



System Initialization Part 2

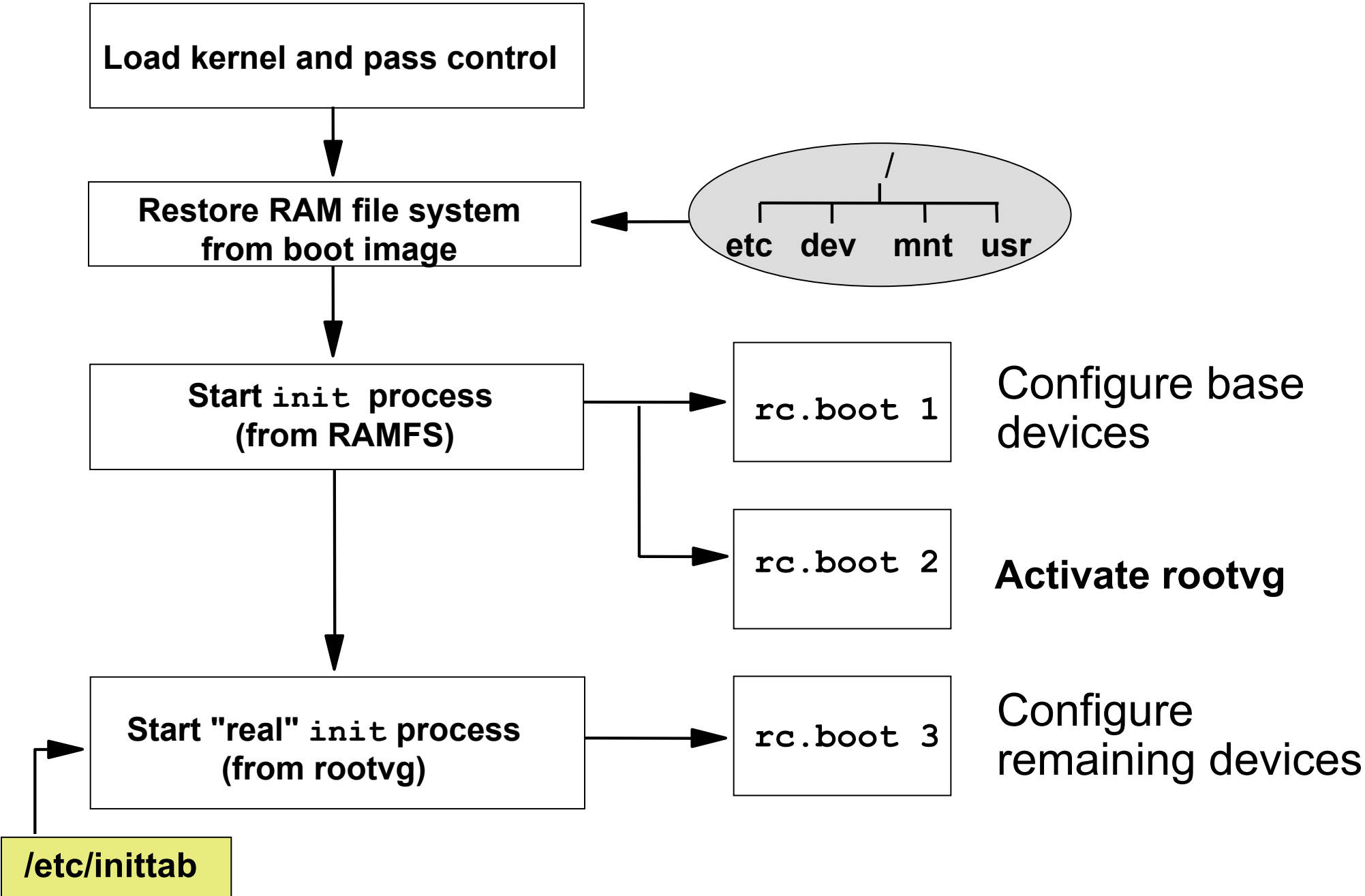


Unit Objectives

After completing this unit, you should be able to:

