



Unit 7

Devices



Unit objectives

After completing this unit, you should be able to:

- Describe the difference between logical and physical devices
- Describe the purpose of the ODM predefined and customized databases
- Describe the different states of a device
- Describe the format of device location codes
- Use SMIT to add/show/change/delete devices

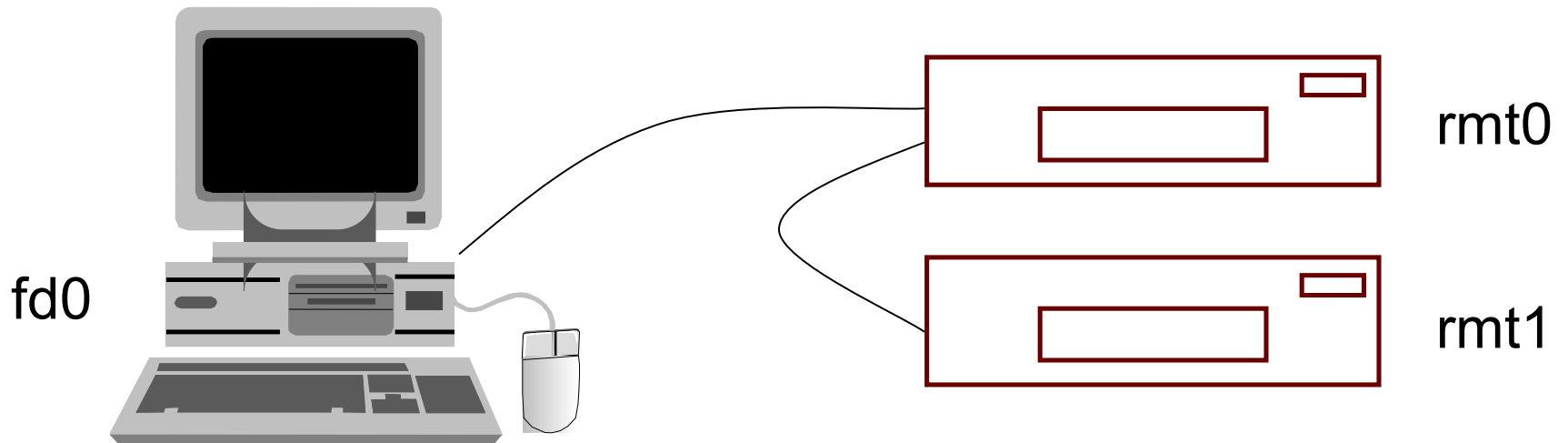
Device terminology

- Physical Devices
- Ports
- Device Drivers
- Logical Devices
- **/dev** Directory

Listing of /dev directory

```
# ls -l /dev
```

```
brw-rw--rw    1    root    system    20,0  Oct 29 02:25    fd0
brw-rw--rw    1    root    system    20,64 Oct 29 02:26    fd1
crw-rw--rw    1    root    system    20,0  Oct 29 02:25    rfd0
crw-rw--rw    1    root    system    20,64 Oct 29 02:26    rfd1
:
:
crw-r--r--    1    root    system    22,0  Oct 29 02:25    rmt0
crw-r--r--    1    root    system    22,1  Oct 29 02:25    rmt0.1
:
:
brw-----    1    root    system    14,1  Oct 29 02:44    hdisk0
brw-----    1    root    system    14,2  Nov  1 05:31    hdisk1
crw-----    2    root    system    14,1  Oct 29 02:44    rhdisk0
crw-----    1    root    system    14,2  Nov  1 05:31    rhdisk1
```



Device configuration database

Predefined Configuration Database

Class	Type	Subclass	Description
memory	totmem	sys	Memory
tape	4mm4gb	scsi	4.0 GB 4mm Tape Drive
disk	osdisk	scsi	Other SCSI Disk Drive
adapter	23100020	pci	IBM 10/100Mbps Ethernet PCI Adapter (23100020)
adapter	14101800	pci	IBM PCI Tokenring Adapter (14101800)
adapter	chrp_ecp	isa_sio	CHRP IEEE1284 (ECP) Parallel Port Adapter
adapter	keyboard	kma chrp	Keyboard Adapter

Customized Configuration Database

Name	Status	Location	Description
sa0	Available	01-S1	Standard I/O Serial Port
sioka0	Available	01-K1-00	Keyboard Adapter
rmt0	Available	10-80-00-0.0	SCSI 4mm Tape Drive
hdisk0	Available	10-80-00-4,0	16 Bit SCSI Disk Drive
hdisk1	Available	10-80-00-5,0	16 Bit SCSI Disk Drive
mem0	Available		Memory
ent0	Available	10-60	IBM 10/100 Mbps Ethernet PC Adapter (23100020)

lft	lft	node	Low Function Terminal Subsystem
diskette	fd	siofd	Diskette Drive
printer	ibm4019	parallel	IBM 4019 LaserPrinter

