

*OpenVMS System Troubleshooting
for System Managers*

Instructor Lab Guide

Training



COMPAQ

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OpenVMS System Troubleshooting for System Managers

Instructor Lab Guide

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OpenVMS System Troubleshooting for System Managers Lab Guide

About This Guide

Introduction

This lab guide contains the setup instructions and methodology for all of the laboratory exercises in the OpenVMS System Troubleshooting for System Managers Course.

CRASH1_PROGRAM.EXE for Alpha

Several of the laboratory exercises require you to crash the system. You will need to create the program CRASH1_PROGRAM.EXE for this purpose.

In the following program example the lines between and including ;++ to ;-- are comments.

Type the lines following ;-- into a file named CRASH1_PROGRAM.MAS:

```
;++
;   CRASH1_PROGRAM.MAR
;
;   ABSTRACT:
;
;   Any error in kernel mode causes the system to crash. In this
;   case, the program simply accesses address 20, to which the
;   program has no access.
;
;   SIDE EFFECTS:
;
;   The system crashes!!
;
;   PROGRAMMER:
;
;   Vik Muiznieks      21-MAY-1980
;
;--

.entry      start,^m<>
$cmkrm1_s -
    routin=doit          ; run routine in kernel mode
ret

.entry      doit,^m<>
movl #20,r0              ; place bad address in R0
movl #48,r1              ; store dummy values
movl #64,r2              ; to see on BUGCHECK
movl #80,r8              ; output
movl (r0),r8             ; this instruction will crash
```

```
                                ; the system
movl #ss$_normal,r0           ; return success, but we never
ret                            ; get here
```

```
.end start
```

Then create an executable file called CRASH1_PROGRAM.EXE, as follows:

```
$ MACRO CRASH1_PROGRAM.MAS
```

```
$ LINK CRASH1_PROGRAM
```

This should produce the following files.

```
CRASH1_PROGRAM.EXE;2          CRASH1_PROGRAM.MAS;1
```

```
CRASH1_PROGRAM.OBJ;2
```

To crash the system:

```
$ RUN CRASH1_PROGRAM
```

CRASH1_PROGRAM.EXE for VAX

```
;++
; CRASH1_PROGRAM.MAS
; ABSTRACT:
;
;Any error in kernel mode causes the system to crash. In this
;case, the program simply accesses address 20, to which the
;program has no access.
;
; SIDE EFFECTS:
;
;The system crashes!!
;
; PROGRAMMER:
;
;Vik MuiznieksMAY-21-1980
;
;--
;
;Program entry point
;
START:.WORD0; null entry mask
$CMKRNLS_ROUTIN=10$; enter kernel mode
RET; will never get here
10$:.WORD^M<R2,R8>; save two registers
MOVZBL#20,R0; place bad address in R0
MOVZBL#48,R1; store dummy values
MOVZBL#64,R2; to see on BUGCHECK
MOVZBL#80,R8; output
MOVL(R0),R8; this instruction should
; crash the system
MOVZWL#SS$_NORMAL,R0; if get here, return success
RET; code
.ENDSTART
```

Then create an executable file called CRASH1_PROGRAM.EXE, as follows:

```
$ MACRO CRASH1_PROGRAM.MAS
```

```
$ LINK CRASH1_PROGRAM
```

This should produce the following files.

```
CRASH1_PROGRAM.EXE;2      CRASH1_PROGRAM.MAS;1
```

```
CRASH1_PROGRAM.OBJ;2
```

To crash the system:

```
$ RUN CRASH1_PROGRAM
```

Dependable Systems Overview

Written Exercise for Dependable Systems Overview

In the space provided, write the letter corresponding with the best answer to each of the following multiple-choice questions.

1. Disaster-tolerant computing systems are characterized by the requirement that they provide:
 - a. For infrequent interruptions of service
 - b. Service during nonbusiness hours
 - c. Redundant hardware, software, and database configurations separated geographically
 - d. More than one cluster
2. Which of the following does **not** increase the mean time between failure of a given hardware component?
 - a. Providing redundant components
 - b. Correct maintenance
 - c. Using quality hardware
 - d. Providing correct environmental conditions
3. Which of the following questions can help you define a system problem?
 - a. Has this problem happened before?
 - b. Has this device ever worked?
 - c. When was the last time the device worked correctly?
 - d. All of the above
4. The result of a system nonfatal bugcheck is:
 - a. System dump
 - b. Error log entry
 - c. Orderly shutdown
 - d. System crash

5. If there is no SYSDUMP.DMP file on the system disk when a fatal bugcheck occurs, OpenVMS:
 - a. Writes the dump file on the default disk
 - b. Does not write a dump file
 - c. Writes the dump file to the paging file in SYS\$SYSTEM
 - d. Sets the systems parameter DUMPBUG
6. Select the correct minimum size for a system dump file on a system where:
Memory= 16 MB or 32,768 pages; ERRORLOGBUFFERS= 6,
DUMPSTYLE=0; ERLBUFFERPAGES =2.
 - a. 32,777
 - b. 64,789
 - c. 32,781
 - d. 87,342
7. Which OpenVMS software component issued the error message:
%TYPE-W-SEARCHFAIL.
 - a. DCL command TYPE
 - b. Cannot be determined from the error message
 - c. SEARCHFAIL

Written exercises and their solutions appear in the Exercises book.

Solutions to Written Exercises for Dependable Systems Overview

Choose the letter corresponding with the best answer to each of the following multiple-choice questions.

1. Disaster-tolerant computing systems are characterized by the requirement that they provide:
 - a. For infrequent interruptions of service
 - b. Service during nonbusiness hours
 - c. Redundant hardware, software, and database configurations separated geographically
 - d. More than one cluster
2. Which of the following does **not** increase the mean time between failure of a given hardware component?
 - a. Providing redundant components
 - b. Correct maintenance
 - c. Using quality hardware
 - d. Providing correct environmental conditions
2. Which of the following questions can help you define a system problem?
 - a. Has this problem happened before?
 - b. Has this device ever worked?
 - c. When was the last time the device worked correctly?
 - d. All of the above
3. The result of a system nonfatal bugcheck is:
 - a. System dump
 - b. Error log entry
 - c. Orderly shutdown
 - d. System crash
4. If there is no SYSDUMP.DMP file on the system disk when a fatal bugcheck occurs, OpenVMS:
 - a. Writes the dump file on the default disk
 - b. Does not write a dump file
 - c. Writes the dump file to the paging file in SYSS\$SYSTEM
 - d. Sets the systems parameter DUMPBUG

5. Select the correct minimum size for a system dump file on a system where:
Memory= 16 MB or 32,768 pages; ERRORLOGBUFFERS= 6,
DUMPSTYLE=0; ERLBUFFERPAGES =2.
 - a. 32,777
 - b. 64,789
 - c. 32,781
 - d. 87,342
6. Which OpenVMS software component issued the error message:
%TYPE-W-SEARCHFAIL .
 - a. DCL command TYPE
 - b. Cannot be determined from the error message
 - c. SEARCHFAIL

Laboratory Exercise for Dependable Systems Overview

Exercise: Capturing a System Dump File



Note

This exercise must be performed in groups according to the number of systems you have available in the lab. Students must work in the system account.

Before beginning this exercise, check the space on the system disk. If there is not adequate space for a full dump file, instruct the students to set `DUMPSTYLE=1`.

When the students reboot the system, if possible, have them use a hardcopy terminal and save the output from the normal reboot. This output can be used in the following exercises.

To prepare the system for this exercise:

- Rename the existing system dump file, `SY$SYSTEM:SYSDUMP.DMP`.
 - Reboot the system.
 - Edit the `SYSTARTUP_VMS.COM` to remove the lines saving the crash dump file.
 - The exercise should leave the system in workable condition.
-

This exercise provides practice in setting up the system to capture a system dump file.

1. Log in to the system account and display the size of the `SYSDUMP.DMP` file, if any.
2. Display the system parameters that must be set to capture a system dump file. Change any that are not appropriate.
3. Calculate the appropriate size for the dump file.
4. Allocate space for the system dump file on the system disk.
5. Save a copy of the file `SYSTARTUP_VMS.COM` as `OLD_SYSTARTUP_VMS.COM`.
6. Edit `SYSTARTUP_VMS.COM` to include lines to use the System Dump Analyzer to:
 - a. Save the dump file
 - b. Create a listing file
 - c. Display crash and summary information
7. Activate the changes by performing an orderly shutdown and reboot of the system.
7. When the system has rebooted, display the size of the system dump file.

8. Run the course program CRASH1_PROGRAM.EXE to crash the system and examine the results.
9. Set DUMPSIZE = 1000, reboot the system, and run CRASH1_PROGRAM.
10. Rename OLD_SYSTARTUP_VMS.COM to SYSTARTUP_VMS.COM.

Solution: Capturing a System Dump File

1. Log in to the system account and display the size of the SYSDUMP.DMP file, if any.
2. Display the system parameters that must be set to capture a system dump file. Change any that are not appropriate.

```
$ DIR/SIZE SYS$SYSTEM:SYSDUMP.DMP
```

```
%DIRECT-W-NOFILES, no files found
```

```
$ RUN SYS$SYSTEM:SYSGEN
```

```
SYSGEN>USE CURRENT
```

```
SYSGEN>SHOW DUMPBUG
```

Parameter Name	Current	Default	Min.	Max.	Unit	Dynamic
DUMPBUG	1	1	0	1	Boolean	

```
SYSGEN>SET DUMPBUG 1
```

```
SYSGEN>SHOW ERRLBUFFERPAGES
```

Parameter Name	Current	Default	Min.	Max.	Unit	Dynamic
ERLBUFFERPAGES	2	2	2	32	Pages	

```
SYSGEN>SET ERRLBUFFERPAGE 2
```

```
SYSGEN>SHOW ERRORLOGBUFFERS
```

Parameter Name	Current	Default	Min.	Max.	Unit	Dynamic
ERRORLOGBUFFERS	4	4	2	64	Buffers	

```
SYSGEN>SET ERRORLOGBUFFERS 4
```

```
SYSGEN>SHOW DUMPSTYLE
```

Parameter Name	Current	Default	Min.	Max.	Unit	Dynamic
DUMPSTYLE	2	2	0	-1	Bitmask D	

```
SYSGEN>SET DUMPSTYLE 0
```

```
SYSGEN>WRITE CURRENT
```

```
SYSGEN>EXIT
```

11. Calculate the appropriate size for the dump file.

Determine the size of memory.

```
$ SHOW MEMORY
```

```
System Memory Resources on 3-MAR-1994 09:12:26.15
Physical Memory Usage (pages):  Total   Free   In Use Modified
Main Memory (16.00Mb)          32768   9007   22864    897
.
.
.
```

$$SIZE = MEMORY + (ERRORLOGBUFFERS * ERRLBUFFERPAGES) + 1$$
$$SIZE = 32,768 + (4 * 2) + 1$$
$$SIZE = 32,777 \text{ blocks}$$