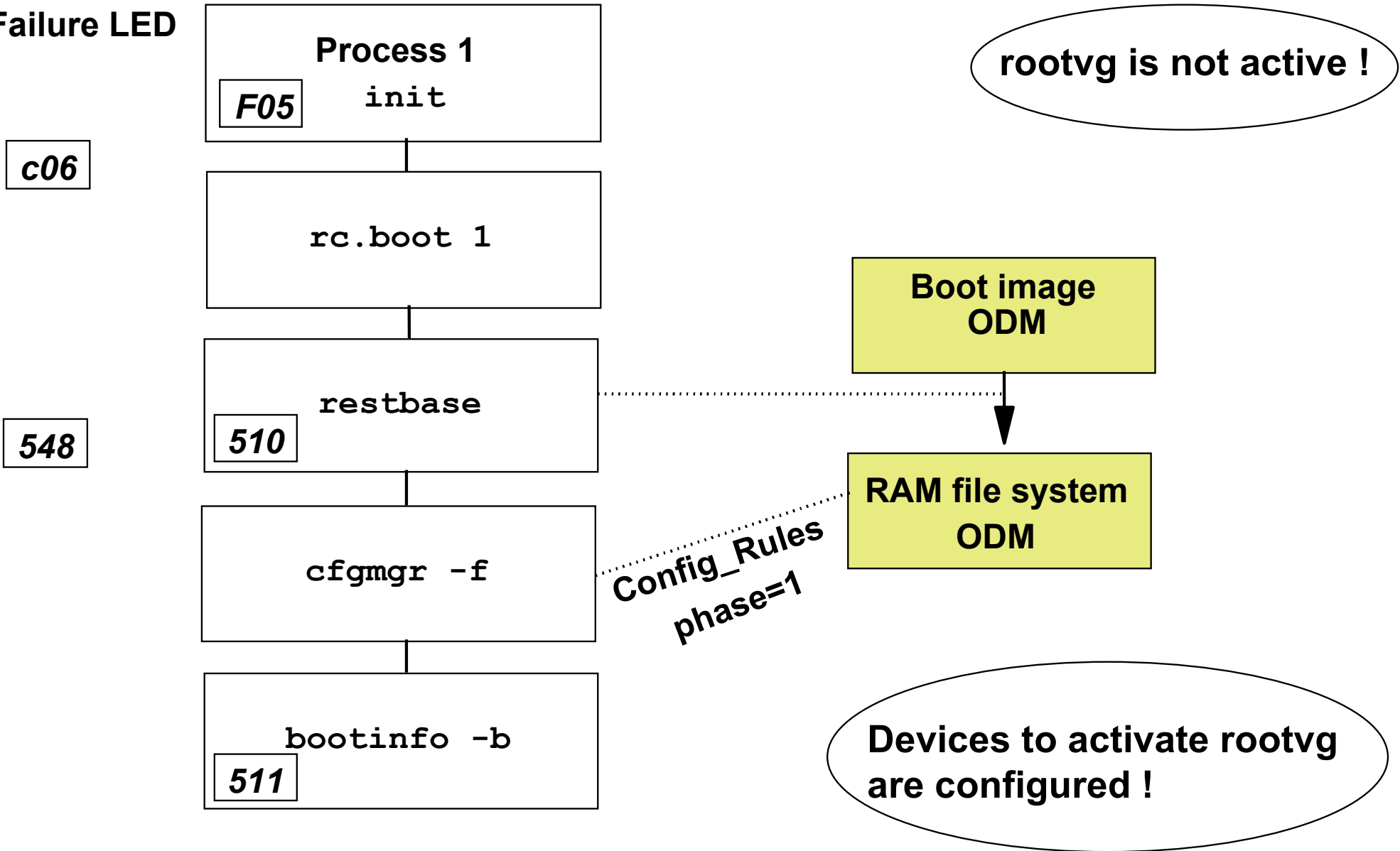
- Identify the steps in system initialization from loading the boot image to boot completion
- Identify how devices are configured during the boot process
- Analyze and solve boot problems

