IBM PC Server System/390

Hints and Tips (FAQ):

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IBM PC Server System/390

Hints and Tips (FAQ):

Preface

Welcome to the **Hints & Tips (FAQ) Guide** for the ***PC Server S/390***.

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Introduction and Overview

This document is intended to address many of the questions or problems that may occur during the installation and use of a PC Server S/390.

The information contained in this document is based on the experience of numerous people involved in the development and testing of the PC Server S/390. *While we believe this information to be accurate and correct it has not been subjected to any formal verification or testing process.*

This guide contains the following sections:

Frequently Asked Questions (FAQs):

A list of questions that are frequently asked about a PC Server S/390. When there is a quick and simple answer, it will be provided along with the question. When the answer is long or involves multiple components, a reference will be provided to a topic in the *Hints and Tips* section which covers that subject.

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Usage: If problems or questions are encountered in the installation and use of a PC Server S/390, check this section for a corresponding Question and answer.

Hints & Tips:

This section provides more extensive information and procedures than the FAQ section. Where necessary, complete procedures or relatively detailed information is provided on the topics.

Usage: We suggest that this section be used much like a "*Read-Me-First*" document. Review the topics in this section which may be related to the installation of a system before actually starting the installation process.

Change Log

Changes implemented in each version are noted here.

05/20/1997 Section on 330 PCI interrupts added. Information on SCSI cabling updated.

03/15/97 First edition distributed.

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Chapter 1. Frequently Asked Questions

Headings with a ***1** notation were added in the May, 1997 update.

Cannot 'Find' CDROM Drive

Question: *I'm installing Warp Server. After booting the installation diskettes, it instructs me to insert the CD, but it's already in the CDROM drive. The system doesn't seem to recognize the CDROM drive.*

Answer: This could be the result of two different (but related) problems. Either:

1. The CDROM Drive is cabled to the ServeRAID adapter and the proper **IPSRAID.ADD** driver has not been added to the Warp Server install diskettes, or
2. The CDROM Drive is cabled to the internal channel of the integrated SCSI controller and the proper **AIC7870.ADD** driver has not been added to the Warp Server install diskettes.

For further information and instructions, see “Required SCSI and RAID Drivers” on page 7 in the *Hints and Tips* section.

CHKDSK Fails or does not Complete

Question: *After a 'hard shutdown', such as a power failure, the system automatically runs CHKDSK, but it fails/never completes. How can I correct this?*

Answer: This is caused by a limitation of CHKDSK when running against large disk partitions. See“Large Partitions - CHKDSK Problems” on page 10 for additional information.

What Releases of OS/2 are supported? *1

Question: *What releases of OS/2 Warp and Communications Manager/2 are supported on the &pcs390.?*

Answer: For systems based on the PC Server 500 and PC Server 520, either OS/2 Warp V3.0 or OS/2 Warp Server (Basic or Advanced) are supported. For systems based on the PC Server 330, only Warp Server (Basic or Advanced) is supported. Systems which use other versions of Warp (such as "Warp Connect") may work, but are not supported and the support center may decline to accept problems encountered on unsupported configurations.
"Communications Manager/2 1.11 for OS/2 Warp" is the only version of Comm. Mgr that is supported. Other (earlier) releases have known problems.
Unless specifically recommended by P/390 support organization, we do not suggest applying OS/2 "FixPacks" as routine maintenance.

Why is my Expansion Unit having problems? *1

Question: *I'm having various problems with my SCSI disks in the expansion unit going DDD (defunct). Sometimes drives in the 330 itself also show DDD.*

Answer: If the drives in an Expansion unit are not ready by the time the Server unit is up and ready to check drive status, it can result in various strange problems, including showing erroneous DDD drive status.

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If you have any expansion units or external devices, you should always power them up first. Allow any drives to come up to speed before powering up the Server. If you have just encountered this problem and have DDD drives or other problems, call the PC Server Help Center. They can guide you through the process of getting all drives back online without losing any data.

What driver to use for the Integrated Ethernet? *1

Question: *I'm configuring my LAN Adapter in MPTS and can't find a driver for the Integrated Ethernet Adapter. What driver should I use and where is it?*

Answer: The Integrated Ethernet adapter uses the 'AMD PCNet Family Ethernet Adapter Driver'. This driver is on the "PC Server 330 Ethernet MPTS Drivers" diskette 1. (See “Recommended Install/Setup Diskettes” on page 18)

To 'install' this driver, go into the MPTS configuration to the panel where you select the drivers and protocals. Select the *Other Adapters* pushbutton. Put the above referenced diskette in the diskette drive and fill in the **Path** as **A:\LANSRVR** . The appropriate driver will be loaded and it will now be listed in the listbox of available drivers.

What is Maximum Disk Partition Size?

Question: *I need to have a very large disk configuration. What is the maximum size Logical Drive and Partition that I can use?*

Answer: The Logical Drive size is limited only by the size and number of disks in the array. However, if a drive fails (goes Defunct), large arrays will take longer to rebuild after drive replacement.

Although OS/2 (HPFS) supports a maximum of a 64GB partition, there are some important limitations with the CHKDSK utility. You may want to consider limiting your partitions to 10-12GB to avoid these problems. See “Large Partitions - CHKDSK Problems” on page 10 for additional information on this limitation.

Configuring TCP/IP across a LAN

Question: *I'm having problems getting TCP/IP working between my PC Server S/390 and other systems connected to my LAN. Are there any general directions or suggestions to help?*

Answer: There are a number of considerations when configuring TCP/IP connections across a LAN. First, you need to have some knowledge of TCP/IP protocols and terminology, as well as some LAN implementation knowledge. A good general reference and starting point is provided in “TCP/IP Configuration Information” on page 25.

Intermittent "Pink Hangs" (Shared Interrupt)*1

Question: *My system is experiencing intermittent 'Hangs" with the S/390 "System Activity Window" showing "Pink". What's wrong?*

Answer: One important thing to remember about the PCI P/390 adapter: it cannot share interrupts with other adapters. The default for PCI machines is to assign each adapter a unique interrupt level so this is not normally a problem. We have, however, occasionally seen the configuration program 'map' interrupts in a shared fashion. On our test floor, for example, a system with two ServeRAID adapters ended up with one of them configured at the same interrupt level as the P/390 adapter.

If the P/390 shares interrupts, the failure mode is "Intermittent Pink Hangs" which result from a lost alert: The P/390 tries to signal the channel to do something (via this shared interrupt), but the channel never gets the alert, so the system hangs "Pink".

If you are experiencing this problem, follow the procedure in “Checking and Resetting PCI Interrupts” on page 13 to ensure the P390 adapter interrupt is not shared.

PCI Slot Selection for PCI P/390 Adapter

Question: *I have five PCI slots in my PC Server 330; does it make any difference which slot I plug the P/390 adapter into?*

Answer: Yes. The PCI P/390 adapter must be plugged into one of the top three PCI slots, numbered slot 3, 4, or 5. The S/390 Parallel Channel Adapter should also be placed in one of these slots. For further information on this restriction, see “PCI Slot Usage for P/390” on page 12.

System Seems to 'Hang'

Question: *The system starts to run OK, then shortly after IPLing my S/390 system, the entire system 'hangs'. What's wrong?*

Answer: There are several possible reasons for the system to 'hang' as described. Some of the more likely or common causes are noted below:

OS/2 Print Queue is Required: If you have a printer defined to your S/390 system that is not explicitly redirected to an OS/2 file, you must define a OS/2 printer queue for this printer. For example, in the standard VM/ESA device map there is a 1403 defined at device number 00E and it defaults to using the OS/2 printer subsystem and LPT1 (logical printer 1). When you IPL VM/ESA it will normally attempt to start the 00E printer. If you do not have an OS/2 printer queue defined for LPT1, OS/2 does not know what to do with this print output and will 'hang'. To correct this problem, either:

1. Delete (or "turn off") the printer definition from the S/390 Device Map, - or -
2. Configure an OS/2 printer queue for LPT1 (drag a OS/2 'Printer' template from the 'Templates' folder and complete the definition of the printer and associated queue.)