12. Allocate space for the system dump file on the system disk.

```
$ RUN SYS$SYSTEM:SYSGEN
```

```
SYSGEN> CREATE SYS$SYSTEM:SYSDUMP.DMP/SIZE=32777
```

```
SYSGEN> EXIT
```

13. Save a copy of the file SYSTARTUP_VMS.COM as OLD_SYSTARTUP_VMS.COM.

```
$ COPY SYSTARTUP_VMS.COM OLD_SYSTARTUP_VMS.COM
```

14. Edit SYSTARTUP_VMS.COM to include lines to use the System Dump Analyzer to:

- a. Save the dump file
- b. Create a listing file
- c. Display crash and summary information

```
$ SET VERIFY
```

```
$!
```

```
$! Print dump listing if system just failed.
```

```
$!
```

```
$ ANALYZE/CRASH_DUMP SYS$SYSTEM:SYSDUMP.DMP
```

```
COPY SYS$SYSTEM:SAVEDUMP.DMP      ! Save the dump file
```

```
SET OUTPUT SYS$SYSTEM:SYSDUMP.LIS ! Create a listing file
```

```
SHOW CRASH                        ! Display crash info
```

```
SHOW SUMMARY/IMAGE               ! List all active processes
```

```
EXIT
```

```
$!
```

```
$ SET NOVERIFY
```

15. Activate the changes by performing an orderly shutdown and reboot of the system.
`$@SYS$SYSTEM:SHUTDOWN`
16. When the system has rebooted, display the size of the system dump file.
`$ DIRECTORY/SIZE SYS$SYSTEM:SYSDUMP.DMP`
Directory SYS\$SYSROOT: [SYSEXEC]
SYSDUMP.DMP;1 32777
Total of 1 file, 32777 blocks.
17. Run the course program CRASH1_PROGRAM.EXE to crash the system and examine the results.
Look in the directory to see the saved system dump file.
18. Set DUMPSIZE = 1000, reboot the system, and run CRASH1_PROGRAM.
A dump file of size 1000 is created. After the crash, the size of the dump file is still 1000 blocks.
19. Rename OLD_SYSTARTUP_VMS.COM to SYSTARTUP_VMS.COM.



Note

The reason for having students copy the SYSTARTUP_VMS.COM prior to modifying it is to teach them to always save a copy of a command procedure before it is modified. This point is also discussed in the Chapter 2 module. You should point out that in the event that the modifications cause the program to loop, you will use the old file to boot the system.

You might receive a warning similar to the one received during the testing of these exercises:

**** WARNING ** - The system disk would be over 95% full
if the dump file were created with 57330 blocks.
No dump file modifications will be made.
Dumpfile will remain at 0 blocks.**

You may need to use a “compressed” dumpstyle (DUMPSTYLE=1) and let AUTOGEN calculate a smaller version of the file.

If you are going to use the paging files to capture the dump file, the total size of all paging files on the system disk must be greater than the size of the dump file.

Exercise: Accessing Message Descriptions from Online Help

Students can do this exercise from their own accounts.

The online help file for the system messages must be installed.

The objective of this exercise is to practice using online help.

1. Display message information for the following error identifications:
 - a. ACCVIO
 - b. SEARCHFAIL
 - c. NOTRAN

Solution: Accessing Message Descriptions from Online Help

1. Display message information for the following error identifications:

- a. ACCVIO

```
$ HELP/MESSAGE ACCVIO
```

```
ACCVIO, access violation, reason mask='xx', virtual
```

```
address='xxxxxxxx', PC='xxxxxxxx', PSL='xxxxxxxx'
```

```
Facility: TPU, DEC Text Processing Utility (DECTPU)
```

```
Explanation: An internal DECTPU failure occurred.
```

```
User Action: Contact a Digital support representative.
```

```
Press RETURN to continue ...
```

```
.  
.   
.
```

- b. SEARCHFAIL

```
$ HELP/MESSAGE SEARCHFAIL
```

```
SEARCHFAIL, error searching for 'file-spec'
```

```
Facility: TPU, DEC Text Processing Utility (DECTPU)
```

```
Explanation: The specified file could not be found.
```

```
User Action: Take action based on the accompanying message.
```

```
Press RETURN to continue ...
```

```
.  
.   
.
```

e. NOTRAN

```
$ HELP/MESSAGE NOTRAN
```

```
NOTRAN, no translation for logical name 'name'
```

```
Facility:  SHOW, SHOW Command
```

```
Explanation: There is no translation for the specified logical  
name.
```

```
User Action: None.
```

```
Press RETURN to continue ...
```

```
.  
.   
.
```

System Initialization Problems

Written Exercise for System Initialization Problems

In the space provided, write the letter corresponding with the best answer to each of the following multiple-choice questions.

1. Which system initialization program turns on memory management?
 - a. EXESINIT
 - b. VMS.EXE
 - c. SYSBOOT.EXE
 - d. SYSINIT.EXE
2. Which of the following **cannot** be done at the SYSBOOT> prompt during a conversational boot?
 - a. Define the console as the startup procedure.
 - b. Specify another parameter file.
 - c. Specify a minimum startup.
 - d. Use the full set of SYSGEN commands.
20. Which program is **not** run when the system is booted minimally?
 - a. EXESINIT
 - b. VMS.EXE
 - c. SYSTARTUP_VMS.COM
 - d. SYSINIT.EXE
21. Which task **cannot** be performed using standalone Backup?
 - a. Restore the system disk from a tape save set.
 - b. Restore a single file from a tape save set.
 - c. Make a full backup of a disk.
22. If a required system initialization file has been deleted from the system disk, and the system boot does not reach the SYSBOOT> prompt, which action can the system and network manager use to bring the system up?
 - a. Perform a minimum boot.
 - b. Boot with the console as the command procedure.
 - c. Restore the system disk from the backup copy using standalone Backup.
 - d. Use standalone Backup to restore the missing file.

23. Which rule should be included in a change management procedure?
- a. Make a backup copy of any files before the change is made.
 - b. Document and date all changes to program files in comments in the code.
 - c. Test changes after they are made to be sure they work.
 - d. All of the above.

Written exercises and their solutions appear in the Exercises book.

Solutions to Written Exercises for System Initialization Problems

Choose the letter corresponding with the best answer to each of the following multiple choice questions.

1. Which system initialization program turns on memory management?
 - a. EXES\$INIT
 - b. VMS.EXE
 - c. SYSBOOT.EXE
 - d. SYSINIT.EXE
2. Which of the following **cannot** be done at the SYSBOOT> prompt during a conversational boot?
 - a. Define the console as the startup procedure.
 - b. Specify another parameter file.
 - c. Specify a minimum startup.
 - d. Use the full set of SYSGEN commands.
24. Which program is **not** run when the system is booted minimally?
 - a. EXES\$INIT
 - b. VMS.EXE
 - c. SYSTARTUP_VMS.COM
 - d. SYSINIT.EXE
25. Which task **cannot** be performed using standalone Backup?
 - a. Restore the system disk from a tape save set.
 - b. Restore a single file from a tape save set.
 - c. Make a full backup of a disk.
26. If a required system initialization file has been deleted from the system disk, and the system boot does not reach the SYSBOOT> prompt, which action can the system and network manager use to bring the system up?
 - a. Perform a minimum boot.
 - b. Boot with the console as the command procedure.
 - c. Restore the system disk from the backup copy using standalone Backup.
 - d. Use standalone Backup to restore the missing file.

27. Which rule should be included in a change management procedure?
- a. Make a backup copy of any files before the change is made.
 - b. Document and date all changes to program files in comments in the code.
 - c. Test changes after they are made to be sure they work.
 - d. All of the above.

Written exercises and their solutions appear in the Exercises book

Laboratory Exercise for System Initialization Problems

Exercise: Define the Console as the Startup Procedure



Note

The objectives of this exercise are:

- To give the students practice in booting the system OPA0:
- To show why the system account should be prepared to provide a full-screen editor when the system is booted OPA0:

Instructor preparation:

- This exercise requires the use of a standalone system. Divide the class into work groups according to the available systems.
 - Change the system account password or just do not tell the students what the system password is.
-

The objectives of this lab exercise:

- Practice defining the console as the startup procedure to resolve system initialization problems.
- Set up the system manager account to use a full-screen editor when the system is booted with the console as the startup procedure.

The system account password has been changed and no one knows what it is.

There are no other privileged accounts on the system.

1. Change the system password so you will be able to log in.
2. Can this problem be prevented? What actions should you take to reduce the impact of this problem?
3. Log in to the system account and create a command procedure that will enable you to use a full-screen editor when the system is booted minimally.
4. Establish a symbol in the LOGIN.COM file to use the command procedure above.

Solution: Define the Console as the Startup Procedure

The system account password has been changed and nobody knows what it is.

There are no other privileged accounts on the system.

1. Change the system password so that you will be able to log in.
 - a. Perform a conversational boot from the console device.
 - b. At the SYSBOOT> prompt, define the console as the startup procedure
SYSBOOT> SET/STARTUP OPA0 :
SYSBOOT> CONTINUE
 - c. At the DCL \$ prompt:
\$ SET NOON
\$ SET NOVERIFY
\$ INSTALL := \$INSTALL/COMMAND_MODE !Install files needed to
execute SYSUAF.DAT
\$ INSTALL
INSTALL> ADD/OPEN/HEADER_RESIDENT/SHARED -
_INSTALL> \$1\$DUA0:[SYS0.SYSCOMMON.SYSLIB] SECURESHR.EXE
INSTALL> ADD/OPEN/HEADER_RESIDENT/SHARED/PROTECTED -
_INSTALL> \$1\$DUA0:[SYS0.SYSCOMMON.SYSLIB] SECURESHRP.EXE
INSTALL> ADD/OPEN/HEADER_RESIDENT -
_INSTALL> \$1\$DUA0:[SYS0.SYSCOMMON.SYSLIB] LIBRTL.EXE
INSTALL> EXIT
\$
\$ SET DEF SYS\$SYSTEM !Or wherever SYSUAF.DAT is located.
\$ RUN AUTHORIZE!Change system password in SYSUAF.DAT
UAF>MODIFY SYSTEM/PASSWORD=new-password/NOPWDEX
UAF>EXIT
\$
\$ RUN SYSGEN!Set SYSGEN to reboot complete startup
SYSGEN> SET/STARTUP SYS\$SYSTEM:STARTUP.COM
SYSGEN> WRITE CURRENT SYS\$SYSTEM:VAXVMSSYS.PAR
SYSGEN> EXIT
\$ @SYS\$SYSTEM:STARTUP.COM!Continue systems complete startup
\$ LOGOUT !To activate windowing on a workstation

2. Can this problem be prevented? What actions should you take to reduce the impact of this problem?
 - a. The problem can never be totally avoided.
 - b. To minimize the impact of the problem, take steps to make it easier for the system and network manager to resolve the problem. The instructions for handling this situation should be written down and filed in a locked drawer.