System Software Initialization Overview

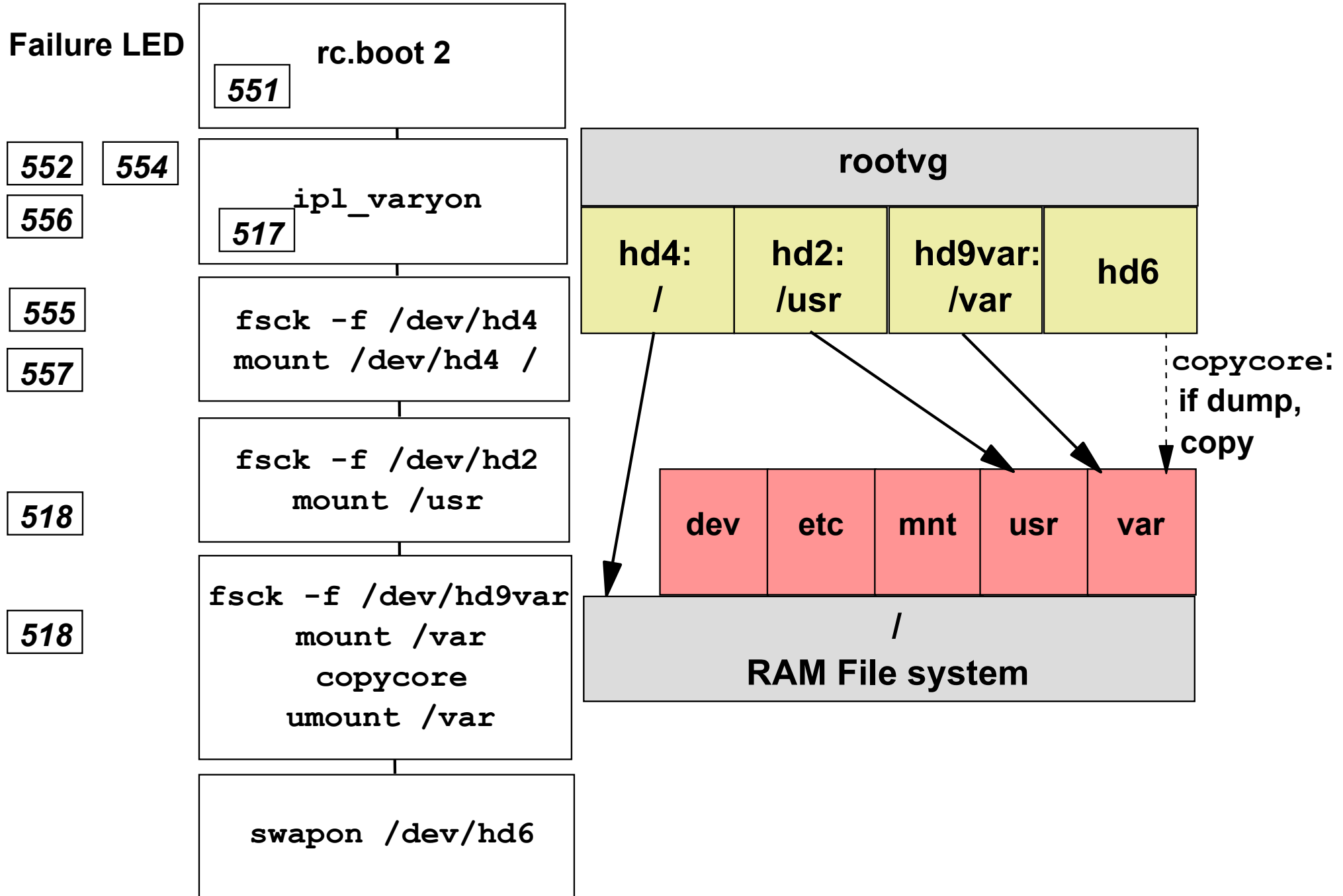


