2R6. Is there anything special about this release?

A: No. We simply want to be specific about the jobs and data set names we used. Other recent releases may have minor differences.

Appendix A. Listings

All the jobs and PARMLIB members listed in this Appendix were collected on a diskette during the P390plex project. A single OS/2 command was produced to upload the complete set of jobs and members.

A.1 Jobs

These jobs are stored in SYS1.P390.CNTL members.

A.1.1 ICKDSF Job To Initialize New Volumes

```
//DSFINIT JOB 1,OGDEN,MSGCLASS=X
//*************************************************************
//* THIS IS AN EXAMPLE OF A JOB THAT WILL:
//* INITIALIZE AND LABEL A DASD VOLUME
//*
//*************************************************************
//ICKDSF EXEC PGM=ICKDSF,REGION=4096K
//SYSPRINT DD SYSOUT=* 00040000
//SYSIN DD * 00050000
 INIT UNIT(130) NOVALIDATE NVFY VOLID(SCPMV6) PURGE -
   VTOC(0,2,13)
 INIT UNIT(A85) NOVALIDATE NVFY VOLID(PLEX01) PURGE -
   VTOC(0,2,13)
 INIT UNIT(A86) NOVALIDATE NVFY VOLID(PLEX02) PURGE -
   VTOC(0,2,13) 00065005
/*
```

A.1.2 SYSALLO2 Job To Create New SYS2 OS/390 Data Sets

```
//SYSALLOC JOB 1,OGDEN,MSGCLASS=X
//DSALC1  EXEC PGM=IDCAMS,COND=(4000,LT)
//SYSPRINT DD SYSOUT=*
//PAGECOMM DD UNIT=3380,VOL=SER=SCPMV6,DISP=OLD
//PAGEPLPA DD UNIT=3380,VOL=SER=SCPMV6,DISP=OLD
//PAGELOC1 DD UNIT=3380,VOL=SER=SCPMV6,DISP=OLD
//STGINDEX DD UNIT=3380,VOL=SER=SCPMV6,DISP=OLD
//SYSIN    DD *
  /* ------------------------------------------------------------ */
  /* DELETE (FOR RERUN PURPOSES)                                  */
  /* ------------------------------------------------------------ */
  DELETE SYS2.MAN1 CLUSTER -
    CAT(OS390.MASTER.CATALOG)
  DELETE SYS2.COMMON.PAGE PAGESPACE -
    FILE(PAGECOMM) -
    CAT(OS390.MASTER.CATALOG)
  DELETE SYS2.PLPA1.PAGE PAGESPACE -
    FILE(PAGEPLPA) -
    CAT(OS390.MASTER.CATALOG)
  DELETE SYS2.LOCAL1.PAGE PAGESPACE -
    FILE(PAGELOC1) -
    CAT(OS390.MASTER.CATALOG)
  DELETE SYS2.STGINDEX CLUSTER -
    CAT(OS390.MASTER.CATALOG)
  /* ------------------------------------------------------------ */
```

```
/* RESET RETURN CODES                                              */
/* ------------------------------------------------------------- */
SET LASTCC = 00
SET MAXCC = 00
/* ------------------------------------------------------------- */
/* ALLOCATE COMMON PAGE DATA SET                                  */
/* ------------------------------------------------------------- */
DEFINE PAGESPACE( -
    FILE(PAGECOMM) -
    NAME(SYS2.COMMON.PAGE) -
    CYLINDERS(50) -
    VOLUME(SCPMV6) ) -
  CATALOG(OS390.MASTER.CATALOG)
/* ------------------------------------------------------------- */
/* ALLOCATE PLPA PAGE DATA SET                                    */
/* ------------------------------------------------------------- */
DEFINE PAGESPACE( -
    FILE(PAGEPLPA) -
    NAME(SYS2.PLPA1.PAGE) -
    CYLINDERS(100) -
    VOLUME(SCPMV6) ) -
  CATALOG(OS390.MASTER.CATALOG)
/* ------------------------------------------------------------- */
/* ALLOCATE LOCAL PAGE DATA SET                                   */
/* ------------------------------------------------------------- */
DEFINE PAGESPACE(  -
    FILE(PAGELOC1) -
    NAME(SYS2.LOCAL1.PAGE) -
    CYLINDERS(300) -
    VOLUME(SCPMV6) ) -
  CATALOG(OS390.MASTER.CATALOG)
/* ------------------------------------------------------------- */
/* ALLOCATE FIRST SMF DATA SET                                    */
/* ------------------------------------------------------------- */
DEFINE CLUSTER( -
    CONTROLINTERVALSIZE(4096) -
    CYLINDERS(40) -
    NAME(SYS2.MAN1) -
    NONINDEXED -
    RECORDSIZE(4086,32767) -
    REUSE -
    SHAREOPTIONS(2) -
    SPANNED -
    SPEED -
    VOLUME(SCPMV6) ) -
  DATA( -
    NAME(SYS2.MAN1.DATA) ) -
  CATALOG(OS390.MASTER.CATALOG)
/* ------------------------------------------------------------- */
/* ALLOCATE STGINDEX DATA SET                                     */
/* ------------------------------------------------------------- */
DEFINE CLUSTER( -
    BUFFERSPACE(20480) -
    CYLINDERS(4) -
    FILE(STGINDEX) -
    KEYS(12,8) -
    NAME(SYS2.STGINDEX) -
    RECORDSIZE(2041,2041) -
```

```
      REUSE -
      VOLUME(SCPMV6) ) -
    DATA( -
      NAME(SYS2.STGINDEX.DATA)-
      CONTROLINTERVALSIZE(2048) ) -
    INDEX( -
      NAME(SYS2.STGINDEX.INDEX)-
      CONTROLINTERVALSIZE(4096) ) -
    CATALOG(OS390.MASTER.CATALOG)
/*
//NOTOK   EXEC PGM=CPPMAXRC,COND=((0,GE,DSALC1),(4000,LT))
//*
```

A.1.3 Create New SYS2.LOGREC

```
//LOGREC  JOB 1,OGDEN,MSGCLASS=X
//*
//*      RUN JOB ON TARGET CPU AND THEN RE-IPL
//*
//STEP1   EXEC PGM=IEHPROGM
//DD1      DD  DSN=SYS2.LOGREC,UNIT=3380,VOL=SER=SCPMV6,
//         DISP=OLD
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
 SCRATCH DSNAME=SYS2.LOGREC,VOL=3380=SCPMV6
//*
//STEP2   EXEC PGM=IFCDIP00
//SERERDS  DD  DSN=SYS2.LOGREC,UNIT=3380,VOL=SER=SCPMV6,
//         DISP=(NEW,CATLG),SPACE=(TRK,(90),,CONTIG)
//SYSPRINT DD  SYSOUT=*
```