28. Log in to the system account and create a command procedure that will enable you to use a full-screen editor when the system is booted minimally.

Type the following at the DCL prompt to create a file called EDTINI.EDT in the system manager default directory.

```
SET TERM/DEV=VT100
CREATE SYS$LOGIN:EDTINI.EDT
SET MODE CHANGE
[Ctrl/Z]
```

29. Add the following lines to the LOGIN.COM file to use the command procedure above.

```
$ SET TERM/DEV=VT100
$ ED*IT == "EDIT/EDT/COMMAND=SYS$LOGIN:EDTINI.EDT"
```



Note

On some systems when the student issues the command SHOW LOGICAL when the system has been booted OPA0:, the following error message is received.

```
$ SHOW LOGICAL
%DCL-W-IVKEYW, unrecognized keyword - check validity and
spelling
```

This shows that the basic SHOW command cannot translate the logical name.

To change directories you must specify:

device:[dir.subdir.subdir]

```
$ set def sys$sysdevice:[sys0.syscommon.sysmgr]
$ dir/date sys$sysdevice:[sys0.syscommon.sysmgr]
$ diff sys$sysdevice:[sys0.syscommon.sysmgr]login.com;1 -
sys$sysdevice:[sys0.syscommon.sysmgr]login.com;2
```

Exercise: System Will Not Boot



Note

There are four solutions to this lab exercise, all of which use the same introduction. In the case study, the system manager is forced into troubleshooting on a system that has been poorly managed. You might want to introduce these exercises by pointing out some statements in the case study that indicate poor management system:

- The system manager has been changing STARTUP.COM. Compaq recommends that this file should not be modified.
- Changes are not well documented.

Do not tell the students which of the exercise situations you have created on the system. Even if a student has read the solutions, he or she does not know which solution applies. You may create a problem not included in any of the solutions. If you do and it works out well, be sure to share it with the course developer and other instructors through the shared area to be made available soon.

The developer recommends that you do all four exercises. Each exercise will take 40 to 45 minutes for the group to solve.

You should divide the students into groups according to the number of systems you have available. Groups of two are optimal.

One way to handle this exercise is to set up one problem on each of four systems. Rotate your groups around the systems. When a group solves a problem, ask them to break the system again in the same way. Breaking the system gives the students additional hands-on practice.

After completing the exercises, discuss each problem and the solution with the class as a group. Make a point of discussing how such a problem could occur and how you could prevent such a problem. The answer, of course, is to establish a good change management procedure. After solving these laboratory exercises, the students should be very receptive to controls that will prevent these problems.

Make sure the students learn to recognize the hardware diagnostic messages that appear on most systems as a series of numbers at the start of the initialization. One way to introduce this is to ask the students how the operator knows that it is not a hardware problem.

- He saw messages on the console, or he saw the numbers.

The objectives of this lab exercise:

- Apply the troubleshooting methodology to real problem situations.
- Practice using the emergency startup procedures to resolve system initialization (boot) problems.
- Demonstrate the need to use proper change management procedures.

You are the system and network manager for the Building 1 cluster. The manager for the Building 2 cluster is on vacation and you are covering both clusters. At 10:00 P.M., the operator on duty in Building 2 calls to say that they just lost power temporarily and one system will not initialize. It does not seem to be a hardware problem.

When you arrive on the scene, you ask the operator for the documentation on changes that have been made recently. He does not know what you are talking about.

Before your friend left on vacation, he told you that he had recently edited the site-independent startup command procedure in preparation for the installation of a third-party device. Your friend likes to name files with an X as the first letter. Just in case there is some problem, he tells you that he made a copy of the original STARTUP.COM and named it XSTARTUP.COM.

Your instructor will set up a system to experience a system initialization problem. Use the troubleshooting methodology you learned in Chapter 1, Dependable Systems Overview, to identify the problem and to apply a solution. In each exercise, test your solution by booting the system.

Four solutions are given for this exercise. Your instructor will not tell you which problem has been set up on the system, and the problem may not be the same for other work groups in the class. Your instructor may set up a problem not given in any of the solutions.

Do the following for each exercise:

1. Solve the problem. Be sure to document your actions.
2. Write a problem report describing what happened and how the problem was solved.
3. Make a list of recommendations for the system and network manager of Building 2 on how to avoid this problem in the future.

Solution A: Restore Site-Independent Startup Procedure

To prepare for this exercise:

- Perform a full backup of the system disk.
- Rename the site-independent startup.com to save.com.
- 1. Solve the problem. Be sure to document your actions.

The startup process could not find the site-independent STARTUP.COM command procedure. It has been deleted or renamed.

Initialize the system with the console as the startup command procedure. Install the full Backup utility and use it to restore the command procedure from a save set on tape.

Perform a conversational boot.

```
SYSBOOT> SET/STARTUP OPA0 :  
SYSBOOT> CONTINUE
```

Configure the devices.

```
$ SET NOON  
$ RUN SYS$SYSTEM:SYSGEN  
SYSGEN> AUTOCONFIGURE ALL  
SYSGEN> EXIT
```

Install the images needed for the full Backup utility.

```
$ SET NOVERIFY  
$ INSTALL :==$ INSTALL/COMMAND_MODE  
$ INSTALL ADD  
  $1$DUA0: [SYS$COMMON.SYSEXEX] MOUNTSHR/OPEN/HEAD/PROT/SHARE  
$ INSTALL ADD  
  $1$DUA0: [SYS$COMMON.SYSEXEX] DISMNTSHR/OPEN/HEAD/PROT/SHARE  
$ INSTALL ADD  
  $1$DUA0: [SYS$COMMON.SYSEXEX] SECURESHRP/OPEN/HEAD/PROT/SHARE
```

Restore STARTUP.COM from tape to the system disk.

```
$ BACKUP/SELECT= [SYS0.SYSCOMMON.SYSEXEX] STARTUP.COM/LOG  
  MUA0:SAVESET.BCK/SAVESET-  
- $1$DUA17: [VMS$COMMON.SYSEXEX] STARTUP.COM
```

2. Write a problem report describing what happened and how the problem was solved.
30. Make a list of recommendations for the system and network manager of Building TWO on how to avoid this problem in the future.
 - Follow recommendations to not alter the site-independent startup file.
 - Establish some controls over persons having access to the system disk.
 - Establish change management procedures.
 - Do not allow personal files or test files to accumulate in the system directories.

Solution B: Use Alternate Site-Independent Startup File



Note

In this case study, the students should discover that the site-independent startup command procedure does not execute. This happens because someone has edited this file. When the students arrive at this conclusion, they have two alternatives:

- Restore the file from a backup to get back to a good copy of the site-independent startup.com file.
- Use a copy of the site-independent startup command procedure that was saved before the changes were made.

The case study mentions a new site-independent startup command procedure. Fortunately we know that the old file was saved and is named XSTARTUP.COM. The students should boot using that old file.

To prepare the system for this exercise:

- Copy: SYS\$COMMON:[SYSEXE]STARTUP.COM to SYS\$COMMON:[000000]XSTARTUP.COM.
- Edit startup.com to insert an EXIT at the start of the file.

At the completion of this lab, the system should be restored.

1. Solve the problem. Be sure to document your actions.

In this case, the problem is in the modified site-independent STARTUP.COM file. This is the file that Compaq requests that you NOT modify.

However, the system manager mentioned archiving an online copy of the original file as XSTARTUP.COM.

Boot the system using the alternate XSTARTUP.COM file.

Perform a conversational boot of the system. At the SYSBOOT> prompt, do the following:

```
SYSBOOT> SET/STARTUP SYS$SYSTEM:XSTARTUP.COM
SYSBOOT> CONTINUE
```

After the system is booted, rename the STARTUP.COM to MODIFIED_STARTUP.COM and then rename XSTARTUP.COM to STARTUP.COM.

Then you must run SYSGEN to reset the startup command procedure to STARTUP.COM.

```
$ RUN SYS$SYSTEM:SYSGEN
SYSGEN> SET/STARTUP SYS$SYSTEM:STARTUP.COM
SYSGEN> WRITE CURRENT SYS$SYSTEM:VAXVMSSYS.PAR
```

2. Write a problem report describing what happened and how the problem was solved.
31. Make a list of recommendations for the system and network manager of Building TWO on how to avoid this problem in the future.

Your recommendations should include the following points:

- Follow *Compaq* guidelines to avoid making changes to the site-independent startup command procedures.
- Always save an original copy of any startup command file changed.
- Always test changes.
- Document changes according to a standard procedure.

Solution C: Correct SYSTARTUP_VMS Loop



Note

Instructor preparation:

To set the problem for Solution C:

- Copy SYSTARTUP_VMS.COM to SAVE_SYSTARTUP_VMS.COM
- Insert the following lines in the SYSTARTUP_VMS.COM right after loading the LAT software.

```
$WAIT_LOOP:
$ TERM_EXISTS=F$GETDVI ("LTA131:", "EXISTS")
$ IF TERM_EXISTS THEN GOTO ESCAPE_LOOP
$ WAIT 0:0:10
$ GOTO WAIT_LOOP
$ESCAPE_LOOP:
```

Have the students follow the steps for resolving system boot problems.

- Check the hardware.
- Check the site hardcopy logs to see if any changes have been made.
- Reboot the system using a conversation boot.
- Do a minimum boot.
- Set verify.
- Execute SYSTARTUP_VMS.COM
- Find the bad lines in the command procedure.
- Edit the command procedure to remove those lines.
- Boot with the new command procedures.
- Document the problems and the solution.
- Discuss how this problem could have been prevented and/or made easier to fix.

To restore the system after Solution C:

- Copy SAVE_SYSTARTUP_VMS.COM to SYSTARTUP_VMS.COM
-

1. Solve the problem. Be sure to document your actions.

The problem in this example is that the site-specific SYSTARTUP_VMS.COM is looping.

- a. To find the problem, perform a conversational boot.

```
SYSBOOT> SET STARTUP_P1 "MIN"
SYSBOOT> CONTINUE
```

- b. Edit the command procedure.

```
$ SET DEF SYS$MANAGER
$ EDIT SYSTARTUP_VMS.COM
```

- f. Insert a command to turn verification on.

```
$ SET VERIFY
```

- g. Execute SYSTARTUP_VMS.COM.

```
$ @SYSTARTUP_VMS.COM
```

- h. To correct the command procedure, remove the following five lines:

```
$WAIT_LOOP:
$ TERM_EXISTS=F$GETDVI("LTA131:", "EXISTS")
$ IF TERM_EXISTS THEN GOTO ESCAPE_LOOP
$ WAIT 0:0:10
$ GOTO WAIT_LOOP
$ESCAPE_LOOP:
```

- i. Test your solution by executing SYSTARTUP_VMS.COM. Repeat the process until it works.