rc.boot 1

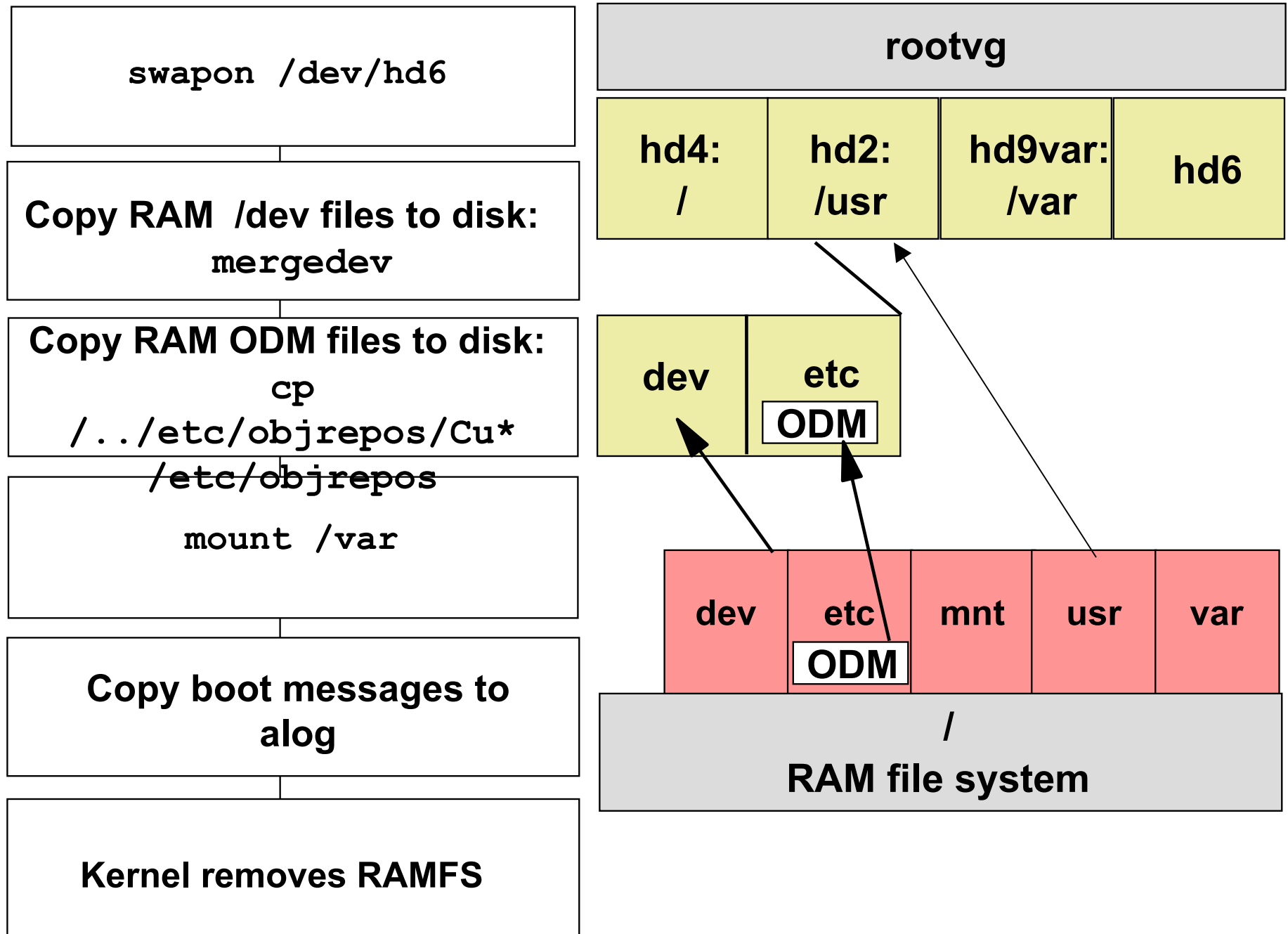