List all supported devices

PdDv (Predefined Devices)

```
# lsdev -P -H
```

class	type	subclass	description
memory	totmem	sys	Memory
tape	4mm4gb	scsi	4.0 GB 4mm Tape Drive
disk	osdisk	scsi	Other SCSI Disk Drive
adapter	22100020	pci	IBM PCI Ethernet Adapter (22100020)
adapter	14101800	pci	IBM PCI Tokenring Adapter (14101800)
adapter	ppa	isa_sio	Standard I/O Parallel Port Adapter
adapter	isa_keyboard	isa_sio	Keyboard Adapter
. .			
. .			

```
# lsdev -Pc tape
```

tape	1200mb-c	scsi	1.2 GB 1/4-Inch Tape Drive
tape	150mb	scsi	150 MB 1/4-Inch Tape Drive
tape	3490e	scsi	3490E Autoloading Tape Drive
tape	4mm2gb	scsi	2.0 GB 4mm Tape Drive
. .			
. .			

List all defined devices

CuDv (Customized Devices)

```
# lsdev -C -H

name          status      location      description
sys0          Available   System        Object
pci0          Available   PCI Bus
isa0          Available   10-58         ISA Bus
sa0           Available   01-S1         Standard I/O Serial Port
scsi0         Available   10-80         Wide/Fast-20 SCSI I/O Controller
cd0           Available   10-80-00-3,0 SCSI Multimedia CD-ROM Drive
rmt0          Defined     10-80-00-6,0 4.0 GB 4mm Tape Drive
hdisk0        Available   10-80-00-4,0 16 Bit SCSI Disk Drive
hdisk1        Available   10-80-00-5,0 16 Bit SCSI Disk Drive
mem0          Available                                     Memory
ent0          Available   10-60         IBM 10/100 Mbps Ethernet PCI
tok0          Available   10-90         IBM PCI Tokenring Adapter

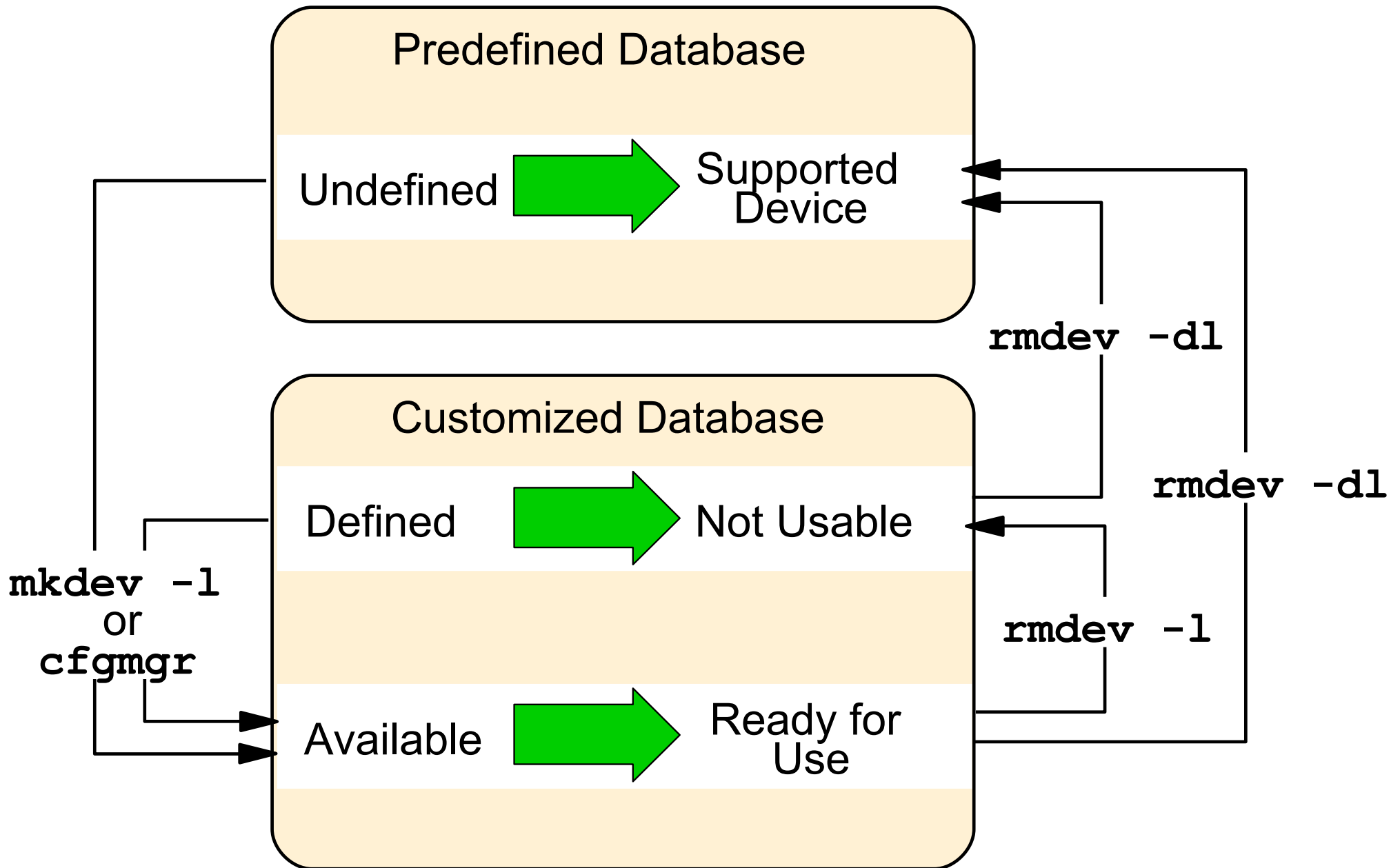
# lsattr -EH -l sys0

attribute value      description                                     user_settable
keylock   normal    State of system keylock at boot time         False
realmem   131072    Amount of usable physical memory Kbytes       False
iostat    true      Continuously maintain DISK I/O history        True

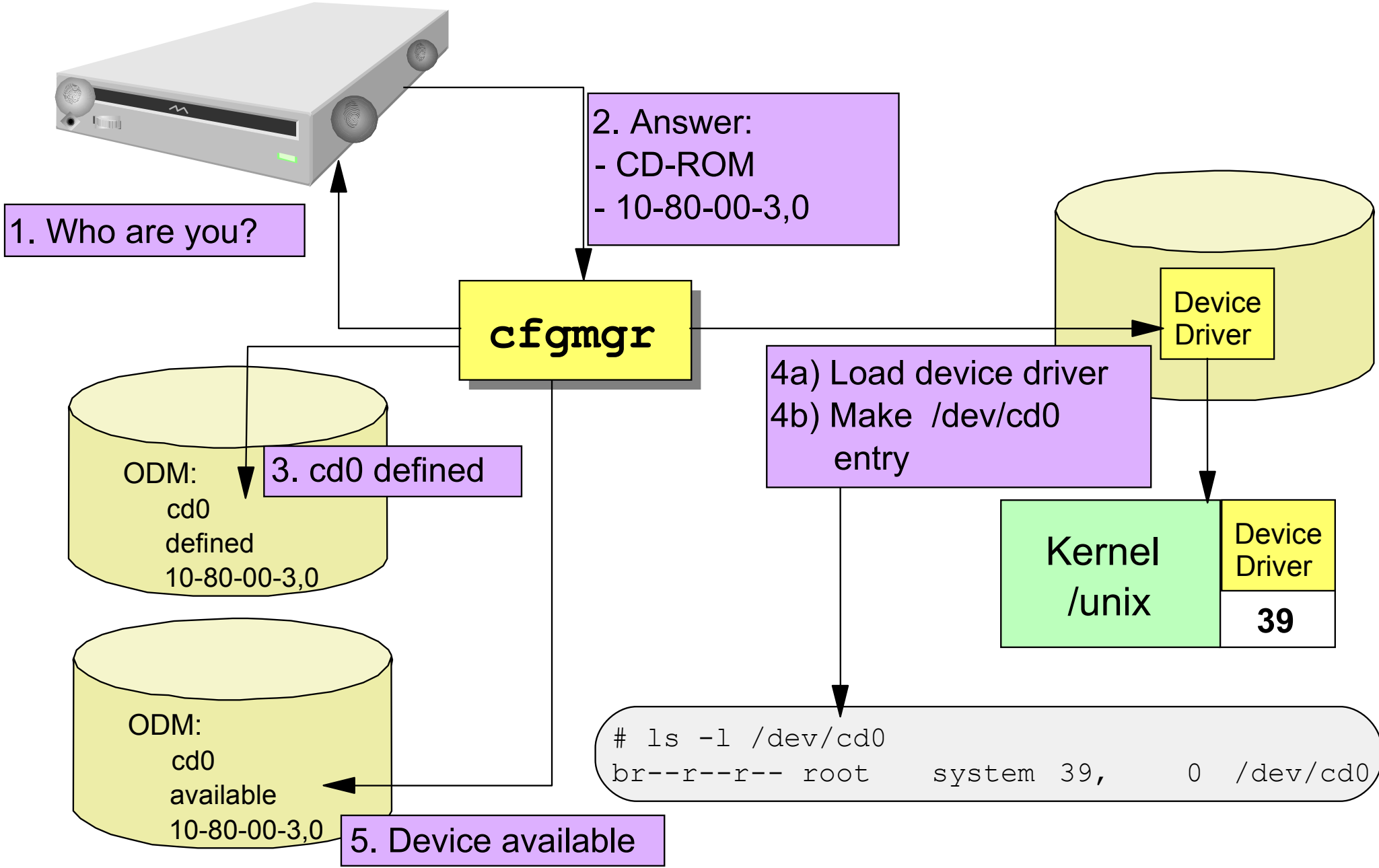
# lsattr -E -l sys0 -a realmem

realmem   131072    Amount of usable physical memory in Kbytes    False
```