A.1.4 Create Couple Datasets (Job IXCSYSPF)

```
//IXCSYSPF JOB 1,OGDEN,MSGCLASS=X
//STEP1    EXEC PGM=IXCL1DSU
//STEPLIB  DD   DSN=SYS1.MIGLIB,DISP=SHR
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
     DEFINEDS SYSPLEX(P390PLEX)
              DSN(SYS1.XCF.CDS01) VOLSER(PLEX01)
              MAXSYSTEM(2)
              CATALOG
          DATA TYPE(SYSPLEX)
               ITEM NAME(GROUP) NUMBER(70)
               ITEM NAME(MEMBER) NUMBER(120)
               ITEM NAME(GRS) NUMBER(1)
     DEFINEDS SYSPLEX(P390PLEX)
              DSN(SYS1.XCF.CDS02) VOLSER(PLEX02)
              MAXSYSTEM(2)
              CATALOG
          DATA TYPE(SYSPLEX)
               ITEM NAME(GROUP) NUMBER(70)
               ITEM NAME(MEMBER) NUMBER(120)
               ITEM NAME(GRS) NUMBER(1)
/*
```

A.1.5 Create Policy Data Sets (Job IXCCFRMF)

```
//IXCCFRMF JOB 1,OGDEN,MSGCLASS=X
```

```
//STEP10   EXEC PGM=IXCL1DSU
//STEPLIB  DD   DSN=SYS1.MIGLIB,DISP=SHR
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
     DEFINEDS SYSPLEX(P390PLEX)
              DSN(SYS1.CFRM.CDS01) VOLSER(PLEX02)
              CATALOG MAXSYSTEM(8)
          DATA TYPE(CFRM)
               ITEM NAME(POLICY) NUMBER(6)
               ITEM NAME(CF) NUMBER(8)
               ITEM NAME(STR) NUMBER(50)
               ITEM NAME(CONNECT) NUMBER(32)
     DEFINEDS SYSPLEX(P390PLEX)
              DSN(SYS1.CFRM.CDS02) VOLSER(PLEX01)
              CATALOG MAXSYSTEM(8)
          DATA TYPE(CFRM)
               ITEM NAME(POLICY) NUMBER(6)
               ITEM NAME(CF) NUMBER(8)
               ITEM NAME(STR) NUMBER(50)
               ITEM NAME(CONNECT) NUMBER(32)
/*
```

A.1.6 Create Initial Policy (Job IXCCFRMP)

The DSN operand in the DATA statement must be removed if this job is rerun after the CFs are operational and the system is in Parallel Sysplex operation.

```
//IXCCFRMP JOB 1,MSGCLASS=X
//STEP20   EXEC PGM=IXCMIAPU
//SYSPRINT DD   SYSOUT=A
//SYSABEND DD   SYSOUT=A
//SYSIN    DD   *

     DATA TYPE(CFRM) REPORT(YES) DSN(SYS1.CFRM.CDS01)

     DEFINE POLICY NAME(POLICY1) REPLACE(YES)

        CF NAME(CF01)
               TYPE(009000)
               MFG(IBM)
               PLANT(PK)
               SEQUENCE(P39000390344)
               PARTITION(0)
               CPCID(00)
               DUMPSPACE(2000)

        CF NAME(CF02)
               TYPE(009000)
               MFG(IBM)
               PLANT(PK)
               SEQUENCE(P39000390345)
               PARTITION(0)
               CPCID(00)
               DUMPSPACE(2000)

        STRUCTURE NAME(IXCLIST1)
               SIZE(40000)
               PREFLIST(CF01,CF02)
```

```
    STRUCTURE NAME(IXCLIST2)
           SIZE(40000)
           PREFLIST(CF02,CF01)

    STRUCTURE NAME(ISGLOCK)
           SIZE(10000)
           REBUILDPERCENT(1)
           PREFLIST(CF01,CF02)
```

A.1.7 Create Coupling LOGR Datasets (Job IXCLOGRF)

```
//IXCLOGRF JOB 1,OGDEN,MSGCLASS=X
//STEP10   EXEC PGM=IXCL1DSU
//STEPLIB  DD   DSN=SYS1.MIGLIB,DISP=SHR
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
     DEFINEDS SYSPLEX(P390PLEX)
              DSN(SYS1.LOGR.CDS01) VOLSER(PLEX02)
              CATALOG MAXSYSTEM(8)
          DATA TYPE(LOGR)
               ITEM NAME(LSR) NUMBER(20)
               ITEM NAME(LSTRR) NUMBER(16)
               ITEM NAME(DSEXTENT) NUMBER(10)
     DEFINEDS SYSPLEX(P390PLEX)
              DSN(SYS1.LOGR.CDS02) VOLSER(PLEX01)
              CATALOG MAXSYSTEM(8)
          DATA TYPE(LOGR)
               ITEM NAME(LSR) NUMBER(20)
               ITEM NAME(LSTRR) NUMBER(16)
               ITEM NAME(DSEXTENT) NUMBER(10)
/*
```

A.1.8 Create LOGR Policy (Job IXCLOGRP)

```
//IXCLOGRP JOB 1,OGDEN,MSGCLASS=X
//STEP20   EXEC PGM=IXCMIAPU
//SYSPRINT DD   SYSOUT=A
//SYSABEND DD   SYSOUT=A
//SYSIN    DD   *

     DATA TYPE(LOGR) REPORT(YES)

     /* sample definition for EREP */

     DEFINE STRUCTURE NAME(SYSTEM_LOGREC)
            LOGSNUM(1)
            AVGBUFSIZE(4096)
            MAXBUFSIZE(4096)

     DEFINE LOGSTREAM NAME(SYSPLEX.LOGREC.ALLRECS)
            STRUCNAME(SYSTEM_LOGREC)
            HLQ(IXGLOGR)
            MODEL(NO)
            AUTODELETE(YES) RETPD(7)
            LS_DATACLAS(LOGR)
```

```
/* sample definition for OPERLOG */

DEFINE STRUCTURE NAME(SYSTEM_OPERLOG)
       LOGSNUM(1)
       AVGBUFSIZE(4096)
       MAXBUFSIZE(4096)

DEFINE LOGSTREAM NAME(SYSPLEX.OPERLOG)
       STRUCNAME(SYSTEM_OPERLOG)
       HLQ(IXGLOGR)
       MODEL(NO)
       AUTODELETE(YES) RETPD(7)
       LS_DATACLAS(LOGR)

/* sample definition for CICS TS */

DEFINE STRUCTURE NAME(CICS_DFHLOG)
       LOGSNUM(8)
       AVGBUFSIZE(720)
       MAXBUFSIZE(32000)

DEFINE STRUCTURE NAME(CICS_DFHSHUNT)
       LOGSNUM(8)
       AVGBUFSIZE(240)
       MAXBUFSIZE(64000)

DEFINE LOGSTREAM NAME(CICSA.DFHLOG)
       STRUCNAME(CICS_DFHLOG)
       HLQ(IXGLOGR)
       MODEL(NO)
       AUTODELETE(YES) RETPD(5)
       LOWOFFLOAD(70) HIGHOFFLOAD(90)
       LS_DATACLAS(LOGR)

DEFINE LOGSTREAM NAME(CICSA.DFHSHUNT)
       STRUCNAME(CICS_DFHSHUNT)
       HLQ(IXGLOGR)
       MODEL(NO)
       AUTODELETE(YES) RETPD(5)
       LOWOFFLOAD(0) HIGHOFFLOAD(80)
       LS_DATACLAS(LOGR)
/*
```

A.2 Changes to SYS1.VTAMLST

While not needed in our initial implementation, the second VTAM should have different parameters. This will be required when the two VTAMs are connected. We used this ATCSRT10 member for the second OS/390 in anticipation of additional VTAM customization.