Failure LED



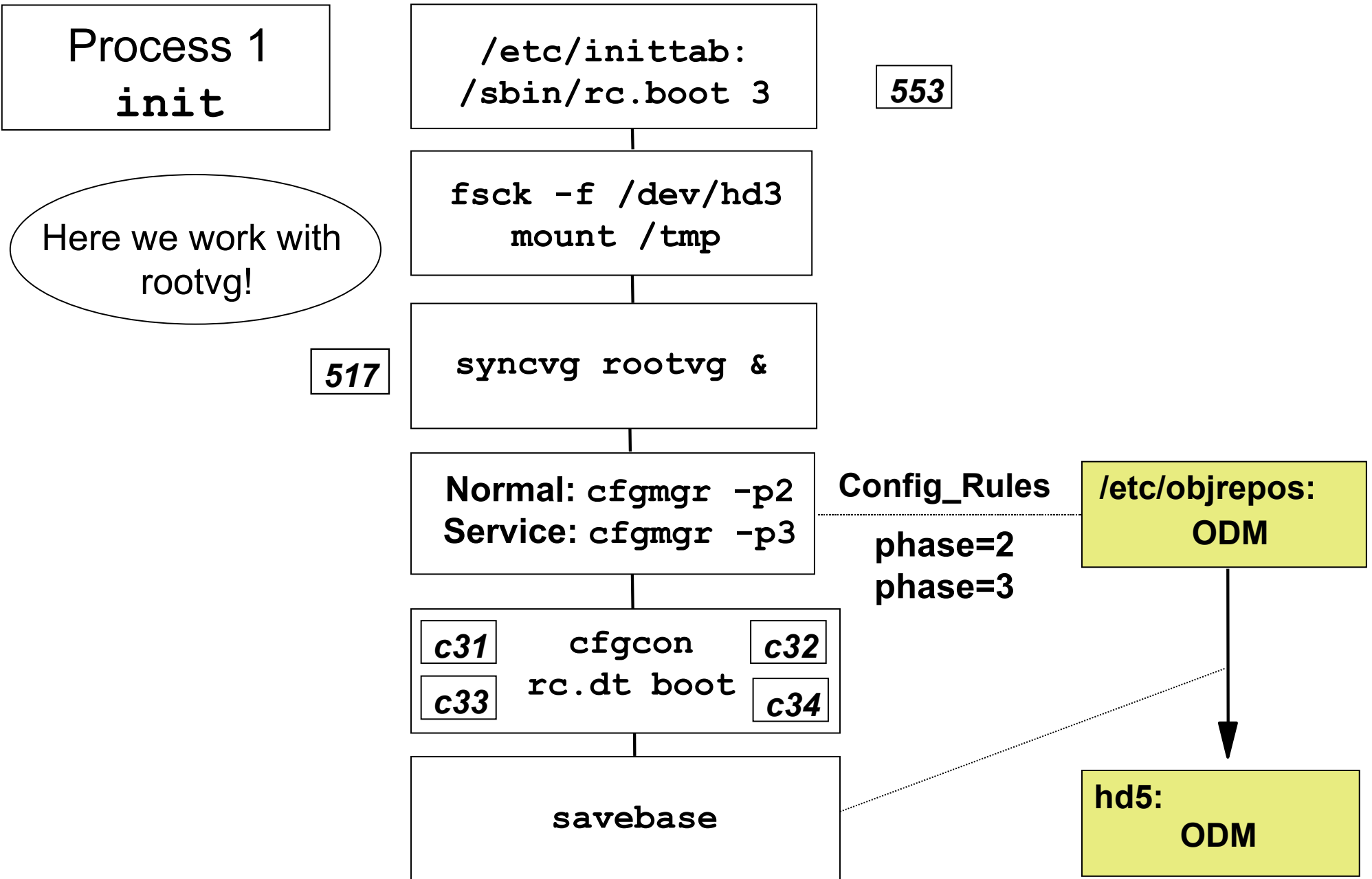
rc.boot 2 (Part 1)