- j. Reset the STARTUP_P1.

```
$ RUN SYS$SYSTEM:SYSGEN
SYSGEN> USE CURRENT
SYSGEN> SET STARTUP_P1 ""
SYSGEN> WRITE CURRENT SYS$SYSTEM:VAXVMSSYS.PAR
SYSGEN> EXIT
```

2. Write a problem report describing what happened and how the problem was solved.

32. Make a list of recommendations for the system and network manager of Building 2 on how to avoid this problem in the future.

Your recommendations should include the following points:

- Always test the startup command procedure after making changes.
- Document changes in the command procedure.
- Save a copy of the original file before making changes to it.

Solution D: Solve System Parameter Problems



Note

If you only have three systems on which to perform these exercises, save Solution D until after you have rotated the class through the first three solutions. Then prepare all systems for this solution. This solution will probably take the longest to solve depending on how the group approaches the problem. Groups that start by using AUTOGEN.PAR will, of course, finish easily, but during the pilot most groups tried to change parameters manually. You should conduct a class discussion of all the exercises after they have been performed, but it is most important to discuss this one.

To prepare for this lab:

- Make sure the system has had a recent AUTOGEN and reboot. Check to see that the file SYSS\$SYSTEM:AUTOGEN.PAR is present.
- Print a copy of SYSS\$SYSTEM:MODPARAMS.DAT and SYSS\$SYSTEM:PARAMS.DAT.
- Output your sysgen parameters to a file, SYSGEN.TXT.

```
SYSGEN> SET /OUTPUT=SYS$SYSTEM:SYSGEN.TXT
SYSGEN> SHOW ALL
SYSGEN>EXIT
$
```
- Print SYSS\$SYSTEM:SYSGEN.TXT
- Change the SYSGEN parameter VIRTUALPAGECNT to 512. This will prevent the system from initializing. Change some other parameters as well.

```
$MCR SYSGEN
SYSGEN>USE CURRENT
SYSGEN>SET VIRTUALPAGECNT 512
SYSGEN>WRITE CURRENT
SYSGEN>EXIT
```
- Shut down the system

The students will be asked to boot the system.

1. Solve the problem. Be sure to document your actions.

There are three ways you can solve this problem:

- a. Use the default system parameters.

```
SYSBOOT> USE DEFAULT
```

```
SYSBOOT> SET STARTUP_P1 "MIN"
```

```
SYSBOOT> CONTINUE
```

- b. Use AUTOGEN.PAR, a file that was created the last time you ran AUTOGEN on the system. If the system parameter changes were made without running AUTOGEN, this should restore the original parameters.

```
SYSBOOT> USE AUTOGEN.PAR
```

```
SYSBOOT> SET STARTUP_P1 "MIN"
```

```
SYSBOOT> CONTINUE
```

- k. Boot the system conversationally. At the SYSBOOT> prompt, SHOW and SET any system parameters that might be wrong.

2. Write a problem report describing what happened and how the problem was solved.

33. Make a list of recommendations for the system and network manager of Building 2 on how to avoid this problem in the future.

Your recommendations should include the following points:

- Any changes to system parameters should always be documented.
- Use AUTOGEN.
- Provide the following reference documentation in hard copy for every system you manage:
 - ♦ MODPARAMS.DAT
 - ♦ PARAMS.DAT
 - ♦ System parameters

Troubleshooting Printing Problems

Written Exercise for Troubleshooting Printing Problems

In the space provided, write the letter corresponding with the best answer to each of the following multiple-choice questions.

1. Which of the following formats a print file?
 - a. Job controller
 - b. Print symbiont
 - c. Queue manager
 - d. Digital Command Language
2. In an OpenVMS cluster system running OpenVMS Version 6.0 or higher, there may be:
 - a. A queue manager process for each node in the cluster
 - b. One queue manager process for the cluster
 - c. A queue manager process for each queue
 - d. All of the above
34. User processes, symbionts, and job controllers communicate with the queue manager through:
 - a. IPC link
 - b. DECnet
 - c. System services
 - d. LAT
35. Which command is used to set options for print queues?
 - a. RENAME/QUEUE
 - b. START QUEUE
 - c. SET QUEUE
 - d. All of the above
36. The form mounted for a queue always:
 - a. Matches the form of the job being printed or of the last job printed on an idle queue
 - b. Matches the default form for the queue
 - c. Is the form designated with the INITIALIZE/QUEUE command
 - d. All of the above

37. If you do not want to use multiple paper stocks on a single printer, you should:
 - a. Define all forms for the queue with the same paper stock.
 - b. Define all forms for the queue using the qualifier /STOCK=DEFAULT.
 - c. Make sure all forms have a paper stock defined.
38. Which of the following is **not** a printer characteristic?
 - a. Speed
 - b. Lines per page
 - c. Spooling
 - d. Timing
39. An output device such as a printer is usually spooled to:
 - a. Allow programs using the COPY command to print files without interfering with other jobs being printed
 - b. Allow the printer to be a remote device
 - c. Allow privileged users to write directly to the printer
 - d. Change the default disk to the system disk
40. Which component contributes to the formatting of a print job?
 - a. Print symbiont
 - b. Device driver
 - c. Printer
 - d. All of the above

Written exercises and their solutions appear in the Exercises book.

Solution to Written Exercises for Troubleshooting Printing Problems

1. Which of the following formats a print file?
 - a. Job controller
 - b. Print symbiont
 - c. Queue manager
 - d. Digital Command Language
2. In an OpenVMS cluster system running OpenVMS Version 6.0 or higher, there may be:
 - a. A queue manager process for each node in the cluster
 - b. One queue manager process for the cluster
 - c. A queue manager process for each queue
 - d. All of the above
3. User processes, symbionts, and job controllers communicate with the queue manager through:
 - a. IPC link
 - b. DECnet
 - c. System services
 - d. LAT
3. Which command is used to set options for print queues?
 - a. RENAME/QUEUE
 - b. START QUEUE
 - c. SET QUEUE
 - d. All of the above
4. The form mounted for a queue always:
 - a. Matches the form of the job being printed or of the last job printed on an idle queue
 - b. Matches the default form for the queue
 - c. Is the form designated with the INITIALIZE/QUEUE command
 - d. All of the above

5. If you do not want to use multiple paper stocks on a single printer, you should:
 - a. Define all forms for the queue with the same paper stock.
 - b. Define all forms for the queue using the qualifier /STOCK=DEFAULT.
 - c. Make sure all forms have a paper stock defined.
6. Which of the following is **not** a printer characteristic?
 - a. Speed
 - b. Lines per page
 - c. Spooling
 - d. Timing
7. An output device such as a printer is usually spooled to:
 - a. Allow programs using the COPY command to print files without interfering with other jobs being printed
 - b. Allow the printer to be a remote device
 - c. Allow privileged users to write directly to the printer
 - d. Change the default disk to the system disk
8. Which component contributes to the formatting of a print job?
 - a. Print symbiont
 - b. Device driver
 - c. Printer
 - d. All of the above

Laboratory Exercise for Troubleshooting Printing Problems

Moving the Queue Database Files

Note

The really important message here is that an open index file should not be backed up using the normal procedures. Remember to mention that this applies to other applications as well, especially ALL-IN-1.

You may want to conduct this lab exercise as a class project.

No special preparation is required to set up the system for this lab exercise.

To restore the system at the end of the exercise you need to delete the files from the spare disk and define the logical name QMAN\$MASTER to point to the SYS\$COMMON:[SYSEXE] directory.

- Stop the queue manager cluster wide.

```
$ stop/que/manager/cluster
```

- Redefine the logical QMAN\$MASTER.

```
$ SET DEF SYS$COMMON:[SYSEXE]
```

```
$ MCR SYSMAN
```

```
SYSMAN> SET ENV/CLUSTER
```

```
%SYSMAN-I-ENV, current command environment:
```

```
Clusterwide on local cluster
```

```
Username SYSTEM will be used on nonlocal nodes
```

```
SYSMAN> DO DEF/SYS/EXEC QMAN$MASTER SYS$COMMON:[SYSEXE]
```

```
%SYSMAN-I-OUTPUT, command execution on node noda
```

```
%DCL-I-SUPERSEDE, previous value of QMAN$MASTER has been superseded
```

```
%SYSMAN-I-OUTPUT, command execution on node nodc
```

```
%SYSMAN-I-OUTPUT, command execution on node nodb
```

```
SYSMAN>DO SHOW LOGICAL QMAN$MASTER
```

```
%SYSMAN-I-OUTPUT, command execution on node noda
```

```
"QMAN$MASTER" = "SYS$COMMON:[SYSEXE]" (LNM$SYSTEM_TABLE)
```

```
%SYSMAN-I-OUTPUT, command execution on node nodc
```

```
"QMAN$MASTER" = "SYS$COMMON:[SYSEXE]" (LNM$SYSTEM_TABLE)
```

```
%SYSMAN-I-OUTPUT, command execution on node nodb
```

```
"QMAN$MASTER" = "SYS$COMMON:[SYSEXE]" (LNM$SYSTEM_TABLE)
```

```
SYSMAN> EXIT
```

The objectives of this lab exercise:

- Practice moving the queue database files from the system disk to another disk.
- Test the handling of open files by the Backup utility.
- Design an appropriate backup procedure for saving the queue database files.

You want to move the queue database files from the system disk to another disk.

1. Make a list of change management rules to follow in performing this exercise.
2. Move the three queue database files from the system disk to another disk. Your instructor will tell you which disk to use. You do not need to make a backup copy of the system disk before you begin this procedure because your instructor has made one. However, on working systems, you must **not** skip this step.
3. After you move the queue database file, start up the queues.
4. Use the Backup utility to back up these files. What happens?
5. Modify your BACKUP command to include the /IGNORE=INTERLOCK qualifier and try again. What happens?
6. Design an appropriate backup procedure for this disk.

Solution: Moving the Queue Database Files

1. Make a list of change management rules to follow in performing this exercise.
Your list should include the following rules:
 - a. Make a backup copy of the system disk before making the change.
 - b. Make an entry in the system manager log file that lists the reason for the change, the date, and exactly what is to be done.
2. Move the three queue database files from the system disk to another disk.
Your instructor will tell you which disk to use. You do not need to make a backup copy of the system disk before you begin this procedure because your instructor has made one. However, on working systems, you must **not** skip this step.

- a. Stop the queue manager process on all nodes in the cluster.

```
$ STOP/QUEUE/MANAGER/CLUSTER
```

- b. Create a new directory for the files on another disk.