A.2.1 New ATCSTR10 Member in SYS1.VTAMLST

```
CONFIG=00,SUPP=NOSUP,                                          X
SSCPID=07,NOPROMPT,                                            X
HOSTSA=7,MAXSUBA=31,                                           X
SSCPNAME=P391SSCP,HOSTPU=P391$PU,                              X
NETID=P391,                                                    X
```

```
NODETYPE=NN,                                                    X
DYNLU=YES,                                                      X
CRPLBUF=(208,,15,,1,16),                                        X
IOBUF=(400,508,19,,1,20),                                       X
LFBUF=(104,,0,,1,1),                                            X
LPBUF=(64,,0,,1,1),                                             X
SFBUF=(163,,0,,1,1)
```

A.3 New SYS1.IPLPARMS Members

Note that all are identical except for the SYSPARM value.

LOAD0C

```
IODF     00 SYS1
NUCLEUS  1
SYSCAT   SCPMV5113COS390.MASTER.CATALOG
SYSPARM  0C
NUCLST   00
IEASYM   00
PARMLIB  SYS1.ADCD06.PARMLIB
```

LOAD1C

```
IODF     00 SYS1
NUCLEUS  1
SYSCAT   SCPMV5113COS390.MASTER.CATALOG
SYSPARM  1C
NUCLST   00
IEASYM   00
PARMLIB  SYS1.ADCD06.PARMLIB
```

LOAD0W

```
IODF     00 SYS1
NUCLEUS  1
SYSCAT   SCPMV5113COS390.MASTER.CATALOG
SYSPARM  0W
NUCLST   00
IEASYM   00
PARMLIB  SYS1.ADCD06.PARMLIB
```

LOAD1W

```
IODF     00 SYS1
NUCLEUS  1
SYSCAT   SCPMV5113COS390.MASTER.CATALOG
SYSPARM  1W
NUCLST   00
IEASYM   00
PARMLIB  SYS1.ADCD06.PARMLIB
```

LOAD0D

```
IODF     00 SYS1
NUCLEUS  1
SYSCAT   SCPMV5113COS390.MASTER.CATALOG
SYSPARM  0D
```

```
NUCLST   00
IEASYM   00
PARMLIB  SYS1.ADCD06.PARMLIB
```

LOAD1D

```
IODF     00 SYS1
NUCLEUS  1
SYSCAT   SCPMV5113COS390.MASTER.CATALOG
SYSPARM  1D
NUCLST   00
IEASYM   00
PARMLIB  SYS1.ADCD06.PARMLIB
```

LOAD0B

```
IODF     00 SYS1
NUCLEUS  1
SYSCAT   SCPMV5113COS390.MASTER.CATALOG
SYSPARM  0B
NUCLST   00
IEASYM   00
PARMLIB  SYS1.ADCD06.PARMLIB
```

LOAD1B

```
IODF     00 SYS1
NUCLEUS  1
SYSCAT   SCPMV5113COS390.MASTER.CATALOG
SYSPARM  1B
NUCLST   00
IEASYM   00
PARMLIB  SYS1.ADCD06.PARMLIB
```

A.4 Additions and Changes to PARMLIB

PARMLIB changes provide the basic controls for enabling Parallel Sysplex operation.

A.4.1 New CLOCK10 Member in PARMLIB

```
OPERATOR NOPROMPT
TIMEZONE W.05.00.00
ETRMODE YES
ETRZONE NO
ETRDELTA 1
```

A.4.2 New BPXPRM10 Member in Parmlib

```
MAXPROCSYS(200)
MAXPROCUSER(25)
MAXUIDS(200)
MAXFILEPROC(256)
MAXPTYS(256)
MAXTHREADTASKS(500)
CTRACE(CTIBPX00)
STEPLIBLIST('/system/steplib')

FILESYSTYPE TYPE(HFS)
```

```
 ENTRYPOINT(GFUAINIT)
```

A.4.3 New COUPLE10 Member in PARMLIB

```
COUPLE SYSPLEX(P390PLEX)
       PCOUPLE(SYS1.XCF.CDS01,PLEX01)
       ACOUPLE(SYS1.XCF.CDS02,PLEX02)

PATHIN  STRNAME(IXCLIST1,IXCLIST2)
PATHOUT STRNAME(IXCLIST1,IXCLIST2)

DATA
       TYPE(CFRM)
       PCOUPLE(SYS1.CFRM.CDS01,PLEX02)
       ACOUPLE(SYS1.CFRM.CDS02,PLEX01)
DATA
       TYPE(LOGR)
       PCOUPLE(SYS1.LOGR.CDS01,PLEX02)
       ACOUPLE(SYS1.LOGR.CDS02,PLEX01)
```

A.4.4 GRSRNL00 Member in PARMLIB

```
RNLDEF RNL(EXCL) TYPE(SPECIFIC)
 QNAME(SYSDSN)
 RNAME(PASSWORD)

 RNLDEF RNL(EXCL) TYPE(SPECIFIC)
 QNAME(SYSDSN)
 RNAME(SYS1.BRODCAST)

 RNLDEF RNL(EXCL) TYPE(SPECIFIC)
 QNAME(SYSDSN)
 RNAME(SYS1.DAE)

 RNLDEF RNL(EXCL) TYPE(SPECIFIC)
 QNAME(SYSDSN)
 RNAME(SYS1.DCMLIB)

 RNLDEF RNL(EXCL) TYPE(GENERIC)
 QNAME(SYSDSN)
 RNAME(SYS1.DUMP)

 RNLDEF RNL(EXCL) TYPE(SPECIFIC)
 QNAME(SYSDSN)
 RNAME(SYS1.LOGREC)

 RNLDEF RNL(EXCL) TYPE(GENERIC)
 QNAME(SYSDSN)
 RNAME(SYS1.MAN)

 RNLDEF RNL(EXCL) TYPE(SPECIFIC)
 QNAME(SYSDSN)
 RNAME(SYS1.NUCLEUS)

 RNLDEF RNL(EXCL) TYPE(GENERIC)
 QNAME(SYSDSN)
 RNAME(SYS1.PAGE)
```

```
 RNLDEF RNL(EXCL) TYPE(SPECIFIC)
 QNAME(SYSDSN)
 RNAME(SYS1.STGINDEX)

 RNLDEF RNL(EXCL) TYPE(SPECIFIC)
 QNAME(SYSDSN)
 RNAME(SYS1.SVCLIB)

 RNLDEF RNL(EXCL) TYPE(SPECIFIC)
 QNAME(SYSDSN)
 RNAME(SYS1.UADS)
/*  SYSTEM INCLUSION RESOURCE NAME LIST - RNLDEF STATEMENTS         */

 RNLDEF RNL(INCL) TYPE(GENERIC)
 QNAME(SYSDSN)

/*   RESERVE CONVERSION RESOURCE NAME LIST - RNLDEF STATEMENTS      */
```