Interrupt Conflicts: There are several interrupt conflicts which can cause 'hang' symptoms. One of these is the 'Pink Hang' noted above. Sometimes other devices or adapters can 'steal' the interrupts from the P/390 processor or the S/390 Parallel Channel Adapters. To make sure this does not happen, make sure the P/390 set of updates to the **CONFIG.SYS** is always at the **end** of the file. After installing any additional products (hardware or software) check the **CONFIG.SYS** to make sure no statements have been added or moved after the P/390 section. If any statements have been added or moved after the *"This must be the last line in CONFIG.SYS"* line, move them above the P390 section.

Dial-In Access

Question: *How can I (or other users) dial into my my PC Server S/390 from remote workstations or from home?*

Answer: There are several ways to provide dial-in access. Which one you choose would depend on your requirements and familiarity with the technologies involved with each. Some possibilities are:

LAN Distance
8235 'DIALS'
LAN3274 support of SLIP TCP/IP connections

For further information on these alternatives, see “Obtaining Dial-In Access” on page 19.

CM/2 Session is Not Used

Question: *I have the normal configuration with five Communication Manager/2 sessions defined. However, the first session (A) never seems to be used. Instead my 'Operator' console is on session 'B', and I can never use the 'A' session. Is something wrong? How can I use the 'A' session?*

Answer: This symptom is caused by the default '3270 Logical Terminal' configuration provided in the pre-configured system Device Maps. For complete information on 3270 Logical Terminal configuration, see the *PC Server S/390 Users Guide and Reference*, **Identifying LT Sessions** . To quickly change your configuration to 'enable' session 'A',

1. Start the P/390 Configurator (double click on the configurator icon)
2. From the main menu, select **F7**, *Update 3270 LT sessions*
3. The "list box" for session 'A' probably shows **HOST**. Change it to **LOCAL**.
4. Click on "SAVE" and exit the configurator.
5. The next time you re-boot your PC Server S/390, the first (A) 3270 window will be available for your "local" sessions.

Other Useful Publications

Question: *I've got the standard PC Server S/390 User's Guide and Reference, but I need additional information to configure my system. What other publications are available?*

Answer: There are a number of publications that may be of interest to anyone interested in learning more more about the PC Server S/390 and what it is capable of doing.
Redbooks are an excellent source of 'real world' information based on actual use of the systems. Several 'Redbooks' are available about the PC Server S/390.

GG24-2538: *MVS and the IBM PC Server 500 System/390*
SG24-4679: *VSE and the IBM PC Server 500 System/390*
SG24-4624: *Connectivity on a PC Server System/390*
SG24-4612: *Printing with MVS and the PC Server System/390*
SG24-4847: *P/390 and R/390 with OS/390: An Introduction*

Technical Application Brief The "TAB" (subtitled: *"The PC Server S/390, is it Right for You?"*) is available as a publication (GK20-2763) or as a viewable and printable document linked off the PC Server S/390 home page.

S/390 memory Upgrade

Question: *I have a PC Server S/390 with 32MB of S/390 memory. My system is now becoming memory constrained. What are my upgrade alternatives?*

Answer: The ability to upgrade depend on which version of the PC Server S/390 you have,

PC Server 500/520 The 500 and 520 based systems used a base P/390 card with 32MB of S/390 memory and an optional 'daughter card' with an additional 96MB of S/390 memory. If you have this version, you should be able to purchase the 96MB upgrade from your reseller.

PC Server 330 On the PCI version of the P/390 adapter used on the PC Server 330, all S/390 memory (either 32MB or 128MB) is contained on the same card as the P/390 CMOS microprocessor, occupying a single slot. Consequently, a memory upgrade is not possible. There is no plan to offer any kind of trade-in or exchange.

Performance Improvement

Question: *I have heard that the PC Server 330 version of the PC Server S/390 will perform 40% better than the PC Server 500/520 based versions. I am not seeing this much improvement on my system. Why not?*

Answer: There are a number of actions that may provide improved performance, but first we need to understand where the 40% number came from. In some very **I/O intensive** workloads, improvements of **up to** 40% in the **I/O throughput** of the system were observed. On the other hand, workloads which were more balanced or which were S/390 memory or processor intensive showed relatively little improvement (less than 10%). The components of the 330 version of the PC Server S/390 which contributed to the improved I/O performance are:

200MHz Pentium Pro processor to execute the I/O emulation programs faster.
The ServeRAID controller is faster than the prior versions of RAID controllers.
With the faster Pentium Pro proessor, Warp Server Advanced (and it's HPFS386), and large PC memory on the PC Server 330, it is practical to define a large (40 - 48MB) OS/2 - HPFS386 cache.

Most systems will see an overall improvement in the range of 10% to 30%, depending very much on specific workload characteristics and system configuration. Systems which make significant use of the S/390 Parallel Channel Adapter will usually see a more pronounced improvement over the old S/370 Channel Emulator.

For more information and for some performance tuning recommendations, see “Optimizing Performance” on page 21.

Required/Recommended Files or Diskettes

Question: *I am planning on setting up a PC Server S/390 from 'scratch'. Are there any required or recommended files or diskettes, such as new drivers?*

Answer: Yes!! There are several new drivers and 'BIOS' updates that are available. In general, you should occasionally check the PC Company file download area (see “Material Available Electronically” on page 9.) for updated levels of related drivers. In the file download area, seach for
Server 330
to get a list of the current files.

For a list of recommended files as of the publication of this document, see “Recommended Install/Setup Diskettes” on page 18.

S/370 Channel Card

(Note: This is about the 'old' S/370 Channel Emulator, not the new/current S/390 Parallel Channel Adapter.)

Question: *I have a P/390 machine with a S/370 channel (POSID E014) in Slot 4. I have run automatic configuration after installing the card.*

The IO Buffer Location is forced to "PROGRAMMED 64K > 1M" and shows as a conflict. Saving the configuration then booting the machine with the chan370 statements in CONFIG.SYS result in the card being detected but disabled.

How can I fix this?

Answer: The proper way to configure the S/370 channel card is to let the server autoconfigure on its own. Selecting the auto-config option is *not* the same.

1. Make sure the ADF file you are using for the S/370 channel card is the one from the P/390 disk, don't use the one that came with the S/370 channel card itself. (That one has some options that are incompatible with the P/390. It sounds like you were using the right ADF, I just mention this in case somebody else is browsing this in the archives.)
2. Remove the card from the machine and go through configuration.
3. Shutdown the machine and re-install the S/370 channel card.
4. Power up the machine and when it asks if you want to autoconfigure say 'yes'.
5. Then when you look at the S/370 channel configuration it should be OK. You can make changes at this point (to the interrupt level, for example, or to other adapters) and save them and all will be fine. Its just the initial 'forced' autoconfiguration that does something unique that can't be reliably done any other way/time.

You may be able to get it to work by moving other cards, etc. but this is the only 'sure' way to do it.

"File Not Found" when "INSTALL CILENT"

Question: *When I do an "INSTALL CLIENT " using version 2.3.2, it returns an error saying several DLLs were not found. What's the problem?*

Answer: The two files, AWSNTCA and AWSDFTS are no longer needed. They provided support for ES 1.0 (precursor to CM/2). Since ES 1.0 is no longer supported, the supporting DLLs are no longer shipped. The statements in INSTALL.CMD that install these DLLs should be commented out. If these two messages were the only errors received, you can ignore them and the client code should operate normally.

Chapter 2. Hints and Tips

Required SCSI and RAID Drivers

The PC Server 330 includes several components which are not properly recognized and supported by WARP Server "out of the box". Both the ServeRAID adapter and the integrated SCSI controller require specific device drivers which are not included in WARP Server. Because of this, you must prepare the OS/2 Install diskettes with the proper device drivers before starting the install process.