- l. Copy the three files to the new directory.

```
$ CREATE/DIRECTORY DUA1:[SYSFILES]/OWNER=[1,9]
```

```
$!
```

```
$ SET DEFAULT SYS$SYSTEM
```

```
$ COPY QMAN$MASTER.DAT DUA1:[SYSFILES]QMAN$MASTER.DAT
```

```
$ COPY SYS$QUEUE_MANAGER.QMAN$JOURNAL
```

```
To: DUA1:[SYSFILES]SYS$QUEUE_MANAGER.QMAN$JOURNAL
```

```
$ COPY SYS$QUEUE_MANAGER.QMAN$QUEUES
```

```
DUA1:[SYSFILES]SYS$QUEUE_MANAGER.QMAN$QUEUES
```

- m. Use the SYSMAN utility to change the QMAN\$MASTER logical name, for the entire cluster, to point to the new directory. The logical definition must be in the system logical name directory and must be in EXECUTIVE_MODE.

```
$! Run the SYSMAN Utility
```

```
$ RUN SYS$SYSTEM:SYSMAN
```

```
SYSMAN> SET ENVIRONMENT/CLUSTER
```

```
%SYSMAN-I-ENV, current command environment:
```

```
Clusterwide on local cluster
```

```
Username SYSTEM will be used on nonlocal nodes
```

```
SYSMAN> DO DEF/SYSTEM/EXECUTIVE_MODE QMAN$MASTER
```

```
DUA1:[SYSFILES]
```

```
%SYSMAN-I-OUTPUT, command execution on node NODA
```

```
%DCL-I-SUPERSEDE, previous value of QMAN$MASTER has been
superseded
```

```
%SYSMAN-I-OUTPUT, command execution on node NODC
```

```
%SYSMAN-I-OUTPUT, command execution on node NODB
```

```
SYSMAN>DO SHOW LOGICAL QMAN$MASTER
```

```
%SYSMAN-I-OUTPUT, command execution on node NODA
```

```
"QMAN$MASTER" = "DUA1:[SYSFILES]" (LNM$SYSTEM_TABLE)
```

```
%SYSMAN-I-OUTPUT, command execution on node NODC
```

```
"QMAN$MASTER" = "DUA1:[SYSFILES]" (LNM$SYSTEM_TABLE)
```

```
%SYSMAN-I-OUTPUT, command execution on node NODB
```

```
"QMAN$MASTER" = "DUA1:[SYSFILES]" (LNM$SYSTEM_TABLE)
```

```
SYSMAN> EXIT
```

9. After you move the queue database file, start up the queues.

```
$ START/QUEUE/MANAGER directory-specification
```

10. Use the Backup utility to back up these files. What happens?

Error messages show that the files are not copied by the Backup utility because they are open. If this was done as part of a disk backup, these files would not be saved and therefore would not be available in case the disk had to be restored.

```
$
$ BACKUP/LOG SYS$SYSTEM:*Q*E*.*A* X.X/SAVE_SET
%BACKUP-W-NOFILES, no files selected from
$4$DUA17:[SYS0.] [SYSEXE] *Q*E*.*A*;*
%BACKUP-E-OPENIN, error opening
$4$DUA17:[SYS0.SYSCOMMON.] [SYSEXE] QMAN$MASTER.DAT;1 as input
-SYSTEM-W-ACCONFLICT, file access conflict
%BACKUP-E-OPENIN, error opening
$4$DUA17:[SYS0.SYSCOMMON.] [SYSEXE] SYS$QUEUE_MANAGER.QMAN$JOURNAL;1 as input
-SYSTEM-W-ACCONFLICT, file access conflict
%BACKUP-E-OPENIN, error opening
$4$DUA17:[SYS0.SYSCOMMON.] [SYSEXE] SYS$QUEUE_MANAGER.QMAN$QUEUE
S;1 as input
-SYSTEM-W-ACCONFLICT, file access conflict
```

11. Modify your BACKUP command to include the /IGNORE=INTERLOCK qualifier and try again. What happens?

Warning messages indicate that the files are open for write by another user. This means that the backup copy might not be reliable in the event the disk must be restored.

```
$ backup/log SYS$SYSTEM:*Q*E*.*A* X.X/SAVE_SET/IGNORE=INTERLOCK
%BACKUP-W-NOFILES, no files selected from
  $4$DUA17: [SYS0.] [SYSEXE] *Q*E*.*A*;*
%BACKUP-W-ACCONFLICT,
  $4$DUA17: [SYS0.SYSCOMMON.] [SYSEXE] QMAN$MASTER.DAT;1 is
open for write by another user
%BACKUP-S-COPIED, copied
  $4$DUA17: [SYS0.SYSCOMMON.] [SYSEXE] QMAN$MASTER.DAT;1
%BACKUP-S-COPIED, copied
  $4$DUA17: [SYS0.SYSCOMMON.] [SYSEXE] SYS$QUEUE_MANAGER.-
QMAN$JOURNAL;1
%BACKUP-S-COPIED, copied
  $4$DUA17: [SYS0.SYSCOMMON.] [SYSEXE] SYS$QUEUE_MANAGER.-
QMAN$QUEUES;1
```

12. Design an appropriate backup procedure for this disk.
 - a. Use the Convert utility to save the master file and the queue file. You can do this while the queuing system is functioning. These files will be copied by backup.

```
$ SET DEFAULT DUA1: [SYSFILES]
$ CONVERT/SHARE QMAN$MASTER.DAT QMASTER.KEEP
$ CONVERT/SHARE SYS$QUEUE_MANAGER.QMAN$QUEUES QFILE.KEEP
```
 - b. You will need a special procedure if you ever have to restore this disk.
7. Restore the disk.
8. Rename QMASTER.KEEP to QMAN\$MASTER.DAT.
9. Rename QFILE.KEEP to SYS\$QUEUE_MANAGER.QMAN\$QUEUES.



Note

Exercise: Set Up a Remote Print Queue



Note

The minimum configuration for this lab exercise is:

- Two-node VAXcluster system <oparne> All groups can share one cluster.)
- Terminal server and printer or terminal for each group of four students

The optimal configuration is to lower the group size to two students. It is easier to use a terminal to simulate a printer. Students will need to have the terminal server password.

Naming Conventions

The name of the terminal server must be unique on the network. The name of the port need only be unique on the terminal server. Assign each group a one-digit group number to replace the symbol #.

- VTSTS# — Stands for VMS Troubleshooting Terminal Server
- VTSPR# — Stands for VMS Troubleshooting Printer

Start this exercise in the classroom by assigning a number to each group. Have the student draw their diagrams before they go in the lab where it is usually very noisy. Notice that the students are not asked to actually make the queue available to a network node, but only to describe how to do this. If all groups set up their print queues as autostart queues on *NODA* to fail over to *NODB*, you can crash *NODA* once and all queues should fail over.

Avoid attaching a printer to port #1 on a terminal server.

The print queues set up by each group will be used in the next group of exercises.

The objective of this lab exercise is to practice setting up a remote print queue.

You are the system and network manager for a two-node cluster. You have a new printer that you want to set up as a remote printer.

For this exercise, you will work in groups and the instructor will assign a one-digit number to each group. Substitute your group number for the symbol # in the following list.

- The terminal server is to be named VTSTS#.
- The port on the terminal server is to be named VTSPR#.
- The print queue is VTSPR#\$PRINT.
- The OpenVMS VAX system is *NODA*.

1. Make a simple diagram of your configuration. Include the node, terminal server, and printer.
2. Name the terminal server.
3. Set up the printer port on the server.
4. Set up the application port on *NODA*.
5. Create the remote print queue so that users on *NODA* can print to the queue.
6. Add a node *NODN*, which is on the same network as *NODA*, to your diagram. Describe the steps to make the queue accessible to users on *NODN*.
7. Add a node *NODB*, clustered with *NODA*, to your diagram. Describe the steps to make the queue accessible to users on *NODB*.
8. Modify the print queue so that if node *NODA* fails, the queue will fail over to *NODB*. Test the setup by crashing node *NODA*.

Solution: Set Up a Remote Print Queue

In the solution:

- The group number is 9.
 - The printer is attached to port 8 of a DECserver 200 system.
1. Make a simple diagram to include the node, terminal server, and printer.
 2. Give the terminal server a name.
 - a. Log in to the terminal server, turn on privileges, determine to which port number the printer is attached, and define the server name.

```
Local> SET PRIV
Local> DEFINE SERVER NAME VTSTS9
Local> LIST SERVER
```

- b. Reboot the server to make the changes permanent.

```
Local> INITIALIZE
```

2. Set up the printer port on the server.
 - a. Continue in local mode on the terminal server. Use the commands appropriate to the specific server to set up the printer port.

```
Local> DEFINE PORT 8 NAME VTSPR9
Local> DEFINE PORT 8 ACCESS REMOTE
Local> DEFINE PORT 8 SPEED 4800
Local> DEFINE PORT 8 AUTOBAUD DISABLE
Local> DEFINE PORT 8 BROADCAST DISABLE
Local> DEFINE PORT 8 BREAK DISABLE
Local> DEFINE PORT 8 VERIFY DISABLE
Local> LIST PORT 8
Local> LOG PORT 8
```

- b. Log back in and verify the port setting and the server name. Only INPUT FLOW and OUTPUT FLOW should be enabled.

```
Local> SET PRIV
Local> SHOW SERVER
Local> SHOW PORT 8
```

- c. Test the port.

You should see a consistent test pattern.

```
Local> TEST PORT 8 COUNT 20 WIDTH 80
```

3. Set up the application port on *NODA*.
 - a. Select an unused number for the application port. In this example, the number 809 was used.

```
$ RUN SYS$SYSTEM:LATCP
LATCP> SHOW PORT
```
 - b. Create the application port and map the application port to the port on the server.

```
LATCP> CREATE PORT LTA809:/APPLICATION
LATCP> SET PORT LTA809:/APPLICATION/NODE= VTSTS9/PORT=VTSPR9
LATCP> SHOW PORT
LATCP> EXIT
```
 - d. Test the port from a node that has access to the terminal server.
\$ COPY/LOG filename LTA809:
4. Create the remote print queue so users on *NODA* can print to the queue.
 - a. Set the device characteristics.

```
$ SET TERM LTA809/NOBROADCAST/PERM
$ SET SECURITY/CLASS=DEVICE /PROTECTION= (S:RWLP,O,G,W) LTA809
$ SET DEV LAT809/SPOOLED
```
 - b. Create the queue.

```
$ !Created by: Student Name dd-mmm-yy
$ !Start an LN03 on LAT809 Que VTSPR9$PRINT
$ ! Printer is located on the west side of the second floor.
$ !
$ ! Initialization should be done by the QUE$MASTER database
  on reboot.
$ INITIALIZE/QUEUE/DEF= FLAG -
  /TERMINAL/AUTOSTART_ON=NODA::LTA809: /START VTSPR9$PRINT
```
5. Add a node *NODN*, which is on the same network as *NODA*, to your diagram. Make the queue accessible to users on *NODN*.
 - a. Set the device characteristics on *NODN*.

```
$ SET TERM LTA809/NOBROADCAST/PERM
$ SET SECURITY/CLASS=DEVICE /PROTECTION= (S:RWLP,O,G,W) LTA809
$ SET DEV LAT809/SPOOLED
```
 - b. Create an application port on *NODN*.

```
LATCP> CREATE PORT LTA809:/APPLICATION
LATCP> SET PORT LTA809:/APPLICATION/NODE= VTSTS9/PORT=VTSPR9
LATCP> SHOW PORT
LATCP> EXIT
```

- b. Create the queue on *NODN*.

```
$ !Created by: Student Name dd-mm-yy
$ !Start an LN03 on LTA809 Que VTSPR9$PRINT
$ ! Printer is located on the west side of the second floor.
$ !
$ ! Initialization should be done by the QUE$MASTER database
    on reboot.
$ INITIALIZE/QUEUE/DEF= FLAG -
    /TERMINAL/AUTOSTART_ON=NODN::LTA809: /START VTSPR9$PRINT
```

6. Add a node *NODB*, clustered with *NODA*, to your diagram. Make the queue accessible to users on *NODB*.

No changes or additions are required.