A.4.5 New SMFPRM10 Member in PARMLIB

```
 NOACTIVE                      /*NO     SMF RECORDING*/
                                   /* SMF DATA SETS      */
     DSNAME(SYS2.MAN1)
     NOPROMPT                    /* DO NOT PROMPT OPERATOR FOR OPTIONS */
     REC(PERM)                    /* TYPE 17 PERM RECORDS ONLY */
     MAXDORM(3000)                /* WRITE AN IDLE BUFFER AFTER 30 MIN */
     STATUS(010000)               /* WRITE SMF STATS AFTER 1 HOUR */
     JWT(2400)                    /* 522 AFTER 24 HOURS    */
     SID(P391)                    /* SYSTEM ID IS P390 */
     LISTDSN                      /* LIST DATA SET STATUS AT IPL */
     SYS(NOTYPE(14:19,62:69),NOINTERVAL,NODETAIL)
```

A.4.6 New VTAMAPP1 Member in PARMLIB

```
S VLF,SUB=MSTR
Pause 10
S LLA.SUB=MSTR
S TCAS
D T
```

A.4.7 New SHUTDOW1 Member in PARMLIB

```
F Tso,usermax=0        /* Don't allow anyone else to logon right now! */
Pause 30
F BPXOINIT,SHUTDOWN=FORKINIT
Pause 10
C INETD8
Pause 10
P Tcas
Pause 10
P Lla
P vlf
Pause 10
F BPXOINIT,SHUTDOWN=FORKINIT
Z net,quick
Pause 10
```

```
/* P IRLMPROC */
#STOP
```

A.4.8 New JES2MAS Member in PARMLIB

The new JES2MAS member is a copy of the original JES2PARM member with the following lines changed (MASDEF) or added (the MEMBER statements).

```
MASDEF   SHARED=CHECK,        /* MULTI ACCESS SPOOL NOCHECK      OHWNC*/
         DORMANCY=(100,500), /*                                  OHWNC*/
         HOLD=100,           /*                                  OHWNC*/
         LOCKOUT=1200        /*                                  OHWNC*/
                             /*                                       */
                             /*---------------------------------------*/
MEMBER(01) NAME=P390
MEMBER(02) NAME=P391
```

A.4.9 IEASYSxx Members in PARMLIB

IEASYS0C (copied from IEASYSCS and modified**)**

```
CLOCK=10,                      ===> PLEASE READ NOTES AT END PRIOR <===
CMB=(UNITR,COMM,GRAPH,CHRDR), ===> TO MAKING CHANGES TO PARMLIB!  <===
CMD=0C,                       COMMNDCS
CLPA,
CON=00,                       CONSOL00 (DEFAULT)
COUPLE=10,
CSA=(3000,18000),             MVS/ESA CSA RANGE
DUMP=DASD,                    PLACE SVC DUMPS ON DASD DEVICES (DEFAULT)
FIX=00,                       IEAFIX00
GRS=STAR,                     NO INTERSYSTEM SERIALIZATION
GRSCNF=00,                    GRS CONFIGURATION DEFINITION
GRSRNL=00,
IOS=00,                       IECIOS00 SET INTERRUPT HANDLER FOR E20,E21
ICS=00,                       IEAICS00 (DEFAULT)
IPS=00,                       IEAIPS00 (DEFAULT)
LNKAUTH=LNKLST,               APF-AUTHORIZE LNKLSTXX LIBRARIES
LOGCLS=L,                     WILL NOT BE PRINTED BY DEFAULT
LOGLMT=999999,                MAX WTL MESSAGES QUEUED (MUST BE 6 DIGITS)
LOGREC=SYS1.LOGREC,           LOGREC DATASET NAME
LPA=00,                       LPALST00
MAXUSER=250,                  MAX # ADDRESS SPACES (STC+INITS+TSO)
MLPA=00,                      IEALPA00
MSTRJCL=00,                   MSTJCL00 (DEFAULT)
OMVS=00,                     OPEN EDITION
PAGTOTL=(5,2),                CAN ADD 3 PAGE, 2 SWAP D/S
PAK=00,                       IEAPAK00
OPI=YES,                      OPERATOR MAY OVERRIDE THESE PARMS
OPT=00,                       IEAOPT00
PAGE=(SYS1.PLPA1.PAGE,         PAGE
      SYS1.COMMON.PAGE,            DATA SET
      SYS1.LOCAL1.PAGE,                    NAMES
      SYS1.PLPA.PAGE,
        L),                   LIST PAGE DATA SET NAMES DURING IPL
PROD=00,                      IFAPRD00 - PRODUCT ENABLEMENT/DISABLEMENT
PROG=00,                      PROG00 - DYNAMIC APF LIST
RSU=0,                        NO RECONFIG STORAGE UNITS (DEFAULT)
RSVSTRT=5,                    RESERVED ASVT ENTRIES (DEFAULT)
RSVNONR=5,                    RESERVED ASVT ENTRIES (DEFAULT)
```

```
SCH=00,                     SCHED00 (DEFAULT)
SMF=00,                     SMFPRM00 (DEFAULT)
SMS=00,                     IGDSMS00 (DEFAULT)
SQA=(8,8),                  MVS/ESA SQA APPROX 1024K
SSN=00,                     IEFSSN00
SVC=00,                     IEASVC00 (DEFAULT)
SYSNAME=P390,               SAME AS SID IN SMFPRM00
VAL=00,                     VATLST00 (DEFAULT)
VIODSN=SYS1.STGINDEX,       VIO JOURNALING DATA SET
VRREGN=64                   DEFAULT REAL-STORAGE REGION SIZE
```