Device states



Self-configuring devices



SMIT Devices menu

smit devices

Devices

Move cursor to desired item and press Enter.
Install/Configure Devices Added After IPL
Printer/Plotter
TTY
Asynchronous Adapters
PTY
Console
MPIO Management
Fixed Disk
Disk Array
CD ROM Drive
Read/Write Optical Drive
Diskette Drive
Tape Drive
Communications
Graphic Displays
Graphic Input Devices
Low Function Terminal (LFT)
SCSI Initiator Device
SCSI Adapter
FC Adapter
IDE Adapter
iSCSI
Asynchronous I/O
Multimedia
List Devices
Configure/Unconfigure Devices
Install Additional Device Software
PCI Hot Plug Manager
SSA Disks
SSA RAID Arrays

Device addressing

- Location codes are used for device addressing
- The location code for a device is a path from the adapter in the CPU drawer or system unit, through the signal cables and the asynchronous distribution box (if there is one) to the device
- Location codes consist of up to four fields of information depending on the type of device
- Location codes differ based on model type

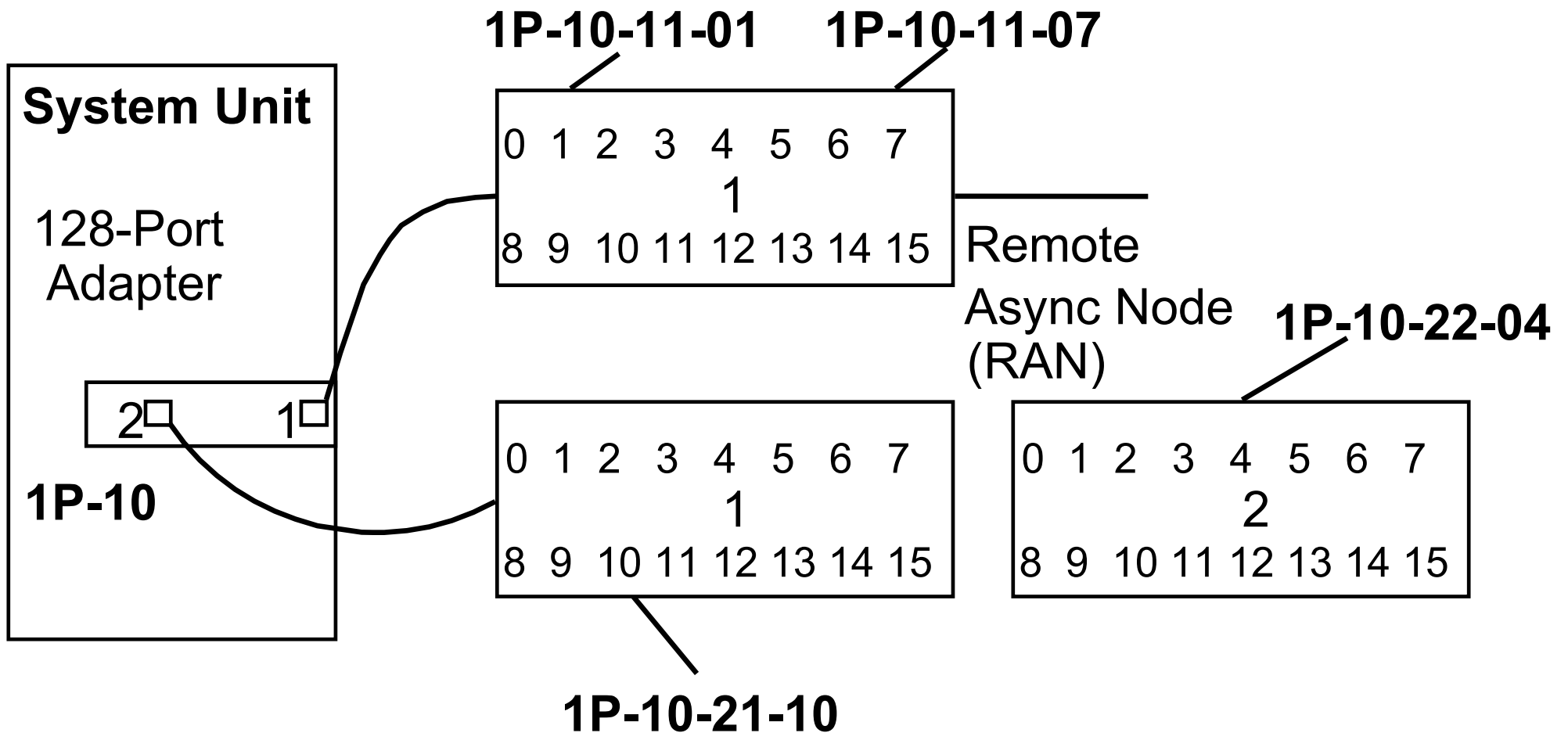
Location code format for PCI devices

AB-CD-EF-GH

AB	00	Resources attached to the processor
	01	Resources attached to the ISA bus
	04	Resources attached to the PCI bus (only)
	XY	Resources attached to the XY PCI bus (For example - 10 or 1P)
CD	01-99	For pluggable adapters/cards
	A-Z,0	As position 1 and 2 respectively for integrated adapters
EF		The connector ID
GH		Port identifier, address, memory modules, device, FRU for the device

Location code example: Non-SCSI

128-Port Asynchronous Controller



Location code format for SCSI devices

AB-CD-EF-G,H

AB-CD

Identifies the bus and the adapter location
Same as with non-SCSI devices

EF

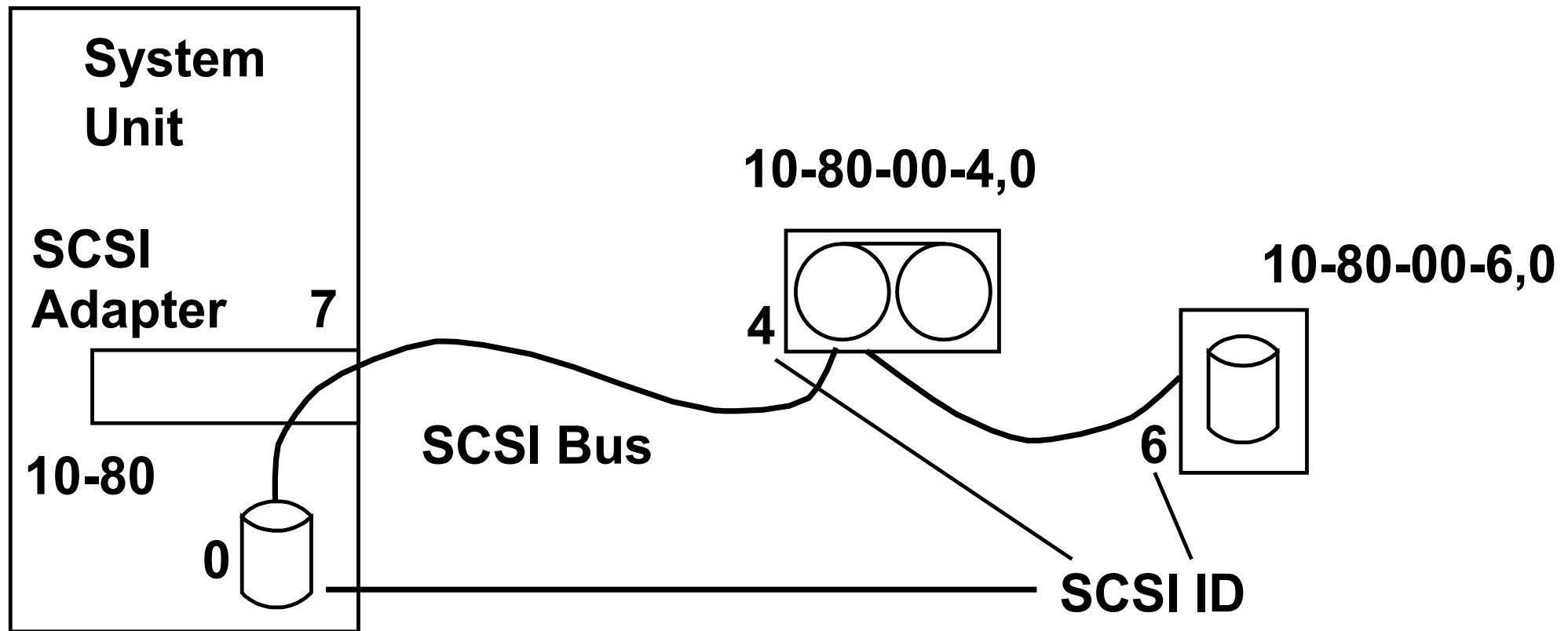
For a single SCSI bus - 00
For a dual SCSI bus:
 Internal bus - 00
 External bus - 01