7. Modify the print queue so that if node *NODA* fails, the queue will fail over to *NODB*.

- a. Set the device characteristics on *NODB*.
- b. Create and map the application port on *NODB*.
- c. Initialize the queue using the AUTOSTART_ON qualifier with a failover list.

```
$ INITIALIZE/QUEUE/DEF= FLAG -
    /TERMINAL/AUTOSTART_ON=(NODA::LTA809:,NODB::LTA809) /START
    VTSPR9$PRINT
```

Exercise: New Printer Not Working



Note

You do not have to present these problems in the same order as the solutions. This will make problem resolution a bit harder.

To set up these problems, use the print queues established by the student groups in the previous exercise. Break each queue according to the instructions provided. Rotate the groups through the problems. After a group solves a problem, ask them to break it again in the same way. Display of example COURSE_LAT\$SYSTARTUP.COM.

```
$ set noon
$ set verify
$ MCR LATCP
CREATE PORT LTA2: /NOLOG
!
! Maps applications port(s) to a specific port(s) on the
terminal
! server
!
SET PORT LTA2: /APPLICATION /NODE=TSA1 /PORT=PORT_2
!
! Start LAT Service
$
```

The objective of this exercise is to use the troubleshooting methodology to solve problems with print queues.

Certain printer problems are usually associated with new printer installations.

System and network manager Ann Smith returns from vacation to find several calls in the problem queue regarding a new remote printer that was installed on a terminal server while she was gone.

There are no entries in the log files to help her figure out why the new printer is not working. Your instructor will provide some information to make the example more realistic. For each case do the following:

1. Submit a print job to the print queue. Record any error messages or conditions.
2. Determine the cause of the problem.
3. Fix the problem.
4. Document the problem and the resolution.

Solution A: Incorrect Mapping



Note

In this case, the problem is that the remote print queue has been set up incorrectly. The easiest way to create this situation is to move the printer cable from one port to another on the terminal server. Obviously this is the easiest way to fix the problem as well, but we want the students to correct the mapping using the LATCP. After they fix the problem, they can move the printer cable to another port. Follow the same naming conventions as for the previous exercise.

1. Submit a print job to the print queue. Record any error messages or conditions.

Enter the SHOW QUEUE/ALL command. Send a file to the printer and enter the SHOW QUEUE/ALL command several times. You will see something like the following:

```
$! The state of the queue before the job is submitted
$ SHOW QUEUE/ALL VTSPR9$PRINT
Printer queue VTSPR9$PRINT, idle, on VTSTS9::LTA809, mounted form
    DEFAULT
(stock=DEFAULT)
```

```
$! Send a print job to the printer.
$ PRINT/QUEUE=VTSPR9$PRINT  DELE_TEST_QUE.COM
Job DELE_QUE (queue VTSPR9$PRINT, entry 390) started on
    VTSPR9$PRINT
```

```
$! The state of the queue after the job is submitted
$ SHOW QUEUE/ALL VTSPR9$PRINT
Printer queue VTSPR9$PRINT, busy, on VTSTS9::LTA809, mounted form
    DEFAULT
(stock=DEFAULT)
```

Entry	Jobname	Username	Blocks	Status
-----	-----	-----	-----	-----
390	DELE_TES	SYSTEM	2	Printing

```
$! The state of the queue a few minutes later
$ SHOW QUEUE/ALL VTSPR9$PRINT
```

```
(stock=DEFAULT)
```

- This situation occurred because the application port was incorrectly mapped to the terminal server port.

```
$ RUN SYS$SYSTEM:LATCP
```

.

•

•

Target Node Name: *NODA*

•

•

•

2. Fix the problem.

- a. For example, if the printer is attached to `PORT_2`, but the application port is mapped to `PORT_6`, enter the following command:

LATCP> DELETE PORT LTA809

LATCP> CREATE PORT LTA809

```
LATCP> SET PORT LTA809/NODE=VTSTS9/PORT=PORT 2 /APPLICATION
```

LATCP> SHOW PORT LTA809

- b. Test your change by sending a file to the printer.
- b. To make the change permanent, however, you must change the incorrect lines in the LAT\$SYSTARTUP.COM. Your instructor will print a copy of this procedure for you.

Solution B: Bad Printer Cable



Note

The easiest way to set up this exercise is to carefully place a small piece of paper between the printer cable and the terminal server connection. You need to use a real printer for this solution. An LA50 will do.

When discussing this case you might want to discuss what to do with the bad cable after it is discovered. The obvious answer is to mark it as broken and discard. However as one student in the pilot joked..”Always save it. You never know when you are going to want to switch a good cable for a bad one.”

Of course in this case the cable is not broken. The case illustrates the situation in which the terminal server port is bad as well.

1. Submit a print job to the print queue. Record any error messages or conditions.
The job does not print.
2. Determine the cause of the problem.
Isolate the cause of the problem.
 - a. If the printer is the type that produces a test, print the test sheet and validate the settings.
 - b. Set the printer /NOSPOOL and test the COPY command.
 - c. Set up a terminal at the end of the printer cable to use instead of the printer.

In this case, the problem appears to be a faulty communications cable.

2. Fix the problem.
Replace the cable with a good one and test the terminal with the COPY command.
Replace the terminal with the printer and test again.

Exercise: Using Different Paper Stock in One Printer



Note

Do not skip this exercise just because none of the students think they will ever want to use two paper stocks in one printer or because all students have LPS20 printers that avoid this problem. The objectives of this exercise have nothing to do with paper stock.

The most important of the two objectives is to teach the students to document a procedure to be performed by a person with few skills.

Customers need to have and will buy computer systems that run reliably and efficiently. These objectives are not achieved by good hardware and software alone. Training the employees of our customers to manage our products efficiently is important to our future. Documenting procedures to prevent user error and frustration is an appropriate part of managing computer systems efficiently. Students from internal customer service centers should recognize that the databases used to document common problems are an example of such documentation.

The last task in this exercise is to document the procedure described in the exercise. This is designed to be presented as a class discussion rather than a written exercise. You might want to tell the students to think about the final task, but that it will be discussed at the next lecture session.

Create some letterhead paper using a marker pen and the copy machine. Do not supply Compaq letterhead paper to the class.

To save time, you may choose to conduct this entire exercise as a class discussion rather than a laboratory exercise. You might make it different by changing the problem to be one requiring security rather than different paper stocks.

The objectives of this exercise:

- Use forms to provide special printing options.
- Document a procedure so it can be reliably performed by relatively unskilled personnel.

The head of the customer service department comes to you with a request for printing services. The department wants to send a personalized form letter to the 25 or so individuals who write letters to the department telling them that their letter has been received and that the problem is being worked. The department plans to print and mail these letters every Friday to all individuals whose letters have not received attention during the week. They want to use paper with the company letterhead. The department head would like you to install a special printer to hold the company letterhead paper.

The department has two LN03 printers suitable for this job. However, both printers are heavily used for other printing needs. You do not have any capital budget to buy another printer.

You suggest to the department head that you will set up one printer for printing letterhead paper on Friday morning.

1. Design and implement a procedure to handle this problem.
2. Load the printer with regular paper.
2. Print a job that requires letterhead paper.
3. Because you do not have time to run upstairs and fix this printer every week, you need to document the procedure so it can be handled by both an operator with privileges and the department secretary. Each week when the letterhead paper is to be loaded, the secretary will notify the operator by telephone. Think about how this can be done. Your instructor will discuss this task during the lecture session.

Solution: Using Different Paper Stock in One Printer

1. Design and implement a procedure to handle this problem.

- a. Define two forms to use on the LN03 printer.

```
$ DEFINE/FORM MEMO 3 -
/DESCRIPTION="LN03 indented memo format" -
/STOCK= plain -
/MARGIN=(TOP=2,BOTTOM=2, LEFT=6, RIGHT=0 ) -
/WIDTH=80 /LENGTH=66
$ DEFINE/FORM LETTER 4 -
/DESCRIPTION="LN03 company letter head" -
/STOCK=LETTER_HEAD -
/MARGIN=(TOP=2,BOTTOM=2, LEFT=6, RIGHT=0) -
/WIDTH=80 -
/LENGTH=66
```

- b. Display the queue forms.

```
$ SHOW QUEUE/FORMS
Form name      Number Description
-----
MEMO (stock=PLAIN)      3 LN03 indented memo format
LETTER (stock=LETTER_HEAD) 4 LN03 company letter head
```

2. Load the printer with regular paper.
2. Print a job that requires letterhead paper.

```
$ PRINT/QUEUE=LN03$NODA/FORM=LETTER LETTER.LIS
Job 3_LAB2_FORMS (queue LN03$NODA, entry 327) pending
pending status caused by form/stock mismatch
$ SHOW QUEUE/FULL LN03$NODA
Terminal queue LN03$NODA, idle, on NODA::LTA2:, mounted form
DEFAULT
/BASE_PRIORITY=4 /DEFAULT=(FORM=DEFAULT) /NOENABLE_GENERIC
Lowercase
/OWNER=[30J,SYSTEM] /PROTECTION=(S:E,O:D,G:R,W:W)
```

Place the correct paper in the printer and reset the form on the printer queue.

```
$ STOP/QUEUE/NEXT LN03$NODA
$ START/QUEUE/FORM_MOUNTED=4 LN03$NODA
```

3. Because you do not have time to run upstairs and fix this printer every week, you need to document the procedure so it can be handled by both an operator with privileges and the department secretary. Each week when the letterhead paper is to be loaded, the secretary will notify the operator by telephone. Think about how this can be done. Your instructor will discuss this task during the lecture session.

The following example shows a procedure that could be used for this purpose.

Sample User Documentation

Special Accounting Department Printer Handling

Problem Definition:

The accounting department will be using the printer ACCT_PA to print on letter head paper every Friday. The rest of the time, this printer will be used to print on plain paper. When they are ready to print letterhead, the accounting secretary will call the data center and request that the printer be set for letterhead paper.

ACCOUNTING SECRETARY:

The Accounting secretary will perform the following steps:

Print the files requiring the letterhead paper with the following command.

```
$ PRINT/QUEUE=ACCT_PA/FORM=LETTER letter.txt
```

The files will not print, but will remain in the system waiting for the printer to be set up for letterhead paper.