IEASYS1C (copied from IEASYSCS and modified**)**

```
CLOCK=10,                    ===> PLEASE READ NOTES AT END PRIOR <===
CMB=(UNITR,COMM,GRAPH,CHRDR), ===> TO MAKING CHANGES TO PARMLIB!  <===
CMD=1C,                     COMMNDxx
CLPA,
CON=00,                     CONSOL00 (DEFAULT)
COUPLE=10,
CSA=(3000,18000),           MVS/ESA CSA RANGE
DUMP=DASD,                  PLACE SVC DUMPS ON DASD DEVICES (DEFAULT)
FIX=00,                     IEAFIX00
GRS=STAR,                  NO INTERSYSTEM SERIALIZATION
GRSCNF=00,                  GRS CONFIGURATION DEFINITION
GRSRNL=00,
IOS=00,                     IECIOS00 SET INTERRUPT HANDLER FOR E20,E21
ICS=00,                     IEAICS00 (DEFAULT)
IPS=00,                     IEAIPS00 (DEFAULT)
LNKAUTH=LNKLST,             APF-AUTHORIZE LNKLSTXX LIBRARIES
LOGCLS=L,                   WILL NOT BE PRINTED BY DEFAULT
LOGLMT=999999,              MAX WTL MESSAGES QUEUED (MUST BE 6 DIGITS)
LOGREC=SYS2.LOGREC,         LOGREC DATASET NAME
LPA=00,                     LPALST00
MAXUSER=250,                MAX # ADDRESS SPACES (STC+INITS+TSO)
MLPA=00,                    IEALPA00
MSTRJCL=00,                 MSTJCL00 (DEFAULT)
OMVS=10,                    OPEN EDITION
PAGTOTL=(5,2),              CAN ADD 3 PAGE, 2 SWAP D/S
PAK=00,                     IEAPAK00
OPI=YES,                    OPERATOR MAY OVERRIDE THESE PARMS
OPT=00,                     IEAOPT00
PAGE=(SYS2.PLPA1.PAGE,       PAGE
      SYS2.COMMON.PAGE,          DATA SET
      SYS2.LOCAL1.PAGE,                NAMES
        L),                 LIST PAGE DATA SET NAMES DURING IPL
PROD=00,                    IFAPRD00 - PRODUCT ENABLEMENT/DISABLEMENT
PROG=00,                    PROG00 - DYNAMIC APF LIST
RSU=0,                      NO RECONFIG STORAGE UNITS (DEFAULT)
RSVSTRT=5,                  RESERVED ASVT ENTRIES (DEFAULT)
RSVNONR=5,                  RESERVED ASVT ENTRIES (DEFAULT)
SCH=00,                     SCHED00 (DEFAULT)
SMF=10,                     SMFPRM10
SMS=00,                     IGDSMS00 (DEFAULT)
SQA=(8,8),                  MVS/ESA SQA APPROX 1024K
SSN=00,                     IEFSSN00
SVC=00,                     IEASVC00 (DEFAULT)
SYSNAME=P391,               SAME AS SID IN SMFPRM
VAL=00,                     VATLST00 (DEFAULT)
```

```
VIODSN=SYS2.STGINDEX,        VIO JOURNALING DATA SET
VRREGN=64                    DEFAULT REAL-STORAGE REGION SIZE
```

IEASYS0W (copied from IEASYS00 and modified)

```
CLOCK=10,                     ===> PLEASE READ NOTES AT END PRIOR <===
CMB=(UNITR,COMM,GRAPH,CHRDR), ===> TO MAKING CHANGES TO PARMLIB!  <===
CMD=0W,                      COMMND00
CON=00,                      CONSOL00 (DEFAULT)
COUPLE=10,
CSA=(3000,18000),            MVS/ESA CSA RANGE
DUMP=DASD,                   PLACE SVC DUMPS ON DASD DEVICES (DEFAULT)
FIX=00,                      IEAFIX00
GRS=STAR,                   NO INTERSYSTEM SERIALIZATION
GRSCNF=00,                   GRS CONFIGURATION DEFINITION
GRSRNL=00,
IOS=00,                      IECIOS00 SET INTERRUPT HANDLER FOR E20,E21
ICS=00,                      IEAICS00 (DEFAULT)
IPS=00,                      IEAIPS00 (DEFAULT)
LNKAUTH=LNKLST,              APF-AUTHORIZE LNKLSTXX LIBRARIES
LOGCLS=L,                    WILL NOT BE PRINTED BY DEFAULT
LOGLMT=999999,               MAX WTL MESSAGES QUEUED (MUST BE 6 DIGITS)
LOGREC=SYS1.LOGREC,          LOGREC DATASET NAME
LPA=00,                      LPALST00
MAXUSER=250,                 MAX # ADDRESS SPACES (STC+INITS+TSO)
MLPA=00,                     IEALPA00
MSTRJCL=00,                  MSTJCL00 (DEFAULT)
OMVS=00,                     OPEN EDITION
PAGTOTL=(5,2),               CAN ADD 3 PAGE, 2 SWAP D/S
PAK=00,                      IEAPAK00
OPI=YES,                     OPERATOR MAY OVERRIDE THESE PARMS
OPT=00,                      IEAOPT00
PAGE=(SYS1.PLPA1.PAGE,        PAGE
      SYS1.COMMON.PAGE,           DATA SET
      SYS1.LOCAL1.PAGE,                 NAMES
      SYS1.PLPA.PAGE,
        L),                  LIST PAGE DATA SET NAMES DURING IPL
PROD=00,                     IFAPRD00 - PRODUCT ENABLEMENT/DISABLEMENT
PROG=00,                     PROG00 - DYNAMIC APF LIST
RSU=0,                       NO RECONFIG STORAGE UNITS (DEFAULT)
RSVSTRT=5,                   RESERVED ASVT ENTRIES (DEFAULT)
RSVNONR=5,                   RESERVED ASVT ENTRIES (DEFAULT)
SCH=00,                      SCHED00 (DEFAULT)
SMF=00,                      SMFPRM00 (DEFAULT)
SMS=00,                      IGDSMS00 (DEFAULT)
SQA=(8,8),                   MVS/ESA SQA APPROX 1024K
SSN=00,                      IEFSSN00
SVC=00,                      IEASVC00 (DEFAULT)
SYSNAME=P390,                SAME AS SID IN SMFPRM00
VAL=00,                      VATLST00 (DEFAULT)
VIODSN=SYS1.STGINDEX,        VIO JOURNALING DATA SET
VRREGN=64                    DEFAULT REAL-STORAGE REGION SIZE
```

IEASYS1W (copied from IEASYS00 and modified)

```
CLOCK=10,                     ===> PLEASE READ NOTES AT END PRIOR <===
CMB=(UNITR,COMM,GRAPH,CHRDR), ===> TO MAKING CHANGES TO PARMLIB!  <===
CMD=1W,                      COMMND1W
CON=00,                      CONSOL00 (DEFAULT)
```

```
COUPLE=10,
CSA=(3000,8000),            MVS/ESA CSA RANGE
DUMP=DASD,                  PLACE SVC DUMPS ON DASD DEVICES (DEFAULT)
FIX=00,                     IEAFIX00
GRS=STAR,                  NO INTERSYSTEM SERIALIZATION
GRSCNF=00,                  GRS CONFIGURATION DEFINITION
GRSRNL=00,
IOS=00,                     IECIOS00 SET INTERRUPT HANDLER FOR E20,E21
ICS=00,                     IEAICS00 (DEFAULT)
IPS=00,                     IEAIPS00 (DEFAULT)
LNK=00,                     LNKLST00 (DEFAULT)
LNKAUTH=LNKLST,             APF-AUTHORIZE LNKLSTXX LIBRARIES
LOGCLS=L,                   WILL NOT BE PRINTED BY DEFAULT
LOGLMT=999999,              MAX WTL MESSAGES QUEUED (MUST BE 6 DIGITS)
LOGREC=SYS2.LOGREC,         LOGREC DATASET NAME
LPA=00,                     LPALST00
MAXUSER=250,                MAX # ADDRESS SPACES (STC+INITS+TSO)
MLPA=00,                    IEALPA00
MSTRJCL=00,                 MSTJCL00 (DEFAULT)
PAGTOTL=(5,2),              CAN ADD 3 PAGE, 2 SWAP D/S
PAK=00,                     IEAPAK00
OMVS=10,                    BPXPRM10
OPI=YES,                    OPERATOR MAY OVERRIDE THESE PARMS
OPT=00,                     IEAOPT00
PAGE=(SYS2.PLPA.PAGE,       PAGE
      SYS2.COMMON.PAGE,          DATA SET
      SYS2.LOCAL1.PAGE,                NAMES
        L),                 LIST PAGE DATA SET NAMES DURING IPL
PROD=00,                    IFAPRD00 - PRODUCT ENABLEMENT/DISABLEMENT
PROG=00,                    PROG00 - DYNAMIC APF LIST
RSU=0,                      NO RECONFIG STORAGE UNITS (DEFAULT)
RSVSTRT=5,                  RESERVED ASVT ENTRIES (DEFAULT)
RSVNONR=5,                  RESERVED ASVT ENTRIES (DEFAULT)
SCH=00,                     SCHED00 (DEFAULT)
SMF=10,                     SMFPRM
SQA=(8,8),                  MVS/ESA SQA APPROX 1024K
SSN=00,                     IEFSSN00
SVC=00,                     IEASVC00 (DEFAULT)
SYSNAME=P391,               SAME AS SID IN SMFPRM
VAL=00,                     VATLST00 (DEFAULT)
VIODSN=SYS2.STGINDEX,       VIO JOURNALING DATA SET
VRREGN=64                   DEFAULT REAL-STORAGE REGION SIZE
```