G,H

G = SCSI address (SCSI ID) of the device
H = Logical unit number of the device

Location code example for SCSI device

SCSI Devices (Disk, Tape, CD-ROM)



Physical location codes

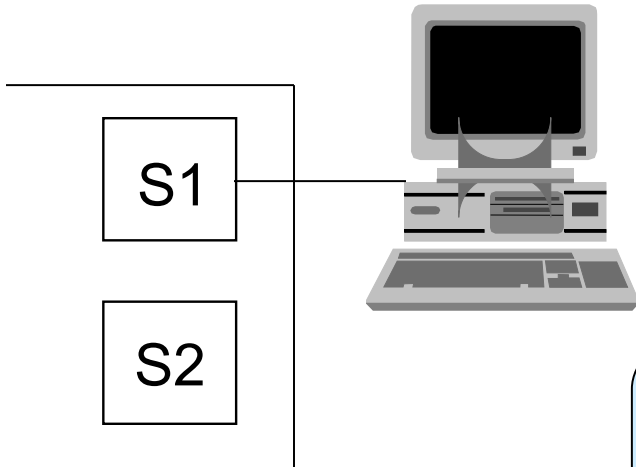
- Assigned by system firmware
- Used to uniquely identify hardware for:
 - Assigning adapters to logical partitions
 - Identifying field replaceable units (FRU)
- Structure of a physical location code:
 - <enclosure>.<planar>.<slot>-<port>-<logical location>
 - Enclosure is usually:
 <machine type>.<model>.<serial#>
 - Example, **U787A.001.DNZ0713-P1-C3**
- Displayed by default with **lscfg** command

Listing device physical locations

CuDv Customized Devices

```
# lsdev -C -H -F "name status physloc location description"
name      status    physloc                                     location    description
en1       Defined                                               01-08      Standard Ethernet Network
ent1      Defined   U789D.001.DQDWAYT-P1-C4-T1                01-08      10/100/1000 Base-TX
et1       Defined                                               01-08      IEEE 802.3 Ethernet
hdisk2    Defined   U7311.D20.107F67B-P1-C04-A8                02-08-01-8,0 16 Bit LVD SCSI Disk
hdisk3    Defined   U7311.D20.107F67B-P1-C04-A9                02-08-01-9,0 16 Bit LVD SCSI Disk
scsi0     Defined   U7311.D20.107F67B-P1-C04                  02-08-00     PCI X Dual Channel
scsi1     Defined   U7311.D20.107F67B-P1-C04                  02-08-01     PCI X Dual Channel
ses0      Defined   U7311.D20.107F67B-P1-C04-AF                02-08-01-15,0 SCS Enclosure Services
sisscsia0 Defined   U7311.D20.107F67B-P1-C04                  02-08       PCI XDDR Dual Channel
```

Adding an ASCII terminal



TTY

Move cursor to desired item and press Enter.

List All Defined TTYS

Add a TTY

Move a TTY to Another Port

Change / Show Characteristics of a TTY

Remove a TTY

Configure a Defined TTY

Generate an Error Report

Trace a TTY

F1=Help

F2=Refresh

F3=Cancel

F8=Image

F9=Shell

F10=Exit

Enter=Do

Attachment

TTY Type

Move cursor to desired item and press Enter.

```
tty rs232 Asynchronous Terminal
tty rs422 Asynchronous Terminal
```