ServeRAID Driver: IPSRAID.ADD

The ServeRAID adapter requires the presence of the **IPSRAID.ADD** device driver. To provide access to this driver during the Warp Server install process, do the following (using another PC):

Make a backup copy of the *OS/2 Diskette 1*

Make room on the *OS/2 Diskette 1* by erasing one of the unused drivers, such as SONY535.ADD

The IPSRAID.ADD driver is on the ServeRAID *Driver and Utility Diskette* in the *OS2* directory. Copy the file onto the *OS/2 Diskette 1*.

```
copy  a:\os2\ipsraid.add   b:
```

Add a BASEDEV entry for IPSRAID.ADD to the CONFIG.SYS which is on the *OS/2 Diskette 1* The statement should look like:

```
BASEDEV=IPSRAID.ADD
```

This new IPSRAID should have a 'date stamp' of 1/21/97 or later. If not, get a more current copy of the *ServeRAID Driver and Utility Diskette* from the IBM PC Company web pages. (See “OS/2 and PC Related Files” for more information on the Web site.)

Integrated SCSI Driver: AIC7870.ADD

The integrated SCSI controller on the PC Server 330 system board requires an updated **AIC7870.ADD** device driver. The old AIC7870.ADD that comes on the *OS/2 Diskette 1* will not recognize the controller. An updated AIC7870.ADD must be copied on the *OS/2 Diskette 1*. The correct AIC7870.ADD will have a date stamp of 1996 or later.

To get a current AIC7870.ADD, access the Adaptec Web Pages (**http://www.adaptec.com**) and go to the Service and support area, OS/2, and download **7800OS2.EXE**, or, via FTP, **ftp.adaptec.com/pub/BBS/os2/7800OS2.EXE** 7800OS2.EXE is a self-extracting compressed file, so just execute it to obtain it's component parts, including AIC7870.ADD.

Copy this new AIC7870.ADD to the *OS/2 Diskette 1*. If there is insufficient space to copy the new driver, you can make room by erasing the **AIC7770.ADD** file and other **AIC*.ADD** files.

Add two additional lines to the CONFIG.SYS on Diskette 1:

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```
BASEDEV=AIC787 .ADD
SET  COPYFROMFLOPPY=1
```

These statements deserve some explaination:
BASEDEV=AIC7870.ADD Note that this is an additional statement of this kind. There is also a BASEDEV=AIC7870.ADD about halfway down the CONGIF.SYS. Both instances of the statement are needed to insure the statement gets copied correctly to the final CONFIG.SYS.
SET COPYFROMFLOPPY=1 This statement tells the OS/2 installation process to use drivers on the installation diskettes in preference to the drives which may be on the CDROM. This is necessary because there is a old, backlevel, version of AIC7870.ADD on the CDROM. Without this statement, the old version of AIC7870.ADD would be used in the final OS/2 system.

Completing OS/2 Install

As the OS/2 installation proceeds, a basic OS/2 will be loaded onto the system, then it will reboot. After this reboot, a "System Configuration" screen will be displayed where you can select:

Support for desired printer(s): You should always define at least one printer type / queue, even if you do not have a printer physically attached.
MultiMedia support: You probably will not have any 'sound cards' or other Multimedia devices, so this will be 'none'.
VGA Display adpter: Just accept the basic standard SVGA support. You will need to install the SVGA upgraded drivers later.
CD-ROM Device Support: Should default to "IBM CD-ROM II, Enhanced CD-ROM". This is the correct setting.
SCSI Controller: Make sure this says 'none', otherwise the wrong level of the AIC7870 driver will be loaded from the CDROM. (Having the second instance of 'BASEDEV=AIC7870.ADD' will insure the correct statements are placed in the target CONFIG.SYS.)

In Summary

In summary, you should:

1. Make room on the Diskette 1
2. Copy a recent version of AIC7870.ADD to the diskette
3. Copy IPSRAID.ADD to the diskette
4. Add the following statements to the top of CONFIG.SYS on Diskette 1

   ```
   BASEDEV=IPSRAID.ADD
   BASEDEV=AIC787 .ADD
   SET  COPYFROMFLOPPY=1
   ```

5. Specify **None** to *SCSI Adapter Support* on the "System Configuration" screen.

Material Available Electronically

There are a lot of information files, device drivers, and 'fixes' available electronically from several sources. This section will list many of these files and the sources where they are available.

OS/2 and PC Related Files

Many files are available from the IBM PC Company BBS, FTP site and Web pages.

IBM PC Company BBS

The Bulletin Board System can be accessed by calling (919) 517-0001.

FTP Site

The FTP site is **ftp.pc.ibm.com** (all files are in the /**pub** directory). Logon as user **anonymous**. To go direct to the "PC Servers" directory, use **ftp.pc.ibm.com/pub/pc_servers** and to access the OS/2 Drivers directory, use **ftp.pc.ibm.com/pub/os2_drivers** Remember to transfer any program files in "Binary" mode and file names are case sensitive. The file **allfiles.txt** in the **pub** directory contains a complete listing of all files available and a brief description of each.

PC Company Web Page

The PC Company Web page is **http://www.pc.ibm.com** . To directly access the "Files" section, use **http://www.pc.ibm.com/files.html**
Files of interest to PC Server S/390 users will generally be available from the **PC Server** and **OS/2 Drivers** sections of the **Files** area. You can select the "PC Servers" or "OS/2 Drivers" links to view and download the available software.

To find files related to the PC Server 330 and PC Server S/390, use the **Search** function, searching on:

Server 330 To find all files related to the PC Server 330
ServeRAID To find all files related to the ServeRAID adapter
Server 390 To find all files related to the S/390 component of the PC Server S/390

P/390 And S/390 Related files

The P/390 development group maintains an FTP site with the latest P390 fixes.

Temporary fixes to correct specific problems may sometimes be made available. Users should only install these fixes under the specific direction of IBM Support, or P/390 developers. Such fixes may be available via diskette from IBM Support or via FTP from: **LSCFTP.POK.IBM.COM**

```
 login in as user anonymous,      password=your_net_id
cd  /pub/p39
review  the    'read.me'  file
```

PC Server S/390 Home Page

Additional information and the latest 'news' is available from the PC Server S/390 "Home page". The Home Page for the PC Server S/390 is linked off the S/390 home page:
http://www.s390.ibm.com
From there, choose **Gateway** , then **Products and Services**, then **Hardware**
You may also be able to reach it directly via:
http://www.s390.ibm.com/products/p390/p390hp.html
This page will contain various kinds of information, such as performance reports and recent changes/enhancements to the P390 device managers. Other sites will be linked off of this page for easy access to updated code or announcements.

Online Discussions

The resources noted below are very informative and participants can be very helpful. These resources are, however, informal and "unofficial"; information from these sources should not be considered as formal IBM support or statements.

There is a **"PC500390 CFORUM"** available on IBM's **"TALKLINK** / **DIAL IBM"**. (IBM employees can access this CFORUM on either IBMPC or IBMVM conference disks.)

There is an Internet P/370 - P/390 Discussion group:
P370-L @ PUCC.PRINCETON.EDU
Send 'SUBSCRIBE' request to listserve@pucc.princeton.edu

Large Partitions - CHKDSK Problems

There is a known limitation in the current OS/2 CHKDSK program provided with Warp Server. This problem may appear in either of two ways:

1. CHKDSK takes a very long time to complete (45 - 60 minutes is not unusual).
2. CHKDSK fails or never completes

The problem is caused by the current CHKDSK only using memory below 16 megabytes. Since CHKDSK uses a form of in-memory 'bit-map' of the partition information, large partitions can effectively exceed this 16MB limitation, causing CHKDSK to fail. In general, our experience indicates the following results for different partition sizes:

01 - 10GB Generally no problem, although 8-10GB partitions may take up to 15 - 20 minutes to CHKDSK.

10 - 14GB Will usually complete successfully, but may take up to 60 minutes.

> 14GB Will frequently fail outright, or never complete.

Recommendations:

There are several circumventions available to avoid or minimize this problem.

Do not AUTOCHECK large partitions: The **IFS=** statement in the **CONFIG.SYS** will normally include an **AUTOCHECK** parameter. This parameter specifies which partitions should be CHKDSK'ed when restarting the system after a 'hard shutdown' (power failure, etc.). If you have large partitions, you may choose to remove them from the **AUTOCHECK** parameter to allow your system to restart quickly. If you do this, you should attempt to run CHKDSK against these partitions as soon as possible to check for possible file structure damage. The recommended way to do this is to add the appropriate CHKDSK statements to your **STARTUP.CMD** For example, to run CHKDSK against the D, E, and F partitions:

```
CHKDSK  D:  /C  /F
CHKDSK  E:  /C  /F
CHKDSK  F:  /C  /F
```

The /**C** parameter specifies that the CHKDSK command should only run if the partition is 'dirty'; that is, if the system was not shut down cleanly. The /**F** parameter tells CHKDSK to correct any file system structure errors it finds. Since the 'Boot' partition ('C') is normally a relatively small sise (200 - 300 MB), you should leave it in the Autocheck parameter so it can be checked and corrected prior to OS/2 startup.

Avoid Large Partitions: To be reasonably safe and ensure quick restarts after 'hard shutdowns', avoid defining any partition greater than about 10GB. This will allow fast AUTOCHECK processing on a restart. Partitions of up to 12GB are reasonable if the partitions are removed from the **AUTOCHECK** parameter (and CHKDSK is run 'manually' after a restart).

Other Comments

If it is very important to use large partitions for any reason, they can be defined and will work up to the 64GB limit of OS/2. The only limitation is that CHKDSK can not be run against these partitions. In the PC Server S/390 environment the inability to run CHKDSK is not usually a major exposure. This is true because the file structure of a typical P390 partition is relatively stable. Very few files are either allocated, extended, or erased during operation of the S/390 environment. Once the S/390 'volumes' are allocated, they are very static as far as the file 'structure' is concerned. Since the file structure is not changing, there is very little chance for it to be damaged during a hard shutdown. This does suggest that files which are frequently allocated, extended, or erased should not be placed on a large (>16GB) partition. For example, emulated tape files (AWSTAPE) or printer output files (AWS2821) should not be directed to large partitions. Also, any system with very large partitions should definitely have a UPS (Uninterruptable Power Supply) to protect the power supply to the system. If the system runs unattended, appropriate automated shutdown procedures should be in place to cause a clean system shutdown in case of an extended power outage. The APC (American Power Conversion) **PowerChute** software can be used to accomplish this and is provided as part of the **ServerGuide** package that comes with the PC Server 330.

PCI Slot Usage for P/390

One of the 'restrictions' for the PCI P/390 adapter is that it must be placed in PCI slots 3, 4, or 5 and the S/390 Parallel Channel Adapter should also be placed in one of these slots. This item will provide some additional information on this restriction.

The initial PCI bus design specified a maximum of three PCI slots. As use of the PCI bus grew, it quickly became apparent that three slots would not be sufficient for many systems, so a solution was devised. In effect, one of the three slots is used as a 'bridge' to another PCI bus, normally referred to as the 'Secondary PCI Bus'. This secondary bus is functionally equivalent to the primary PCI bus in most regards. There are, however, some considerations caused by this "bridged bus" design:

- Adapters on the primary bus will experience slightly better performance / throughput than those on the secondary bus. Therefore, adapters which cause large amounts of data transfer should use the primary bus. For example, the ServeRAID adapter should always be on the primary bus since it normally experiences the highest data transfer rates in the system.
- Due to timing characteristics, the PCI P/390 adapter must be installed in one of the secondary PCI bus slots (slots, 3, 4, 5).
- PCI Adapters that frequently transfer data between them should be placed on the same bus (primary or secondary). For example, the PCI P/390 adapter and the S/390 Parallel Channel Adapter should both be placed on the secondary PCI bus. (Note that, since the ServeRAID adapter should always be placed in slot 1 for performance reasons, the only way that the PCI P/390 adapter and one or two S/390 Parallel Channel Adapters could be placed on the same bus is to put them on the secondary bus.)

If a SSA RAID Adapter is installed, it should be on the primary PCI bus (slots 1 or 2) for best performance.

Note that the slot numbers (1 to 9) are numbered from the bottom of the system upward. Slot 1 is at the bottom of the system and slot 9 (EISA only) is the top adapter slot.

Checking and Resetting PCI Interrupts

(Added 05/13/1997)
In some configurations, the PC Server 330 will assign the same interrupt level to multiple PCI adapters. Many PCI adapters can use these **shared** interrupts with no problems, but attempting to use a shared interrupt on the P390 adapter will likely cause a problem. The specific symptom this sharing of an interrupt will cause is termed a "Pink-Hang": the system comes to a complete stop (hangs) and the P390 activity window is all "Pink". This symptom is intermittant and may not appear for several days at a time. If you have (or suspect you might have) this problem, follow the procedure below to check for shared interrupts and to reassign the interrupts to eliminate such sharing.

Checking For Shared Interrupts

Follow this procedure to check for a shared P390 interrupt.

1. Shutdown and power-off the system.
2. Remove the PC Server 330 cover and note what adapter cards are in what slots, especially the P390 adapter. (The P390 adapter will usually be in slot-3; the third one from the bottom.) Replace the cover.
3. From a completely powered off condition, power on the PC Server 330 As it is going through the Power On Self Test (POST), press the *F1* key to cause it to enter the *Configuration and Setup Utility*.
4. From the main menu of the Configuration and Setup Utility:

   Select **System Information** then
   Select **PCI Routing**

   You should now see a list of the integrated (planer) PCI adapters and adapters in PCI slots. For each adapter, there will be a notation of *is routed to IRQn*.
5. Check the "routing" for the slot where the P390 adapter is located (again, usually slot 3).
6. See if there are any other adapters/slots that are routed to this same interrupt (IRQ).

   If any other adapters/slots are routed to this same interrupt, then you need to change the default interrupt settings to halt the sharing of the P390 interrupt.
   If no other adapters/slots are routed to (share) this same interrupt then this system is not subject to the "Shared Interrupt Pink Hang". You can restart the system and resume normal operation.

Changing the PCI Interrupt Assignments

The first step in correctly resetting the Interrupt assignments is to determine the initial assignments of all interrupts. The following table is presented as an aid in this process. Reproduce it as necessary.

Table 1. Interrupt Summary Table		
Interrupt #	**Type (EISA/PCI)**	**Assigned use**
0	Fixed	System Timer
1	Fixed	Keyboard
2	Fixed	Redirected to high INTs
3	Fixed	COM2
4	Fixed	COM1
5		
6	Fixed	Floppy Disk
7	Fixed	LPT1 (printer)
8	Fixed	Realtime Clock
9		
10		
11		
12	Fixed	Mouse
13	Fixed	Coprocessor
14		
15		

The Interrupts marked as **Fixed** are standardized and pre-assigned interrupts. These should not be changed unless you understand **exactly and completely** what you are doing. (The COM2 interrupt is the one which could most easily and reasonably be reassigned to something else.)

Your first step is to fill in the blank entries in the table based on your system. To do this:

1. From a powered-off mode, place the *"EISA Configuration Diskette"* in the diskette drive and power the system on.
2. When the system boots the diskette, reply 'Y' (yes) to continue into the configuration utility.
3. From the Primary Menu, select *"Step 3: View or edit details"* .
4. From the "View or Edit details" screen, press **F7** for *"Advanced"*
5. From the "Advanced Menu" popup, select: *"View Additional System Information Menu"*
6. From the "View Additional System Information Menu" popup, select *"Used Resources"*
7. The first screen of the "Used Resources" will be a list of all of the Interrupts which could possibly be reassigned.
8. Now, use this information to complete the table above.

In the list of used resources, 'imbedded' devices are the 'integrated' controllers, such as the integrated SCSI controller and the integrated Ethernet adapter.

At this point, you will find one of three possible conditions:

1. There is an interrupt unused and available
2. There are no unused interrupts, but a embedded/integrated device or a 'Fixed' device can be disabled and the interrupt reassigned.
3. Not enough interrupts can be freed up by the above process, and some sharing of interrups between PCI adapters is required.

A Interrupt is Available: If you have a lightly configured system, an interrupt may be available (unassigned). If so, make a note of which interrupt is available and proceed to “Reassigning the P390 Adapter Interrupt” on page 15.