IEASYS0D (copied from IEASYSDC and modified)

```
CLOCK=10,                    ===> PLEASE READ NOTES AT END PRIOR <===
CMB=(UNITR,COMM,GRAPH,CHRDR), ===> TO MAKING CHANGES TO PARMLIB!  <===
CLPA,
CMD=0D,                     COMMNDDC
CON=00,                     CONSOL00 (DEFAULT)
COUPLE=10,                  COUPLING SYSPLEX
CSA=(3000,18000),           MVS/ESA CSA RANGE
DUMP=DASD,                  PLACE SVC DUMPS ON DASD DEVICES (DEFAULT)
FIX=00,                     IEAFIX00
GRS=STAR,                   INTERSYSTEM SERIALIZATION
GRSCNF=00,                  GRS CONFIGURATION MEMBER
GRSRNL=00,                  GRS RNL MEMBER
IOS=00,                     IECIOS00 SET INTERRUPT HANDLER FOR E20,E21
```

```
ICS=00,                     IEAICS00 (DEFAULT)
IPS=00,                     IEAIPS00 (DEFAULT)
LNKAUTH=LNKLST,             APF-AUTHORIZE LNKLSTXX LIBRARIES
LOGCLS=L,                   WILL NOT BE PRINTED BY DEFAULT
LOGLMT=999999,              MAX WTL MESSAGES QUEUED (MUST BE 6 DIGITS)
LOGREC=SYS1.LOGREC,         LOGREC DATASET NAME
LPA=DB,                     LPALSTDB
MAXUSER=250,                MAX # ADDRESS SPACES (STC+INITS+TSO)
MLPA=00,                    IEALPA00
MSTRJCL=00,                 MSTJCL00 (DEFAULT)
OMVS=00,                    OPEN EDITION
PAGTOTL=(5,2),              CAN ADD 3 PAGE, 2 SWAP D/S
PAK=00,                     IEAPAK00
OPI=YES,                    OPERATOR MAY OVERRIDE THESE PARMS
OPT=00,                     IEAOPT00
PAGE=(SYS1.PLPA1.PAGE,       PAGE
      SYS1.COMMON.PAGE,          DATA SET
      SYS1.LOCAL1.PAGE,                NAMES
      SYS1.PLPA.PAGE,
        L),                 LIST PAGE DATA SET NAMES DURING IPL
PROD=00,                    IFAPRD00 - PRODUCT ENABLEMENT/DISABLEMENT
PROG=DB,                    PROGDB - DYNAMIC APF LIST
RSU=0,                      NO RECONFIG STORAGE UNITS (DEFAULT)
RSVSTRT=5,                  RESERVED ASVT ENTRIES (DEFAULT)
RSVNONR=5,                  RESERVED ASVT ENTRIES (DEFAULT)
SCH=DB,                     SCHED00 (DEFAULT)
SMF=00,                     SMFPRM00 (DEFAULT)
SMS=00,                     IGDSMS00 (DEFAULT)
SQA=(8,8),                  MVS/ESA SQA APPROX 1024K
SSN=DB,                     IEFSSN00
SVC=DB,                     IEASVC00 (DEFAULT)
SYSNAME=P390,               SAME AS SID IN SMFPRM00
VAL=00,                     VATLST00 (DEFAULT)
VIODSN=SYS1.STGINDEX,       VIO JOURNALING DATA SET
VRREGN=64                   DEFAULT REAL-STORAGE REGION SIZE
```

IEASYS1D (copied from IEASYSDC and modified)

```
CLOCK=10,                    ===> PLEASE READ NOTES AT END PRIOR <===
CMB=(UNITR,COMM,GRAPH,CHRDR), ===> TO MAKING CHANGES TO PARMLIB!  <===
CLPA,
CMD=1D,                     COMMNDDC
CON=00,                     CONSOL10 (DEFAULT)
COUPLE=10,                 COUPLING SYSPLEX
CSA=(3000,18000),           MVS/ESA CSA RANGE
DUMP=DASD,                  PLACE SVC DUMPS ON DASD DEVICES (DEFAULT)
FIX=00,                     IEAFIX00
GRS=STAR,                   NO INTERSYSTEM SERIALIZATION
GRSCNF=00,                NO INTERSYSTEM SERIALIZATION
GRSRNL=00,                NO INTERSYSTEM SERIALIZATION
IOS=00,                     IECIOS00 SET INTERRUPT HANDLER FOR E20,E21
ICS=00,                     IEAICS00 (DEFAULT)
IPS=00,                     IEAIPS00 (DEFAULT)
LNKAUTH=LNKLST,             APF-AUTHORIZE LNKLSTXX LIBRARIES
LOGCLS=L,                   WILL NOT BE PRINTED BY DEFAULT
LOGLMT=999999,              MAX WTL MESSAGES QUEUED (MUST BE 6 DIGITS)
LOGREC=SYS2.LOGREC,         LOGREC DATASET NAME
LPA=DB,                     LPALSTDB
```

```
MAXUSER=250,                MAX # ADDRESS SPACES (STC+INITS+TSO)
MLPA=00,                    IEALPA00
MSTRJCL=00,                 MSTJCL00 (DEFAULT)
PAGTOTL=(5,2),              CAN ADD 3 PAGE, 2 SWAP D/S
PAK=00,                     IEAPAK00
OMVS=1D,
OPI=YES,                    OPERATOR MAY OVERRIDE THESE PARMS
OPT=00,                     IEAOPT00
PAGE=(SYS2.PLPA1.PAGE,       PAGE
      SYS2.COMMON.PAGE,          DATA SET
      SYS2.LOCAL1.PAGE,                NAMES
        L),                 LIST PAGE DATA SET NAMES DURING IPL
PROD=00,                    IFAPRD00 - PRODUCT ENABLEMENT/DISABLEMENT
PROG=DB,                    PROGDB - DYNAMIC APF LIST
RSU=0,                      NO RECONFIG STORAGE UNITS (DEFAULT)
RSVSTRT=5,                  RESERVED ASVT ENTRIES (DEFAULT)
RSVNONR=5,                  RESERVED ASVT ENTRIES (DEFAULT)
SCH=DB,                     SCHED00 (DEFAULT)
SMF=10,                     SMFPRM
SMS=00,                     IGDSMS00 (DEFAULT)
SQA=(8,8),                  MVS/ESA SQA APPROX 1024K
SSN=DB,                     IEFSSN00
SVC=DB,                     IEASVC00 (DEFAULT)
SYSNAME=P391,               SAME AS SID IN SMFPRM
VAL=00,                     VATLST00 (DEFAULT)
VIODSN=SYS2.STGINDEX,       VIO JOURNALING DATA SET
VRREGN=64                   DEFAULT REAL-STORAGE REGION SIZE
```