Call the operator in the data center (EXT: 1234) and ask to have the accounting department printer changed to letterhead paper.

Wait until the operator says it is time to change the paper. Remove the plain paper from the printer tray and replace it with the letterhead paper.

When all the files have printed, replace the plain paper and call the operator.

OPERATOR:

The data center operator will perform the following steps when the accounting secretary calls and requests that the department printer be set for letter head paper.

Stop the queue.

```
$ STOP/QUEUE/NEXT ACCT_PA
```

Tell the secretary to change the paper.

After the secretary confirms that the paper has been changed, do the following to change the FORM_MOUNTED.

```
$ START/QUEUE/FORM_MOUNTED=4 ACCT_PA
```

The queued jobs waiting for letterhead paper stock will now print. When they are finished, the secretary will change the paper and call again.

Ask the secretary if the paper has been changed.

Stop the queue and restore the FORM_MOUNTED to plain paper.

```
$ STOP/QUEUE/NEXT ACCT_PA
```

```
$ START/QUEUE/FORM_MOUNTED=3 ACCT_PA
```



Note

You can elaborate here on methods. Some ideas are:

- Place these instructions in a VMS HELP library. The operator and the secretary can access the instructions using VMS HELP.
- Write a command procedure for the operator part of this procedure.

Some points to make about the contents of the sample:

- The problem definition should explain what you are trying to do. People work better when they understand why they are doing something as well as exactly what they should do.
 - The person (identified by job title) who is to perform the task should be clearly identified.
 - The incident that triggers the action should be identified. For example, the operator does this when the secretary calls.
 - The procedure is clearly written when an untrained but reasonably intelligent substitute can carry out the task using the instructions.
 - Test your documentation by asking a person holding the job title to perform the task without help while you watch
-

Exercise: Print File Not Formatted Correctly



Note

This exercise will demonstrate the importance of making the printer device setting to avoid formatting problems. We will set up a printer to print only 72 columns and then send an 80 column file to the printer.

To prepare for this lab:

- Use a line printer, such as an LA50, for this exercise, not an LN03.
- Make sure the LAT LINE is set for a printer. In the example case using an LA50, the baud rate is 4800.
- Delete the existing printer queue. (In this example the queue name is COPY_QUE and the device is LTA20:.)

```
$ STOP/QUEUE/RESET COPY_QUE
$ SET DEVICE/NOSPOOL LTA20:
$ DELETE/QUEUE COPY_QUE
```

- Modify a copy of the course file VMS_TS_3_STARTLA50.COM to be appropriate for the printer you are using. Execute this file.

```
$! VMS_TS_3_STARTLA50.COM
```

```
$! These commands set an LA50 printer to wrap at 72
columns.
```

```
$!
$! Start an LA50 on LTA20:      Queue name = COPY_QUE
$!
$ SET TERMINAL/PERM/DEV=UNKNOWN/SPEED=4800/WRAP/WIDTH=72 -
  /SCOPE/NOECHO/NOBROAD LTA20:
$ SET DEVICE/SPOOLED=(LTA20,SYSSYS$SYSDISK:) LTA20:
$ INITIALIZE/QUEUE/NOENABLE_GENERIC/DEF=(NOFEED,NOFLAGG) -
  /TERMINAL/ON=MRED::LTA20: /START COPY_QUE
$ EXIT
```

- Display the device characteristics to check on your command. The width must be set at 72 columns.

```
$ SHOW TERM LTA20:
Terminal: _LTA20: Device_Type: Unknown Owner: SYMBIONT_44
Username: SYSTEM
LAT Server/Port: TSA1/PORT_4

Input: 4800 LFill: 0 Width: 72 Parity: None
Output: 4800 CRfill: 0 Page: 66
.
.
.
```

- Test the queue by sending a file to the printer. It should print, but wrap at 72 columns.
-

The objectives of this exercise are to:

- Use the troubleshooting methodology to resolve a printer problem.
- Demonstrate the importance of getting good information regarding the problem from the user.
- Set up a printer to avoid formatting problems.

John Smith is a very busy system and network manager in a large facility. The next item in his problem queue reads as follows:

Bill on the second floor says that his printer is not working correctly.

It won't print on the full page. He is trying to print his monthly forecast.

1. What further questions should John ask, before trying to resolve this problem?
2. Ask these questions of your instructor and then solve the problem for Bill.
3. Suggest a policy change to John to avoid this problem in the future on all print queues.

Solution: Print File Not Formatted Correctly

**Note**

The students should come up with a list of questions like those on the solution page. The instructor needs to supply the appropriate answers.

1. What further questions should John ask, before trying to resolve this problem?
 - a. Which printer is the user trying to use?
 - b. What command did he use to print the file?
 - c. Is the printer doing anything?
 - d. What kind of output is Bill getting?
 - e. What kind of output does he want?
 - f. What kind of printer is it?
2. Ask these questions of your instructor and then solve the problem for Bill.
 - a. Test the printer by submitting a file to the printer.
 - b. Notice that the lines are wrapping before the end of the line.
 - d. Display the printer characteristics.

```
Local> SHOW TERM LTA20:
```

```
Terminal: _LTA20: Device_Type: LA50 Owner: SYMBIONT_44
```

```
Username: SYSTEM
```

```
LAT Server/Port: TSA1/PORT_4
```

```
Input: 4800          LfFill: 0      Width: 72      Parity: None
```

```
Output: 4800         CRfill: 0      Page: 66
```

```
Terminal Characteristics:
```

```
Interactive          No Echo          Type_ahead          No Escape
```

```
No Hostsync          Ttsync           Lowercase           No Tab
```

```
Wrap                 Scope            No Remote           No Eightbit
```

```
No Broadcast          No Readsnc          No Form             Fulldup
```

```
No Modem             No Local_echo       No Autobaud          Hangup
```

```
No Brdcstmbx          No DMA             No Altypeahd         Set_speed
```

```
No Commsync           No Line Editing     Overstrike editing No  
Fallback
```

```
No Dialup            No Secure server    No Disconnect         No Pasthru
```

No Syspassword Printer Port	No SIXEL Graphics	No Soft Characters	No
Numeric Keypad Block_mode	No ANSI_CRT	No Regis	No
No Advanced_video DEC_CRT2	No Edit_mode	No DEC_CRT	No
No DEC_CRT3	No DEC_CRT4	VMS Style Input	

The page width is set for 72 columns.

- e. To correct the problem:

Delete the queue.

```
$ STOP/QUEUE/RESET COPY_QUE
```

```
$ SET DEV/NOSPOOL LTA2:
```

```
$ SET TERM LTA2:/PERM/WRAP/WIDTH=511
```

```
$ SET DEVICE/SPOOLED LTA2:
```

```
$ STOP/QUEUE/RESET COPY_QUE
```

2. Suggest a policy change to John to avoid this problem in the future on all print queues.

When setting the device characteristics, always set the line width to the maximum.

Laboratory Exercise for Troubleshooting OpenVMS cluster Systems

Exercise: Satellite Node Will Not Boot

The objective for this exercise is to use the troubleshooting methodology to solve satellite booting problems.

Greg Staley is the senior system and network manager for a large network. A junior system manager tried to add a satellite node to an OpenVMS cluster system.

He has not be able to get the satellite to boot and has called Greg to resolve the situation.

Your instructor will create three situations in which a satellite node will not boot. The problems may not be presented in the same order as the exercise solutions.

In the solution examples, the satellite and boot server are named:

- Boot server node *NODA*
- Satellite node *NODC*

Do the following for each case:

1. Try to boot the satellite <oparne>*NODC* and observe the error conditions.
2. Determine the cause of the problem.
2. Solve the problem and test your solution by successfully booting the satellite.
3. Document your solution.

Solution A: Enable Circuit on Boot Node



Note

In this case, you will disable the circuit service on the boot server node.

To prepare for this lab:

Disable circuit service on the boot server node (*NODA* in this example).

- Find the circuit designation for your system:

```
$ RUN SYS$SYSTEM:NCP
NCP> SHOW KNOWN CIRCUIT
```

```
Known Circuit Volatile Summary as of 17-DEC-1998 14:14:22
```

Circuit Name	State Routing Node	Loopback	Adjacent
-----------------	-----------------------	----------	----------

BNA-0	on	1.6	(ROUTER)
-------	----	-----	----------

```
NCP> EXIT
```

- Type in the file `DISABLE_CIRCUIT.COM` listed on the next instructor page. Use the proper circuit (BNA-0 in the above example).
- Submit the command file `DISABLE_CIRCUIT.COM` to batch on the boot server or run from `LAT` or `SYSMAN`. You cannot execute this procedure interactively if you have set host. The following message will display on the console terminal of the boot server.

```
%%%%%%%%%% OPCOM 17-DEC-1998 15:33:03.76 %%%%%%%%%%
Message from user DECNET on NODA
DECnet event 4.7, circuit down, circuit fault
From node 1.9 (NODA), 17-DEC-1998 15:33:03.71
Circuit BNA-0, Line synchronization lost
```

```
Message from user DECNET on NODA
DECnet event 4.10, circuit up
From node 1.9 (NODA), 17-DEC-1998 15:33:05.63
Circuit BNA-0
```

```
%%%%%%%%%% OPCOM 17-DEC-1998 15:33:15.67 %%%%%%%%%%
Message from user DECNET on NODA
DECnet event 4.15, adjacency up
From node 1.9 (NODA), 17-DEC-1998 15:33:15.66
```

```
Circuit BNA-0, Adjacent node = 1.6 (ROUTER)
```

1. Try to boot the satellite (*NODC*) and observe the error conditions.
You should see one of the following error messages on the satellite console when you attempt to boot the satellite:

- a. ?54 Retry
- b. Retrying network bootstrap

2. Determine the cause of the problem.

- a. To determine the cause of this problem, run NCP from the boot server node (*NODA*). Check the network requests going to the server by setting the logging monitor on and setting reply for network broadcast.

```
$ RUN NCP
```

```
NCP> SET LOGGING MONITOR STATE ON
```

```
NCP> SHOW LOGGING MONITOR STATUS
```

```
Logging Volatile Status as of 17-DEC-1998 14:06:25
```

```
Logging sink type = monitor
```

```
State      = on
```

```
NCP> EXIT
```

- b. Watch the network requests by enabling network broadcasts at your terminal.

```
$ REPLY/ENABLE=NETWORK
```

```
%%%%%%%%%% OPCOM 17-DEC-1998 14:07:28.70 %%%%%%%%%%
```

```
Operator _NODA$LTA5520: has been enabled, username SYSTEM
```

```
$
```

```
%%%%%%%%%% OPCOM 17-DEC-1998 14:07:28.75 %%%%%%%%%%
```

```
Operator status for operator _NODA$LTA5520:
```

```
NETWORK
```