Can reassign a fixed or integrated Interrupt: On some systems, one or more of the integrated adapters may not be required. For example, if the system is used in a Token Ring LAN environment, the Ethernet LAN adapter is probably not required. If so, the Ethernet adapter can be disabled (via jumper) and the interrupt normally assigned to it can be reassigned. Other possibliities are the Integrated SCSI controller (careful..., the DAT tape and CDROM are normally controlled by this controller), and the COM2 or COM1 communications ports. You must make sure these 'devices' are not being used before disabling the device and reusing the interrupt. If you need help in this process, contact your reseller or the PC Server Support Desk. Once you have made an interrupt available, proceed to “Reassigning the P390 Adapter Interrupt” on page 15.

Must share Interrupts on other PCI devices: If the above actions do not result in enough available interrupts, you may be able to force the sharing of an interrupt between two PCI devices which do support interrupt sharing. To do this you will need to find out which of your PCI adapters do support or allow shared interrupts. You will probably need to contact your reseller or the PC Server Support Desk for assistance in this process.

Reassigning the P390 Adapter Interrupt

Once you have identified or 'created' an available interrupt for the P390 Processor adapter, you will need to change the configuration of your system to 'force' the P390 Adapter to use that interrupt.

1. From a powered off condition, power on the PC Server 330 As it is going through the Power On Self Test (POST), press the *F1* key to cause it to enter the *Configuration and Setup Utility*.
2. From the main menu of the Configuration and Setup Utility:

   Select **Advanced Setup** then
   Select **PCI Bus Control** then
   Select **PCI Interrupt Requests** then
   Select **PCI Bus Control**

   You should now see a list of the PCI devices and which interrupt they are assigned. Most, if not all, of the devices will have **Automatic** assignment of interrupts, indicating that the system will automatically assign an interrupt to that device. The P390 Adapter is probably set for 'Automatic'. Using the right and left cursor keys, change this to the interrupt you have identified or made available. Once it is changed, exit from the setup utility, making sure you *Save Settings* before exiting from the main menu screen.

It is possible that the automatic assignment of interrupts could still cause a shared condition. To check, repeat the steps in “Checking For Shared Interrupts” on page 13 to make sure the P390 Adapter has it's own, unshared, interrupt. In some cases, it may be necessary to set all PCI adapter interrupts 'manually' (not allow the 'automatic' assignment to be used). This should probably be considered a 'last resort' however.

SCSI Configuration and Cabling

Updated 05/13/1997

For best performance and capacity, we generally recommend that the ServeRAID RAID adapter be used solely to control the disk drives and the Integrated SCSI controller be used to control the CDROM drive and 4mm DAT tape unit. Since this is not the standard or default configuration for a PC Server 330, this topic will provide some additional information on how to accomplish this configuration as well as some related suggestions.

CDROM and DAT Configuration

The CDROM and 4mm DAT drive should be connected to the integrated Ultra-SCSI controller on the system board. There are two ways to accomplish this:

Using a 4-Drop SCSI F/W Internal Cable:

A 4-Drop F/W SCSI cable (60H7826) can be used to connect the CDROM and 4mm DAT to the internal port of the integrated SCSI conroller. Follow these steps:

1. Remove the "Backplane to CDROM" cable (it will not be needed any more)
2. Change the dip-switch or jumper settings on the CDROM to set it as non-terminating. (Termination will be provided by the terminator installed in the next step.)
3. Plug in the 4-drop F/W SCSI cable into the integrated SCSI controller, then the 4mm CDROM drive, then the DAT. Then plug a 16-bit active terminator (part number 94G7587) into the last connector of the 4-drop cable. Terminating the 4-drop cable in this manner provides proper termination of all 16 signal lines, rather than the 8 bit termination provided by the DAT or CDROM.

Reusing the Supplied Cable:

If a 4-Drop cable and 16 bit terminator is not available, another way is to 're-use' one of the SCSI cables which comes with the system. A standard system (8640-ESS or -ES2) will have a cable connecting the bottom of the HotSwap backplane to the CDROM drive, with two additional, unused, connectors. To re-use this cable, follow these steps:

1. Disconnect the cable from the lower backplane connector and from the CDROM drive.
2. Remove the rubber/plastic end cap from the last connector and remove the terminator from that connector. (Save the terminator; it may come in handy later.)
3. When installing the 4mm DAT drive, plug it as terminating the SCSI bus.
4. Change the jumpers on the CDROM from terminating to non-terminating.
5. Take the connector that was on the CDROM (68-pin) and plug it into the internal port/connector of the integrated SCSI controller.

6. Take the next 68-pin connector and plug it into the CDROM drive (via the 68-50 pin converter).
7. Plug the last 68-pin connector of the cable into the 4mm DAT (via the 68-50 pin converter that comes with the DAT drive).
8. The connector which was plugged into the backplane (the "mini-centronics" style connector) is left unconnected.)

On some systems, the cable length between the CDROM and DAT connectors may not be quite long enough. If this happens, use the 4-drop cable approach or:

1. Disconnect and unplug the DAT and diskette drive.
2. Remove the mounting cage for the DAT and diskette drive.
3. Swap mounting positions for the DAT and diskette drive, placing the DAT in the upper part of the cage.
4. Reassemble the cage and reconnect the cables. With the DAT in the top of the cage, the cable should be long enough to reach it now.

Recommendation:

If the 4-Drop SCSI cable (60H7826) is available, we recommend it's use (with the 16 bit active terminator, 94G7587). If the 4-drop cable is not available and the system will **only** use the integrated SCSI to control the CDROM and 4mm DAT unit, reusing the supplied cable should be satisfactory. For configurations which will have an external SCSI device, the 4-drop cable approach **must** be used. If the supplied cable is reused and the system experiences intermittant SCSI errors:

Check and verify the DAT tape is terminated properly
Replace the supplied cable with a 4-drop SCSI F/W cable as described above.

Using the SCSI External Connector

The integrated SCSI controller has two connectors on the systemboard. One of these can be used to connect an external SCSI device to the SCSI controller. A short 'jumper' cable is included with each PC Server 330 (in a plastic bag of parts) that will allow use of this external port. Simply remove the "knock-out plug" from the back of the system unit and install the jumper cable to the knock-out area from the SCSI controller's external port.

Alternatively, the knock-out plug can be used to provide a second external ServeRAID channel. For this purpose, use a "Bulkhead Cable" (part 76H2675) to cable from the third connector of the ServeRAID adapter to the knock-out plug.

Note:

There is only one knock-out plug. Either the ServeRAID or the integrated SCSI controller can use it for an external connection at a time, but not both.

Note:

If any devices are connected to the internal connector of the integrated SCSI controller (both the CDROM and DAT will normally be connected here), a maximum of only **one** SCSI device can be connected to the external port of the integrated SCSI controller.

If is necessary to connect multiple SCSI devices (tapes) to the external connector of the integrated SCSI adapter, one method is to reconnect the supplied cable so that the DAT and CDROM are daisy-chained off the RAID backplane. If this is done and there are six hard drives installed in the system unit backplane, the backplane must be jumpered so that the disk drives use the 'high SCSI' addresses (08 - 15). See the *PC Server 330 Users's Handbook* for information on doing this. *Note:* This configuration (daisy chain DAT and CDROM off the ServeRAID adapter via the Backplane) should only be used when the 4mm DAT tape unit is **not** going to be used as a S/390 device. The SCSI34x0 device managers do not currently support the use of the ServeRAID adapter to control the 4mm DAT tape.

Recommended Install/Setup Diskettes

(Updated 5/15/1997)
There are a number of files and diskettes images which you should use in setting up or installing a PC Server S/390. We also recommend that a set of diskettes be available at each installed location in case some or all of the components need to be re-installed or changed.

These files can be obtained from the following sources:

IBM PC Company Web Pages, file download area
IBM S/390 Division ftp site
Adaptec Inc. Web site, service & support.