IEASYS0B (copied from IEASYSDB and modified**)**

```
CLOCK=10,                    ===> PLEASE READ NOTES AT END PRIOR <===
CMB=(UNITR,COMM,GRAPH,CHRDR), ===> TO MAKING CHANGES TO PARMLIB!  <===
CMD=0B,                     COMMNDDB
CON=00,                     CONSOL00 (DEFAULT)
COUPLE=10,                  COUPLING SYSPLEX
CSA=(3000,18000),           MVS/ESA CSA RANGE
DUMP=DASD,                  PLACE SVC DUMPS ON DASD DEVICES (DEFAULT)
FIX=00,                     IEAFIX00
GRS=STAR,                  NO INTERSYSTEM SERIALIZATION
GRSCNF=00,                GRS CONFIGURATION DEFINITION
GRSRNL=00,
IOS=00,                     IECIOS00 SET INTERRUPT HANDLER FOR E20,E21
ICS=00,                     IEAICS00 (DEFAULT)
IPS=00,                     IEAIPS00 (DEFAULT)
LNKAUTH=LNKLST,             AUTHORIZE LNKLSTXX LIBRARIES
LOGCLS=L,                   WILL NOT BE PRINTED BY DEFAULT
LOGLMT=999999,              MAX WTL MESSAGES QUEUED (MUST BE 6 DIGITS)
LOGREC=SYS1.LOGREC,         LOGREC DATASET NAME
LPA=DB,                     LPALSTDB
MAXUSER=250,                MAX # ADDRESS SPACES (STC+INITS+TSO)
MLPA=00,                    IEALPA00
MSTRJCL=00,                 MSTJCL00 (DEFAULT)
OMVS=00,                    OPEN EDITION
PAGTOTL=(5,2),              CAN ADD 3 PAGE, 2 SWAP D/S
PAK=00,                     IEAPAK00
OPI=YES,                    OPERATOR MAY OVERRIDE THESE PARMS
OPT=00,                     IEAOPT00
PAGE=(SYS1.PLPA1.PAGE,       PAGE
```

```
      SYS1.COMMON.PAGE,           DATA SET
      SYS1.LOCAL1.PAGE,                 NAMES
      SYS1.PLPA.PAGE,
        L),                   LIST PAGE DATA SET NAMES DURING IPL
PROD=00,                      IFAPRD00 - PRODUCT ENABLEMENT/DISABLEMENT
PROG=DB,                      PROGDB - DYNAMIC APF LIST
RSU=0,                        NO RECONFIG STORAGE UNITS (DEFAULT)
RSVSTRT=5,                    RESERVED ASVT ENTRIES (DEFAULT)
RSVNONR=5,                    RESERVED ASVT ENTRIES (DEFAULT)
SCH=DB,                       SCHED00 (DEFAULT)
SMF=00,                       SMFPRM00 (DEFAULT)
SMS=00,                       IGDSMS00 (DEFAULT)
SQA=(8,8),                    MVS/ESA SQA APPROX 1024K
SSN=DB,                       IEFSSN00
SVC=DB,                       IEASVC00 (DEFAULT)
SYSNAME=P390,                 SAME AS SID IN SMFPRM00
VAL=00,                       VATLST00 (DEFAULT)
VIODSN=SYS1.STGINDEX,         VIO JOURNALING DATA SET
VRREGN=64                     DEFAULT REAL-STORAGE REGION SIZE
```

IEASYS1B (copied from IEASYSDB and modified)

```
CLOCK=10,                      ===> PLEASE READ NOTES AT END PRIOR <===
CMB=(UNITR,COMM,GRAPH,CHRDR), ===> TO MAKING CHANGES TO PARMLIB!  <===
CMD=1B,                       COMMNDDB
CON=10,                       CONSOL10 (DEFAULT)
COUPLE=10,                    COUPLING SYSPLEX
CSA=(3000,18000),             MVS/ESA CSA RANGE
DUMP=DASD,                    PLACE SVC DUMPS ON DASD DEVICES (DEFAULT)
FIX=00,                       IEAFIX00
GRS=STAR,                     INTERSYSTEM SERIALIZATION WITH CF
GRSCNF=00,                    GRS CONFIGURATION DEFINITION
GRSRNL=00,                    GRS ENQ TABLE DEFINITION
IOS=00,                       IECIOS00 SET INTERRUPT HANDLER FOR E20,E21
ICS=00,                       IEAICS00 (DEFAULT)
IPS=00,                       IEAIPS00 (DEFAULT)
LNKAUTH=LNKLST,               AUTHORIZE LNKLSTXX LIBRARIES
LOGCLS=L,                     WILL NOT BE PRINTED BY DEFAULT
LOGLMT=999999,                MAX WTL MESSAGES QUEUED (MUST BE 6 DIGITS)
LOGREC=SYS2.LOGREC,           LOGREC DATASET NAME
LPA=DB,                       LPALSTDB
MAXUSER=250,                  MAX # ADDRESS SPACES (STC+INITS+TSO)
MLPA=00,                      IEALPA00
MSTRJCL=00,                   MSTJCL00 (DEFAULT)
OMVS=10,                      OPEN EDITION
PAGTOTL=(5,2),                CAN ADD 3 PAGE, 2 SWAP D/S
PAK=00,                       IEAPAK00
OPI=YES,                      OPERATOR MAY OVERRIDE THESE PARMS
OPT=00,                       IEAOPT00
PAGE=(SYS2.PLPA1.PAGE,         PAGE
      SYS2.COMMON.PAGE,           DATA SET
      SYS2.LOCAL1.PAGE,                 NAMES
        L),                   LIST PAGE DATA SET NAMES DURING IPL
PROD=00,                      IFAPRD00 - PRODUCT ENABLEMENT/DISABLEMENT
PROG=DB,                      PROGDB - DYNAMIC APF LIST
RSU=0,                        NO RECONFIG STORAGE UNITS (DEFAULT)
RSVSTRT=5,                    RESERVED ASVT ENTRIES (DEFAULT)
RSVNONR=5,                    RESERVED ASVT ENTRIES (DEFAULT)
```

```
SCH=DB,                     SCHED00 (DEFAULT)
SMF=10,                     SMFPRM
SMS=00,                     IGDSMS00 (DEFAULT)
SQA=(8,8),                  MVS/ESA SQA APPROX 1024K
SSN=DB,                     IEFSSN00
SVC=DB,                     IEASVC00 (DEFAULT)
SYSNAME=P391,               SAME AS SID IN SMFPRM
VAL=00,                     VATLST00 (DEFAULT)
VIODSN=SYS2.STGINDEX,       VIO JOURNALING DATA SET
VRREGN=64                   DEFAULT REAL-STORAGE REGION SIZE
```

A.4.10 New COMMNDxx Members in PARMLIB

Some of these COMMNDxx members are exact duplicates of each other. We used separate members to provide a consistent naming convention.