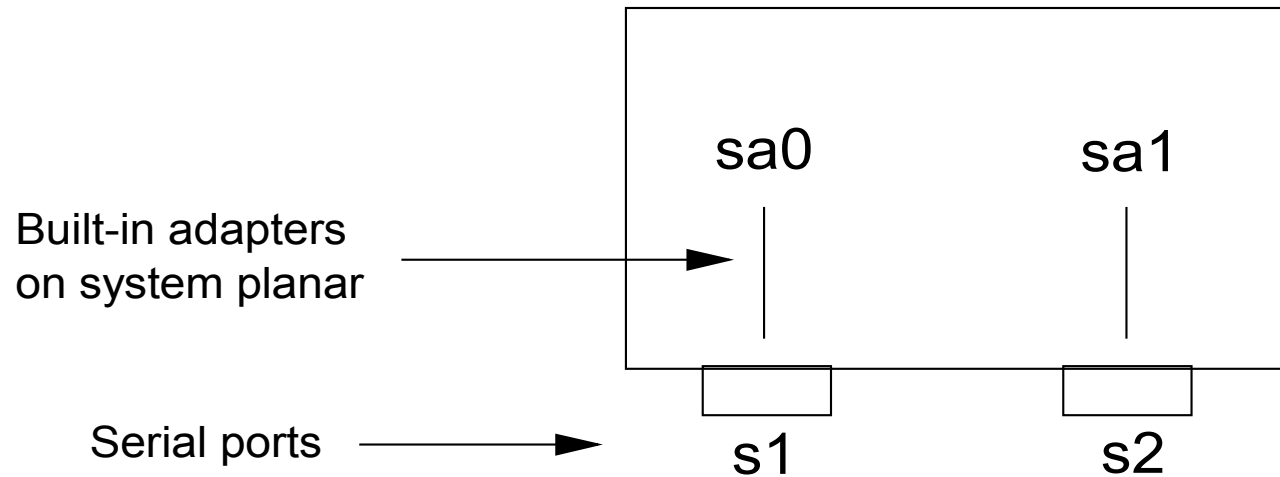
Parent Adapter

Move cursor to desired item and press Enter.

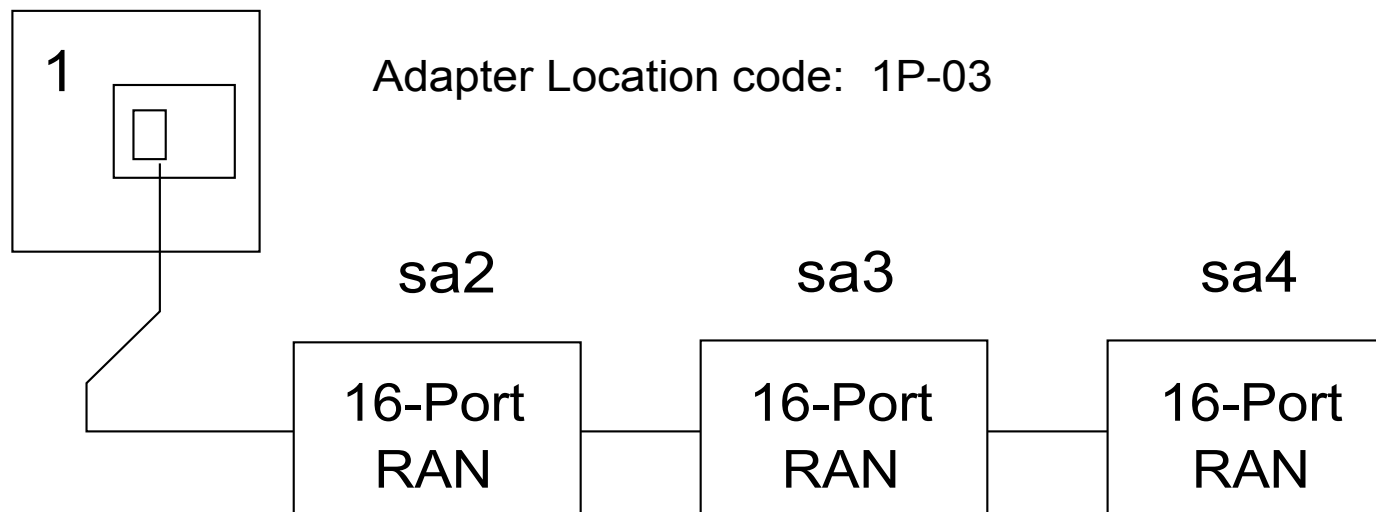
```
sa0 Available 01-S1 Standard I/O Serial Port 1
sa1 Available 01-S2 Standard I/O Serial Port 2
sa2 Available 1P-03-11 16-Port RAN EIA-232 for 128-Port
adapter
sa3 Available 1P-03-12 16-Port RAN EIA-232 for 128-Port
adapter
sa4 Available 1P-03-13 16-Port RAN EIA-232 for 128 Port
adapter
```

Device nomenclature

For the built-in serial connection, the nomenclature looks like this:



For the 128-port adapter, the nomenclature looks like this:



Add a TTY

Add a TTY

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

[TOP]	[Entry Fields]
TTY type	tty
TTY interface	rs232
Description	Asynchronous Terminal
Parent adapter	sa0
* PORT number	[] + ←
Enable LOGIN	disable + ←
BAUD rate	[] +
PARITY	[none] +
BITS per character	[8] +
Number of STOP BITS	[1] +
TIME before advancing to next port setting	[0] + #
TERMINAL type	[dumb] + ←
FLOW CONTROL to be used	[xon] +

[MORE...31]