For full information about accessing these sites, see “Material Available Electronically” on page 9.

P390 Diskettes

Each P390 PCI Adapter should come with a set of P390 diskettes. There are currently six "Program Diskettes" and one "Diagnostic" diskette. As fixes are made available, individual fixes may be made available at the ftp site. When complete 'Fix-Packs' are released, they will generally be available from the ftp site and from the IBM PC Company files ares (under "OS/2 Drivers").

SCSI and RAID drivers

The requirement for new RAID and SCSI drivers is documented in “Required SCSI and RAID Drivers” on page 7. You **must** use an **AIC7870.ADD** dated May, 1996 or later. You should use an **IPSRAID.ADD** from a current (Version 2) level of the ServeRAID utility diskette (see below).

Suggested Diskettes

Here is a complete list, as of publication of this document, of what diskettes and files you should have available when setting up a PC Server S/390 'from scratch'. Note that this does NOT include additional drivers or diskettes for other adapters or options, but only for the basic PC Server S/390. Some of these diskettes will ship with the PC Server 330 itself, but you should verify the shipped diskettes are at the current/latest level. Except for the P390 Diskettes and the Warp Server Install

diskettes all these are available in diskette image format via download from the PC Company file download site.

P390 Diskettes: As described above, currently at Version 2.3.2

Warp Server Installation Diskettes: The "Diskette 1" must be modified with the RAID and SCSI drivers as noted in “Required SCSI and RAID Drivers” on page 7.

PC Server 330 BIOS Update, V 31A: This diskette is used to update the PC Server 330 BIOS to the latest level (4/9/1997).

PC Server 330 EISA Configuration Diskette, V 6.00: Latest version of the configuration diskette for EISA slots/adapters.

PC Server 330 Diagnostic Disk, V 5.45: Updated version of the PC Server S/390 Diagnostic and test routines.

PC Server 330 Utilities V 1.1: Some SCSI and general utilities for the PC Server S/390. Not always needed, but good to have available.

ServeRAID BIOS Firmware Update, V 2.01: Use this diskette to upgrade the ServeRAID BIOS level (04/25/1997).

ServeRAID Driver and Utility Disk, V 2.00: This diskette has the latest IPSRAID.ADD and the latest RAID Administration program (IPSRADM.EXE).

ServeRAID Configuration Diskette, V2.00: Bootable Confituration Diskette for defining and initilaizing the RAID Arrays and Logical drives.

PC Server 330 OS/2 Video Disk, V 1.12: Updated Cirrus drivers and install procedure to allow SVGA operation.

PC Server 330 Ethernet MPTS Drivers, V 3.10: This is the first diskette of a three diskette set. (The other diskettes are for other operating systems or environments.) This diskette is required if the integrated Ethernet Adapter is to be used.

PC Server 330 7800 UltraWide SCSI support: This diskette includes an AIC7870.ADD that can be used and it has other, possibly useful, information about installing and using the Adaptec driver. (Other, more current, versions of AIC7870.ADD are available from the Adaptec Web pages.)

Obtaining Dial-In Access

Many customers have asked how to configure the PC Server S/390 to support dial-in access via phone lines. Typical uses would include 'work-at-home', mobile users, and off-site demo capabilities. While there are a number of ways to accomplish the dial-in objective, most users will also want full LAN connectivity to allow access to other resources on the LAN which the PC Server S/390 is

connected to. IBM offers two types of products to accomplish this full dial-in LAN connection while allowing 3270 emulation access to the PC Server S/390. Both solutions also allow full-function LAN access (such as file and print serving) as well as the 3270 access.

1. LAN Distance is primarily a 'software' solution that can run on the PC Server S/390 or any other suitable system on the LAN. LAN Distance is provided as a component of the WARP Server product.
2. The 8235/DIALs product is primarily a 'hardware' solution that attaches to the LAN with little or no impact on the PC Server S/390 or other systems on the LAN.

Both products have corresponding programs that run in the remote workstations to provide the dial-in and connection capabilities. A more detailed description of each product and the specific hardware and software products required follows.

LAN Distance

The LAN Distance Server component runs on the PC Server S/390 or other suitable PC on the LAN. Remote users dial into modems connected to either the standard PC serial ports or to multi-port adapters such as the 'Artic Multiport/2'. It provides extensive security protection and supports all popular communication protocols and connectivities. Once connected to the LAN Distance server, remote users have all the facilities of the LAN, as though locally connected to the LAN (except, of course, for the difference in communication speeds). Many different configurations are possible, with up to 128 concurrent users. Each remote user must also install and use a copy of LAN Distance Remote, at a cost of $69. per remote workstation. LAN Distance Remote is available for OS/2 and Windows 3.1 users.

If you plan to run the LAN Distance Server on a PC Server S/390, we recommend using a separate LAN Adapter port for LAN Distance. A Dual or triple-ported LAN adapter works well for this purpose.

Since the LAN Distance Server component is included with the Warp Server product, there is very little expense required to configure a LAN Distance facility.

Minimal Configuration:

For users who only need one or two dial in ports, LAN Distance can be configured to use the standard COM1 and COM2 Async ports which come standard on the PC Server S/390 Using this approach, the only expense to implement a dial-in system is the modems at the PC Server S/390.

8235 'Dial In Access to Lans' (DIALs)

The 8235 product offers a independent unit that has it's own built-in LAN adapter connection and supports either internal or external modems for remote users to dial into. A full range of security features are available, including support for dialback and a TACAS client for DCE Kerberos users. Once connected to the 8235, remote users have full use of the LAN environment which the 8235 is a part of. A Wide range of configurations are possible, for both Ethernet and Token Ring LANs, supporting many different protocols and connection methods. Using the internal modems, multiple 8235 units can be stacked together, providing a very compact installation.

Each remote user must also install and use a copy of the DIALs remote client program. There is no charge for using as many copies of the client program as needed. Remote users connect to the host network and work in their OS/2, Windows, Windows 95, DOS, Macintosh, or UNIX environment with no retraining or changes to their applications

In addition...

Both products offer multiple other features and capabilities, such as WAN and inter-LAN connections, Dial-out, remote administration, and choice of protocols (IPX, TCP/IP, SNA, X.25, NetBIOS, 802.2, NetBEUI). Since these products supply only the 'connection services', each remote workstation must have it's own application programs such as:

1. Communications Manager/2 for 3270 connection/emulation for OS/2
2. PC/3270 for 3270 connection/emulation for DOS/Windows
3. LAN Requestor to be a user/requestor on a LAN Server network

Connecting Via SLIP

Another way to get 3270 dial connection to your PC Server S/390 without any additional equipment (other than modems) is to use the OS/2 TCP/IP SLIP support together with LAN3274's TN3270 datastream support.

This document cannot provide full details, but in general:

1. Configure the PC Server S/390 with 3270 sessions using LAN3274 (Specify "/PORT=7490" on the **dmstart aws3274** in **IPL.CMD**
2. IPL the 390 system and vary on/enable the 3270 address(es).
3. Enable the SLIP line by issueing the following 2 commands from an OS/2 window.

   compact

   MODE COM3:19200

   SLIP -COM3 -connect "ATANS.CMD"
4. Configure a SLIP connection on the client TCP/IP workstation
5. Dial/Connect from the client to the PC Server S/390, establishing the SLIP connection.
6. Open a TN3270 window and connect to the host, specifying port 7490.
7. The PC Server S/390 S/390 Logo should appear.

Check the **LAN3274.DOC** file for additional information.

Optimizing Performance

There are many aspects to configuring and tuning PC Server S/390 systems to provide optimun performance. This item will attempt to address some of these considerations.

PC Memory and OS/2 Cache

One of the best ways to speed up I/O access performance is to keep the data in memory, rather than on disk. The best place to keep the data is in S/390 memory, avoiding any kind of I/O operation. Once this has been done, the next best place to have the data is in OS/2 memory; specifically in the OS/2 disk cache.