COMMND0C (copied from COMMNDCS)

```
COM='S JES2,MEMBER=JES2MAS,PARM='COLD,NOREQ''
COM='S VTAM,,,(LIST=00)'
COM='SET MPF=00'
COM='S IRRDPTAB                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S VTAMAPPL'
COM='S EZAZSSI,P=P390          AUTOMATIC START OF TNF AND VMCF'
COM='DUMPDS ADD,VOL=(SCPMV5)'
COM='DUMPDS NAME=SYS1.DUMP.D&DATE..T&TIME..&SYSNAME..S&SEQ'
COM='DUMPDS ALLOC=ACTIVE'
```

COMMND1C (copied from COMMNDCS and modified)

```
COM='S JES2,MEMBER=JES2MAS,PARM='WARM,NOREQ''
COM='S VTAM,,,(LIST=10)'
COM='SET MPF=00'
COM='S IRRDPTAB                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S VTAMAPP1'
COM='S EZAZSSI,P=P391          AUTOMATIC START OF TNF AND VMCF'
COM='DUMPDS ADD,VOL=(SCPMV6)'
COM='DUMPDS NAME=SYS2.DUMP.D&DATE..T&TIME..&SYSNAME..S&SEQ'
COM='DUMPDS ALLOC=ACTIVE'
```

COMMND0W (copied from COMMND00)

```
COM='S JES2,MEMBER=JES2MAS,PARM='WARM,NOREQ''
COM='S VTAM,,,(LIST=00)'
COM='SET MPF=00'
COM='S IRRDPTAB                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S VTAMAPPL'
COM='S EZAZSSI,P=P390          AUTOMATIC START OF TNF AND VMCF'
COM='DUMPDS ADD,VOL=(SCPMV5)'
COM='DUMPDS NAME=SYS1.DUMP.D&DATE..T&TIME..&SYSNAME..S&SEQ'
COM='DUMPDS ALLOC=ACTIVE'
```

COMMND1W (copied from COMMND00 and modified)

```
COM='S JES2,MEMBER=JES2MAS,PARM='WARM,NOREQ''
COM='S VTAM,,,(LIST=10)'
```

```
COM='SET MPF=00'
COM='S IRRDPTAB                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S VTAMAPP1'
COM='S EZAZSSI,P=P391          AUTOMATIC START OF TNF AND VMCF'
COM='DUMPDS ADD,VOL=(SCPMV6)'
COM='DUMPDS NAME=SYS2.DUMP.D&DATE..T&TIME..&SYSNAME..S&SEQ'
COM='DUMPDS ALLOC=ACTIVE'
```

COMMND0D (copied from COMMNDDC)

```
COM='S JES2,MEMBER=JES2MAS,PARM='COLD,NOREQ''
COM='S VTAM,,,(LIST=00)'
COM='SET MPF=00'
COM='S IRRDPTAB                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S VTAMAPPL'
COM='S EZAZSSI,P=P390          AUTOMATIC START OF TNF AND VMCF'
COM='DUMPDS ADD,VOL=(SCPMV5)'
COM='DUMPDS NAME=SYS1.DUMP.D&DATE..T&TIME..&SYSNAME..S&SEQ'
COM='DUMPDS ALLOC=ACTIVE'
```

COMMND1D (copied from COMMNDDC and modified)

```
COM='S JES2,MEMBER=JES2MAS,PARM='WARM,NOREQ''
COM='S VTAM,,,(LIST=10)'
COM='SET MPF=00'
COM='S IRRDPTAB                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S VTAMAPP1'
COM='S EZAZSSI,P=P391          AUTOMATIC START OF TNF AND VMCF'
COM='DUMPDS ADD,VOL=(SCPMV6)'
COM='DUMPDS NAME=SYS2.DUMP.D&DATE..T&TIME..&SYSNAME..S&SEQ'
COM='DUMPDS ALLOC=ACTIVE'
```

COMMND0B (copied from COMMNDDB)

```
COM='S JES2,MEMBER=JES2MAS,PARM='WARM,NOREQ''
COM='S VTAM,,,(LIST=00)'
COM='SET MPF=00'
COM='S IRRDPTAB                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S VTAMAPPL                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S EZAZSSI,P=P390          AUTOMATIC START OF TNF AND VMCF'
COM='DUMPDS ADD,VOL=(SCPMV5)'
COM='DUMPDS NAME=SYS1.DUMP.D&DATE..T&TIME..&SYSNAME..S&SEQ'
COM='DUMPDS ALLOC=ACTIVE'
```

COMMND1B (copied from COMMNDDB and modified)

```
COM='S JES2,MEMBER=JES2MAS,PARM='WARM,NOREQ''
COM='S VTAM,,,(LIST=10)'
COM='SET MPF=00'
COM='S IRRDPTAB                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S VTAMAPP1                AUTOMATIC START OF RACF DYNAMIC PARSE'
COM='S EZAZSSI,P=P391          AUTOMATIC START OF TNF AND VMCF'
COM='DUMPDS ADD,VOL=(SCPMV6)'
COM='DUMPDS NAME=SYS2.DUMP.D&DATE..T&TIME..&SYSNAME..S&SEQ'
COM='DUMPDS ALLOC=ACTIVE'
```

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Appendix C. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

C.1 International Technical Support Organization Publications

For information on ordering these ITSO publications see “How to Get ITSO Redbooks” on page 61.

- *P/390, R/390, S/390 Integrated Server: OS/390 New User’s Cookbook,* SG24-4757-01. (The -00 version is not appropriate.)

C.2 Redbooks on CD-ROMs

Redbooks are also available on the following CD-ROMs. Click the CD-ROMs button at `http://www.redbooks.ibm.com/` for information about all the CD-ROMs offered, updates and formats.

CD-ROM Title	Collection Kit Number
System/390 Redbooks Collection	SK2T-2177
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RS/6000 Redbooks Collection (BkMgr Format)	SK2T-8040
RS/6000 Redbooks Collection (PDF Format)	SK2T-8043
Application Development Redbooks Collection	SK2T-8037

C.3 Other Publications

These publications are also relevant as further information sources:

- *OS/390 MVS Setting Up a Sysplex* (GC28-1779)
- *OS/390 Parallel Sysplex Systems Managemen*t (GC28-1861)

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