F1=Help

F2=Refresh

F3=Cancel

F4=List

Esc+5=Reset

Esc+6=Command

Esc+7=Edit

Esc+8=Image

Esc+9=Shell

Esc+0=Exit

Enter=Do

Documenting hardware configuration

- **lsdev -CH**
 - Provides name, status, location, and description of devices
- **lscfg -v**
 - Provides details of all devices including manufacturer, type and model number, and part numbers
- **lsattr -El sys0**
 - Provides attributes for the name device (for example, **sys0**)
 - Run command for all devices
- **getconf -a**
 - Provides the values of all system configuration variables

Checkpoint (1 of 2)

1. Is it possible to use SCSI ID 7 for a new tape drive?

3. Use the output on the next visual (`lsdev -C -H`) to answer the following four questions.

a) What happens if we attempt to add another device with the SCSI address set to 4?

b) Can the 8 mm tape drive be currently used? Why?

• Where is the printer connected?

d) The Ethernet adapter is installed in what slot?

Checkpoint (2 of 2)

```
# lsdev -C -H
name      status      location      description
sys0      Available
pci0      Available    PCI Bus
isa0      Available    10-58         ISA Bus
ppa0      Available    01-R1         Standard I/O Parallel Port Adapter
lp0       Available    01-R1-00-00   IBM 4039 LaserPrinter
sa0       Available    01-S1         Standard I/O Serial Port 1
tty0      Available    01-S1-00-00   Asynchronous Terminal
mem0      Available
scsi0     Available    10-80         Wide SCSI I/O Controller
rmt0      Defined      10-80-00-3,0  5.0 GB 8 mm Tape Drive
hdisk0    Available    10-80-00-4,0  SCSI Disk Drive
ent0      Available    10-60         IBM PCI 10/100 Ethernet Adapter
```


Checkpoint solutions

1. Is it possible to use SCSI ID 7 for a new tape drive?

No. The SCSI adapter itself uses ID 7. So, it cannot be used for other devices.

3. Use the output on the next visual (`lsdev -C -H`) to answer the following four questions.

a) What happens if we attempt to add another device with the SCSI address set to 4?

The operation fails as there is already a device (SCSI Disk Drive) configured at this location.

c) Can the 8 mm tape drive be currently used? Why?

No, because it is in the defined state. You have to first make it available by either using SMIT or the `mkdev` command.

• Where is the printer connected? The parallel port

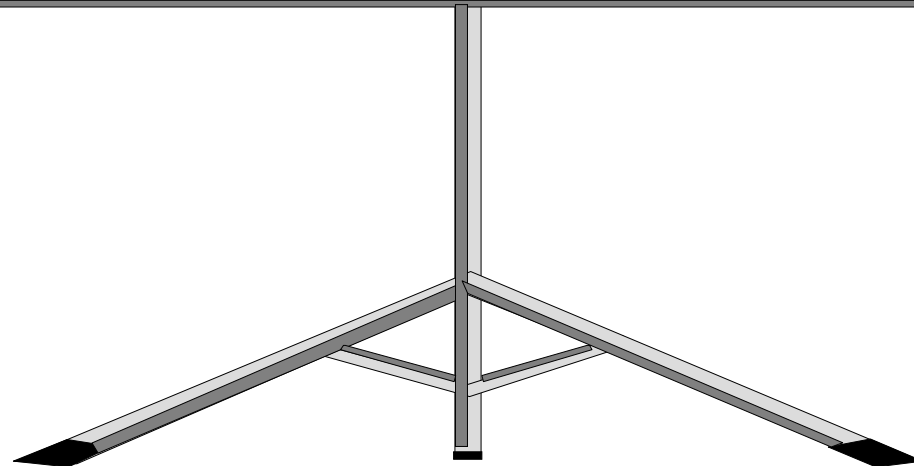
• The Ethernet adapter is installed in what slot?

It is an integrated adapter which does not occupy a slot on the PCI bus.

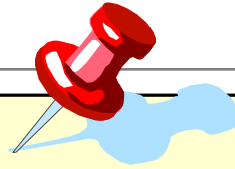
Exercise 7: Devices



- List device configuration
- List and change system parameters
- Configure a tape device
- Configure a CD-ROM device



Unit summary



- A physical device is the actual hardware attached to the system.
- A logical device is the software interface used by programs and users to access a physical device.
- Device information is stored in the ODM in two databases: customized and predefined
- Devices can exist in a number of different states: unavailable, defined, available and stopped
- Location codes are used to describe exactly where a device is connected into the system.
- Device attributes can be modified through SMIT.
- To create, modify, or remove device definitions, it is sometimes necessary to use commands such as **mkdev**, **chdev**, and **rmdev**.