Using the HPFS386 file system, you can define large OS/2 cache sizes. (Without HPFS386 the largest OS/2 cache size available is two megabytes.) The HPFS386 cache size is specified in the **HPFS386.INI** file in the IBM386FS directory. The parameters in this file are explained within the file, but the primary ones of interest for this discussion are CACHSIZE and USEALLMEM.

To provide best performance, the maximum possible amount of PC memory should be allocated to the HPFS386 Cache. To determine the maximum memory available, use the following guidelines:

Assume OS/2 requires a minimum of 20MB to run effectively. So, on a base 32MB system, allocate a maximum of 12MB to the HPFS386 cache.
Out of each additional 32MB memory increment, allocate 24MB for the cache, and leave 8MB for OS/2.
If any other *non-S/390 related* workloads are to be run on the OS/2 system, provide enough PC memory to allow that workload to run without causing swapping.

So, on a system with 96MB of PC memory (and no non-S/390 workload), allocate 60MB to the cache (12 + 24 + 24), leaving 36MB to OS/2.

Recommendations: Since the PC Server S/390 comes with 32MB of PC memory as a base, most systems will benefit from an additional 32MB, allowing a 36MB cache size. Systems which will be subjected to high I/O workloads will probably benefit from a large, 60MB, cache, so they should be configured with 96MB of PC memory. We do not expect to see significant benefit for cache sizes beyond 60MB for most workloads.

PC Server S/390 Array considerations

Array stripe unit size

On in the disk arrays of the PC Server S/390, the customer sets the stripe unit size (amount of data written on a given disk before writing on the next disk). The default stripe unit size is 8K. Choices are 8K, 16K, 32K, and 64K. Sizes larger than 8K will probably yield better performance for S/390 workloads than the default 8K.

Also consider the I/O characteristics of any other OS/2 applications that you may run concurrently on the PC Server S/390 when choosing a stripe unit size. For example, larger stripe sizes may not be the best performing choice for LAN file serving workloads. A compromise between larger and smaller stripe sizes might be appropriate depending on the overall system I/O characteristics.

Warning: Once the stripe unit is chosen and data is stored in the logical drives, the stripe unit cannot be changed without destroying data in the logical drives.

Write Policy

There are two choices for write policy with the ServeRAID adapter. The default write policy is *write-through* (WT), where the completion status is sent *after* the data is written to the hard disk drive.

To improve performance, you can change this write policy to *write-back* (WB), where the completion status is sent *after* the data is copied to the RAID adapter's cache memory, but *before* the data is actually written to the storage device. There is 4MB of cache memory of which more than 3MB are available for caching data.

Warning: If you use lose power before the data is actually written to the storage device, data in cache memory is lost. See also section “LAZY writes” on page 24 for related information.

You can achieve a performance improvement by using WB, but you run a far greater risk of data loss in the event of a power loss than if you use WT. An uninterruptible power supply (UPS) can help minimize this risk and is highly recommended for this reason and for the other power protection benefits it supplies as well.

OS/2 CONFIG.SYS tuning

MAXWAIT

MAXWAIT in CONFIG.SYS defines the number of seconds that an OS/2 thread waits before being assigned a higher dispatching priority. Applications that are I/O intensive could benefit from setting **MAXWAIT=1** in CONFIG.SYS. Since the S/390 operating system running on the PC Server S/390 is likely to be I/O intensive, setting **MAXWAIT=1** is generally recommended on the PC Server S/390. The valid ranges for MAXWAIT are 1 to 255. The OS/2 default is 3 seconds. Tuning this setting may only show results when there is other OS/2 work being performed in addition to the S/390 workload.

FAT DISKCACHE

If your PC Server S/390 has no FAT formatted partitions, then the **DISKCACHE=** device driver can be commented out (REM) of the PC Server S/390's CONFIG.SYS in order to save some memory. By default, OS/2 places this device driver in CONFIG.SYS. The size of the DISKCACHE may be tuned. Enter *HELP DISKCACHE* for information on the parameters that may be specified on DISKCACHE.

Priority_disk_IO

This command in the CONFIG.SYS file controls whether or not an application running in the foreground of the OS/2 desktop receives priority for its disk accesses over an application running in the background. Because the S/390 operating system is probably serving multiple clients accessing the system over LAN or other communication methods, you would not want users of the S/390 operating system to receive secondary access for the S/390 I/Os in the event someone opens an OS/2 application or window in the foreground.

Specifying **PRIORITY_DISK_IO=NO** is recommended. NO specifies that all applications (foreground and background) are to be treated equally with regard to disk access. The default is YES. YES specifies that applications running in the

foreground are to receive priority for disk access over applications running in the background.

OS/2 HPFS CACHE

Base OS/2 system HPFS Cache size

The HPFS.IFS device driver delivered with the base Warp Server (not Advanced) has a maximum cache size of 2048K (2 Megabytes). The /**CACHE:nnnn** parameter of the IFS device driver specifies the size of the cache. The default is 10% of available RAM (if not specified) with a maximum of 2048K. The specified value after an install of OS/2 is dependent on installed RAM at the time of installation. If you are using the standard OS/2 provided IFS device driver, then specifying /**CACHE:2048** is highly recommended. Enter *HELP HPFS.IFS* at the OS/2 command prompt for further explanation of the parameters.

/CRECL on IFS HPFS cache

The /**CRECL** parameter of the HPFS IFS driver allows you to specify the size of the largest record eligible for this cache. The OS/2 default is 4K. From a S/390 perspective, increasing this value may increase cache read hits if the S/390 operating system is performing repetitive I/Os of the same data in blocks bigger than the default 4K. You can use performance analysis tools for each S/390 operating system to understand the characteristics of I/Os that are being performed by the S/390 operating system and applications. Most S/390 workloads will benefit from a CRECL value of 64 (64K). If the PC Server S/390 is using CKD disk emulation, CRECL should definitely be set to 64(k) since the AWSCKD device manager reads and writes a full track (49K) of data at a time.

Enter *HELP HPFS.IFS* at the OS/2 command prompt for further explanation of the parameters.

LAZY writes

Lazy writes are defaulted to ON with OS/2's HPFS. If lazy writes are enabled then when a write occurs for a block of data that is eligible for the HPFS cache, the application is given completion status *before* the data is actually written to the hard drive. The data is actually written to the hard drive during idle time or when the maximum age for the data is reached. Lazy writes are a **significant** performance enhancement.

Warning: There is a risk to the data in the event of a OS/2 software failure or power loss before the data is written from the cache to the hard drive. See section “Write Policy” on page 23 for related information. You can control whether lazy writes are enabled or not with the OS/2 CACHE command (or the CACHE386 command if using HPFS386) as well as maximum age and idle times for the disk and cache buffers. Enter *HELP CACHE* at the OS/2 command prompt for further information. (Enter *CACHE386 ?* for help with CACHE386.)

DASD device drivers

Functional differences

The AWSCKD device driver has some functional differences when compared with the AWSFBA device driver. The AWSCKD device driver reads and writes a full track when an I/O is performed. The device driver has an internal cache where the track is kept until it must be flushed. As the AWSFBA device driver does not implement an internal cache, the performance characteristics between the two can be different depending upon the I/O workload. VM/ESA ESA Feature's block paging methodology seemed to benefit from the internal cache of the AWSCKD device driver in controlled laboratory experiments. You should consider using 3380 volumes for VM/ESA ESA Feature paging volumes for this reason.

You should not generalize this observation into a statement that AWSCKD performs better than AWSFBA. In fact, AWSFBA dasd volumes performed extremely well in laboratory experiments and offer some benefits over AWSCKD including finer granularity on OS/2 file allocation sizes and a close mapping to the underlying sectors of the dasd media. VM/ESA and VSE/ESA utilize FBA dasd in a very efficient manner. The flexibility of the PC Server S/390 in supporting both CKD and FBA emulated volumes in a mixture allows you to easily have both types in your configuration.