- f. The absence of network requests received by the server when the satellite is attempting to boot is a sign that the network service is disabled or that some other Ethernet issue is present.

```
$ !DISABLE_CIRCUIT.COM
```

```
$ !This procedure will set service enable, look for any of its  
satellites
```

```
$ !that require a boot, initiate the boot, and set service  
disable when done.
```

```
$ !Change the BNA to QNA or ISA or whatever circuit you are  
using.
```

```
$ !Submit this command procedure to batch.
```

```
$!
```

```
$ SET NOON
```

```
$ !
$ node = f$getsyi("nodename")
$ !
$ !
$ DISABLE_SERVICE:
$!
$!
$ NCP ::= $NCP
$!
$ NCP SET CIRCUIT BNA-0 STATE OFF
$ NCP SET CIRCUIT BNA-0 SERVICE DISABLE
$ NCP SET CIRCUIT BNA-0 STATE ON
$!
$ EXIT
$!
```

Note

▲ Create a file to ENABLE circuit service quickly by editing the course file
ENABLE_BNA.COM.

```
$ !ENABLE_CIRCUIT.COM
$ !This procedure will set service enable, look for any of its
   satellites
$ !that require a boot, initiate the boot, and set service
   disable when done.
$ !Change the BNA to QNA or ISA or whatever circuit you are
   using.
$ SET NOON!
$ SET VERIFY!
$ !
$ !
$!
$ENABLE_SERVICE:
$!
$ NCP ::= $NCP
$!
$ NCP SET CIRCUIT BNA-0 STATE OFF
$ NCP SET CIRCUIT BNA-0 SERVICE ENABLE
```

```
$ NCP SET CIRCUIT BNA-0 STATE ON
$!
$ EXIT
```

2. Solve the problem and test your solution by successfully booting the satellite.

- a. From the boot server node (*NODA*), determine the circuit designation. In this example it is BNA-0.

```
$ RUN SYS$SYSTEM:NCP
NCP> SHOW KNOWN CIRCUIT CHAR
Known Circuit Volatile Summary as of 23-DEC-1998 14:14:22
```

Circuit Name	State Routing Node	Loopback	Adjacent
-----------------	-----------------------	----------	----------

BNA-0	on	1.6	(ROUTER)
-------	----	-----	----------

```
NCP> EXIT
$
```

- b. If the service is disabled on the Ethernet circuit, enter the following commands to enable circuit service on the boot server node:

```
$ RUN SYS$SYSTEM:NCP
NCP> SET CIRCUIT BNA-0 STATE OFF
NCP> SET CIRCUIT BNA-0 SERVICE ENABLE
NCP> SET CIRCUIT BNA-0 STATE ON
NCP> EXIT
```

- g. Boot the satellite and look for messages similar to the following:

```
%%%%%%%%%% OPCOM 17-DEC-1998 16:14:14.73 %%%%%%%%%%
Message from user DECNET on NODA
DECnet event 0.7, aborted service request
From node 1.9 (NODA), 17-DEC-1998 16:14:14.71
Circuit BNA-0, Line open error, Ethernet address = 08-00-2B-
02-E1-05
```

- h. If the condition has existed for a period of time, you may have to HALT the satellite and reboot.

- i. A message similar to the following is displayed when a boot is successful:

```
%%%%%%%%%% OPCO 17-DEC-1998 15:41:37.21 %%%%%%%%%%
```

```
Message from user DECNET on NODA
```

```
DECnet event 0.3, automatic line service
```

```
From node 1.9 (NODA), 17-DEC-1998 15:41:34.20
```

```
Circuit BNA-0, Load, Requested, Node = 1.6 (NODC)
```

```
File = DISK$NODA_RL4:<SYS2.>, Operating system
```

```
Ethernet address = 08-00-2B-0F-5A-CC
```

```
$
```

```
Message from user DECNET on NODA
```

```
DECnet event 0.3, automatic line service
```

```
From node 1.9 (NODA), 17-DEC-1998 15:41:34.20
```

```
Circuit BNA-0, Load, Requested, Node = 1.6 (NODC)
```

```
Circuit BNA-0, Load, Successful, Node = 1.6 (NODC)
```

```
File = DISK$NODA_RL4:<SYS2.>, Operating system
```

```
Ethernet address = 08-00-2B-0F-5A-CC
```

Solution B: Boot Server Node Database Problem



Note

In this case, all information about the satellite has been deleted from the network database.

To prepare for this lab, the instructor should:

- Remove all reference to the satellite (VAXC in this example) from NCP using “CLEAR” and “PURGE.” This must be done from the boot server node.

```
$ RUN NCP
NCP>CLEAR NODE NODC ALL

NCP>PURGE NODE NODC ALL
%NCP-I-SUCCESS, Success
Remote node = 1.6 (NODC)
%NML-I-RECDELET, Database entry deleted
NCP> EXIT
```

- On the boot server node (*NODA*), use NCP SHOW CIRCUIT CHAR command to make sure the network service is enabled.

When the students try to boot the satellite node, they will see one of two error messages depending the hardware used.

- ?54 retry
- Retrying network bootstrap

The students will check NETNODE_UPDATE.COM to see that the commands to load the satellite data are included and then execute the file on the boot server.

When the exercise is completed, the system should be restored to its original condition.

Note this situation is similar to that when the hardware information is entered incorrectly.

1. Try to boot the satellite (*NODC*) and observe the error conditions.

In this case, when you tried to boot the satellite, you should have seen an error message similar to one of the following:

- a. ?54 retry
- b. Retrying network bootstrap

Hint: These error messages are typically displayed when the satellite information has been deleted from or never entered into the boot server's local network database.

2. Determine the cause of the problem.

To confirm your conclusion, use NCP on the boot server node (*NODA*) for the satellite to display the characteristics of the satellite (*NODC* in this example).

```
$ RUN SYS$SYSTEM:NCP
```

```
NCP>SHOW NODE NODC CHARACTERISTICS
```

```
Node Volatile Characteristics as of 17-DEC-1998 13:45:03
```

```
%NCP-W-UNRCMP, Unrecognized component , Node
```

```
NCP>EXIT
```

```
$
```

2. Solve the problem and test your solution by successfully booting the satellite.

To resolve the problem:

- a. Search the boot server `SYS$MANAGER:NETNODE_UPDATE.COM` for the commands that define the satellite node network characteristics.

```
$ SEARCH SYS$SYSTEM:NETNODE_UPDATE.COM NODC
```

```
define node NODC address 1.6
```

```
define node NODC hardware address 08-00-2B-0F-5A-CC
```

```
define node NODC load assist agent sys$share:niscs_laa.exe
```

```
define node NODC load assist parameter DISK$NODA_RL4:<SYS2.>
```

```
define node NODC tertiary loader sys$system:tertiary_vmb.exe
```

- b. If the commands are found, run `NETNODE_UPDATE.COM`. In this example the procedure was submitted to the batch queue.

```
$ SUBMIT/QUEUE=NODA$BATCH SYS$MANAGER:NETNODE_UPDATE.COM
```

```
Job NETNODE_UPDATE (queue NODA$BATCH, entry 118) started on  
NODA$BATCH
```

- j. After running the job, check the network database for the satellite network characteristics.

```
$ MCR NCP
```

```
NCP> SHOW NODE NODC CHARACTERISTICS
```

```
Node Volatile Characteristics as of 17-DEC-1998 13:51:32
```

```
Remote node = 1.6 (NODC)
```

```
Hardware address    = 08-00-2B-0F-5A-CC
```

```
Tertiary loader     = SYS$SYSTEM:TERTIARY_VMB.EXE
```

```
Load Assist Agent   = SYS$SHARE:NISCS_LAA.EXE
```

```
Load Assist Parameter = DISK$NODA_RL4:<SYS12.>
```

```
NCP> EXIT
```

- k. Boot the satellite. If this condition has existed too long, you may have to HALT the satellite and reboot it.

Solution C: Ethernet Address Error



Note

To create the environment for this lab, you will change the hardware address for a satellite node (*NODC*) in the database of the load host *NODA*.

To prepare for this lab:

- Change the hardware address for a satellite node (*NODC*). Change the hardware address for example from “08-00” to “00-08”. Note: NOD nodes always have “08-00-2B” prefix for the Ethernet address.
- Do this by running `CLUSTER_CONFIG` and selecting “Change satellite Ethernet Address.”

In NCP, show node *NODC* characteristics.

```
$ MCR NCP
NCP> SHOW NODE NODC CHARACTERISTICS

Node Volatile Characteristics as of 26-DEC-1996 15:26:52

Remote node = 1.6 (NODC)

Hardware address    = 00-08-2B-0F-5A-CC
Tertiary loader     = SYS$SYSTEM:TERTIARY_VMB.EXE
Load Assist Agent   = SYS$SHARE:NISCS_LAA.EXE
Load Assist Parameter = DISK$VMSRL5:<SYS2.>
NCP>EXIT
$
```

1. Try to boot the satellite (*NODC*) and observe the error conditions.

In this case, when you try to boot the satellite, you should see an error message similar to one of the following:

- a. ?54 retry
- b. Retrying network bootstrap

3. Determine the cause of the problem.
 - a. Check to see that the network service is enabled. From the boot server node (*NODA*), run the Network Control Program.

```
$ MCR NCP
```

```
NCP> SHOW KNOWN CIRCUIT
```

```
Known Circuit Volatile Summary as of 23-DEC-1998 14:14:22
```

Circuit Name	State Routing	Loopback Node	Adjacent
-----------------	------------------	------------------	----------

ISA-0	on	1.6 (ROUTER)	
-------	----	--------------	--

```
NCP> EXIT
```

```
NCP> SHOW CIR ISA-0 CHAR
```

```
Circuit Volatile Characteristics as of 26-DEC-1996 16:02:27
```

```
Circuit = ISA-0
```

```
State = on
```

```
Service = enabled
```

```
Counter timer = 28800
```

```
Designated router = 1.6 (ROUTER)
```

```
Cost = 4
```

```
Maximum routers allowed = 33
```

```
Router priority = 64
```

```
Hello timer = 15
```

```
Type = Ethernet
```

```
Adjacent node = 1.6 (ROUTER)
```

```
Listen timer = 45
```

```
NCP> EXIT
```

- b. Check the network to be sure the server knows the satellite's characteristics.

```
NCP>SHOW NODE NODC CHARACTERISTICS
```

```
Node Volatile Characteristics as of 26-DEC-1998 15:36:40
```

```
Remote node = 1.6 (NODC)
```

```
Hardware address      = 00-08-2B-0F-5A-CC
```

```
Tertiary loader       = SYS$SYSTEM:TERTIARY_VMB.EXE
```

```
Load Assist Agent     = SYS$SHARE:NISCS_LAA.EXE
```

```
Load Assist Parameter  = DISK$VMSRL5:<SYS2.>
```

```
NCP>
```

- c. Notice that this display shows the Ethernet address prefix 00-08. This is wrong. The prefix should be 08-00.
 - c. Solve the problem and test your solution by successfully booting the satellite.
- 4. Use CLUSTER_CONFIG to correct the Ethernet address.