TCP/IP Configuration Information

Note:

Casual readers beware! This topic of the Hints and Tips is intended for the more technical readers who are familiar with LAN terminology and technologies.

Judging from the number of outside questions we are receiving, some elaboration about TCP/IP, LCS3172, and Ethernet seems appropriate. While the primary thrust here is Ethernet, some Token Ring considerations are also provided.

For the purposes of this discussion, one doesn't need to differentiate between VM and MVS since both are configured in a similar manner.

LCS3172 (the 3172 TCP/IP manager) links HOST (VM/ESA, VSE/ESA, MVS/ESA, or OS/390) TCP/IP software to OS/2 LAN software (LAPS (LAN Adapter and Protocol Support) or the LAPS component of MPTS (Multi-Protocol Transport Services)). There are two interfaces (HOST and LAPS) involved. Each interface must be configured to be consistent with the other. The LAPS configuration must also be consistent, at the Ethernet IP frame level, with the LAPS configuration of workstations you need to communicate with.

Fortunately, there are only a couple of parameters to configure, at least with regard to aspects of the configuration governing the behavior of LCS3172 and LAPS.

The LAPS configuration ...

One of the differences between LCS3172 and a 3172 is that LCS3172 uses LAPS (or the LAPS component of MTPS) to interface with the Ethernet adapter, whereas the original 8232/3172 interfaced directly to an Ethernet device driver.

Modern versions of LAPS use NDIS (Network Device Interface Specification) to interface to an NDIS Ethernet driver (usually supplied by the Ethernet adapter manufacturer). The LAPS application interface to which LCS3172 is written is independent of the underlying network, whether it be Ethernet, Token Ring, FDDI, etc. The LAN independent nature of the LAPS interface has the following four implications for users of the PC Server S/390:

1. Any network specific knowledge must be imparted directly to LAPS by LAPS (since, by definition, it cannot come from LCS3172).

   The LAPS parameter which you need to be most concerned about is what frame format (DIX or IEEE 802.3) to use on your Ethernet. The frame format is set when selecting the "type of Ethernet driver support" parameter in the "IBM IEEE 802.2" protocol section of the LAPS adapter configuration.

   Much of the IEEE 802.X standard was underwitten by IBM, so most IBM software, including LAPS, defaults to the IEEE 802.3 ("I") setting. Most users, however, use the alternative standard, "DIX". You should always start your problem resolution by changing the parameter to "D" (for DIX).

   Contributing to the confusion is the fact that Novell LAN administrators are used to seeing 802.3 in Novell configuration files. But, this is used in the context of **tolerating** the IEEE 802.3 frames as opposed to **operating** in the IEEE 802.3 frame format. This has been at the root of more than one customer's insistence that they absolutely, positively were running an IEEE 802.3 Ethernet network when they weren't.

   Instances where you can observe traffic is flowing (via lights or via the LCS3172 watch window) yet nothing answers pings (and sometimes snifters cannot see any frames) are almost always due to this parameter being set incorrectly to "I" (IEEE 802.3).

   Although other things like duplicate IP addresses can cause similar problems, you should change this parameter to "D" before changing or adjusting any other parameter. Only if you are very, very sure you know what you are doing, should you change "type of Ethernet driver support" to "I" (IEEE 802.3) (or accept the default).

   Token Ring does not have a similiar problem because there is only one frame format standard (IEEE 802.5).

2. Certain aspects of Ethernet frames and frame sizes must be considered. The LAPS application interface is designed to handle frames for any type of network. In practical terms, this means that the interface is essentially in Token Ring (IEEE 802.5) format. In other words, an interface able to handle a Token Ring frame can handle an Ethernet frame (but not the other way around).

The original 8232/3172 Ethernet used a device driver written for the only Ethernet adapter then available. Also, the HOST TCP/IP code, when configured for Ethernet, formatted frames in exactly the format required by that Ethernet adapter device driver.

With LCS3172, Ethernet frames are accepted from the HOST in Ethernet format, are mapped to LAPS (Token Ring) format, and passed to LAPS for transmission. This mapping adds a SNAP DLC header and usually reduces the maximum length of a frame that could otherwise have been transmitted. Also, different NDIS driver implementations may calculate the maximum Ethernet frame size differently. The worst case combination of these two reductions has not yet exceeded eight bytes.

So, if you would ordinarily specify 1500 bytes in the HOST TCP/IP configuration file, reduce it to 1492 bytes and run LCS3172 with the watch text window (change "AWSSTART LCS3172.EXE N" to "AWSSTART LCS3172.EXE T" in IPL.CMD). As long as there are no "(XSIDE ERROR) DIR.TRANSMIT.FRAME INVALIDLENGTH" errors reported, then the value for maximum frame size is acceptable.

Again, Token Ring users will not be subject to a difference in maximum frame size, since the frames sent from the HOST TCP/IP are in exactly the format required by LAPS for transmission.

Users of the LAN Streamer Token Ring adapters may notice HOST TCP/IP messages concerning rejection of frames with a route length field exceeding 18 bytes. The routing field length might be a problem only on networks on which a frame could pass through more than eight bridges. This is because previous Token Ring (shared memory) adapters were limited to an 18 byte routing field. But, Streamers are able to handle routing fields to the architected length (which is more than 18 bytes). Since later 3172 models allow LAN Streamer Token Ring adapters and would presumably receive these frames as well, a fix for HOST TCP/IP may be required.

3. To run TCP/IP for OS/2 concurrently with LCS3172, then you will need two different LAN adapters (or one of the dual LAN adapters). The usual LCS3172 conflict is with TCP/IP for OS/2 which has the same IP layer requirement (and the same need for the LAPS DIRECT interface). Since both LCS3172 and TCP/IP work at the Ethernet IP layer, both of them must use the LAPS DIRECT interface. The LAPS DIRECT interface can be considered a special (SAP=0) case of the general LAPS 802.2 DLC interface. A Service Access Point (SAP) is the mechanism by which different OS/2 applications share the same LAN adapter. Since the SAP is the sharing mechanism, it follows that only one OS/2 application can have the same SAP open at a time. Specifically, only one OS/2 application can use the LAPS DIRECT (SAP=0) interface at a time.

   IBM Token Ring users may also note a conflict with TRMON (an IBM internal Token Ring monitor utility) which also uses the LAPS Direct interface.

4. LCS3172 can be used with any LAN adapter for which there is an OS/2 LAPS NDIS compliant driver available.

The HOST (VM and/or MVS) configuration

There are several choices possible on the HOST TCP/IP LINK statement. The best advice is to keep it simple. Always specify ETHERNET. If you really, really want to use IEEE 802.3 Ethernet, then let LAPS handle the conversion for you by spcecifying "I" (IEEE 802.3) as the value for the LAPS "type of Ethernet driver support" parameter. This way:

Ethernet (DIX) frame formats are passed between HOST and LCS3172

LCS3172 and LAPS exchange the frames in the LAPS network independent format

LAPS presents/interprets Ethernet frames according to how LAPS is configured.

The Bottom Line

The bottom line for LCS3172 and Ethernet problem determination is to:

1. Change the LAPS default value for "type of Ethernet driver support" from "I" to "D"
2. Code ETHERNET in the HOST TCP/IP LINK statement and use 1492 as the maximum frame value on all of the HOST TCP/IP statements that require it in reference to that Ethernet link. Naturally, if your Ethernet topology limits you to a value smaller than 1492, then code that smaller value.
3. If there are still problems, you should then go ahead and try the easy fix and change the LAPS "type of Ethernet driver support" parameter to "I". Although this is unlikely to correct your problems, it is an easy change to make and test.
4. If there are still problems, insure the LAPS "type of Ethernet driver support" parameter is set to "D" and turn your attention away from LCS3172 and LAPS. Then focus on your Ethernet topology (ie., away from the HARDWARE definition section of the HOST TCP/IP configuration file and towards the HOME and GATEWAY sections of the HOST TCP/IP configuration file).

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