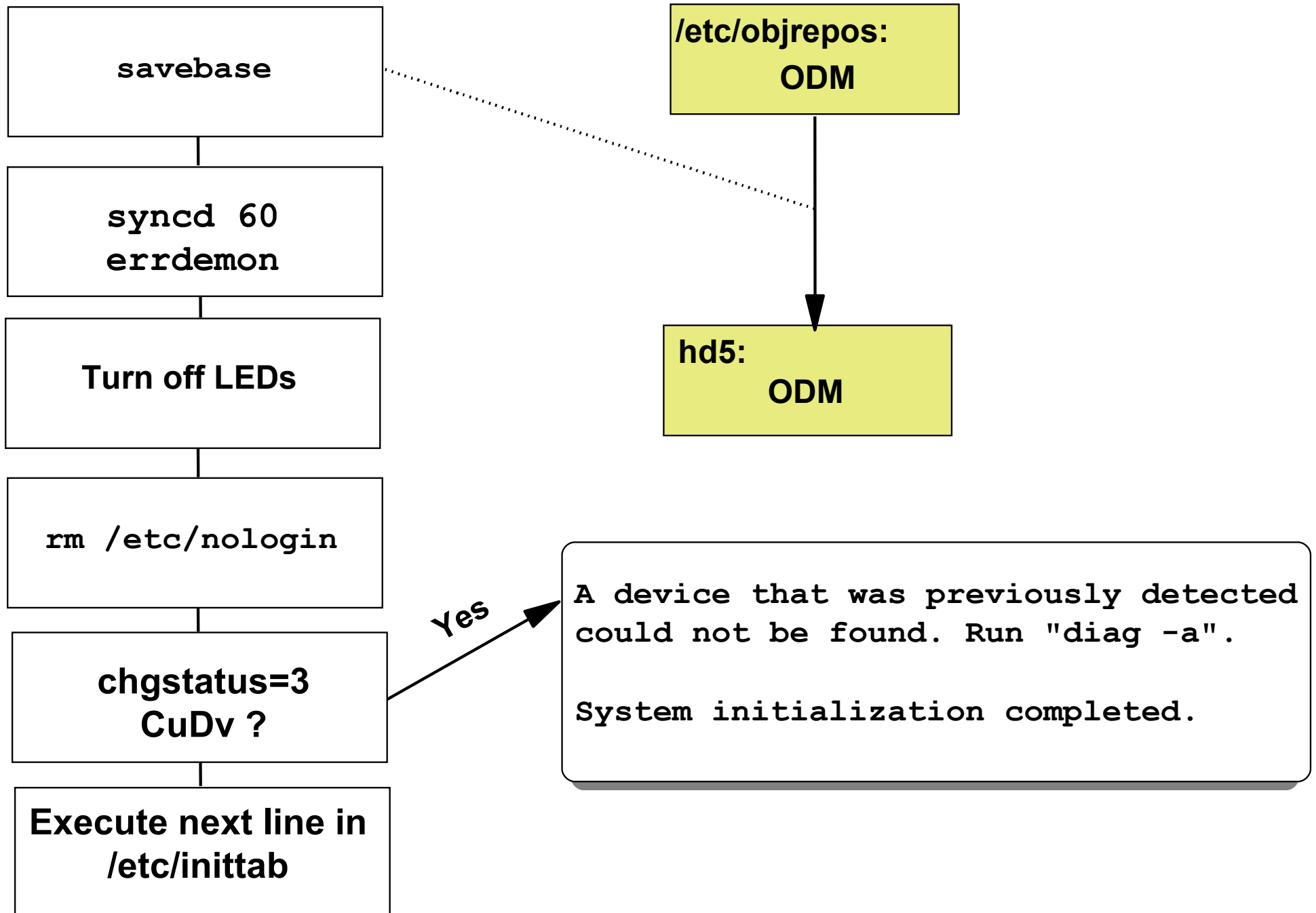
rc.boot 2 (Part 2)



rc.boot 3 (Part 1)



rc.boot 3 (Part 2)

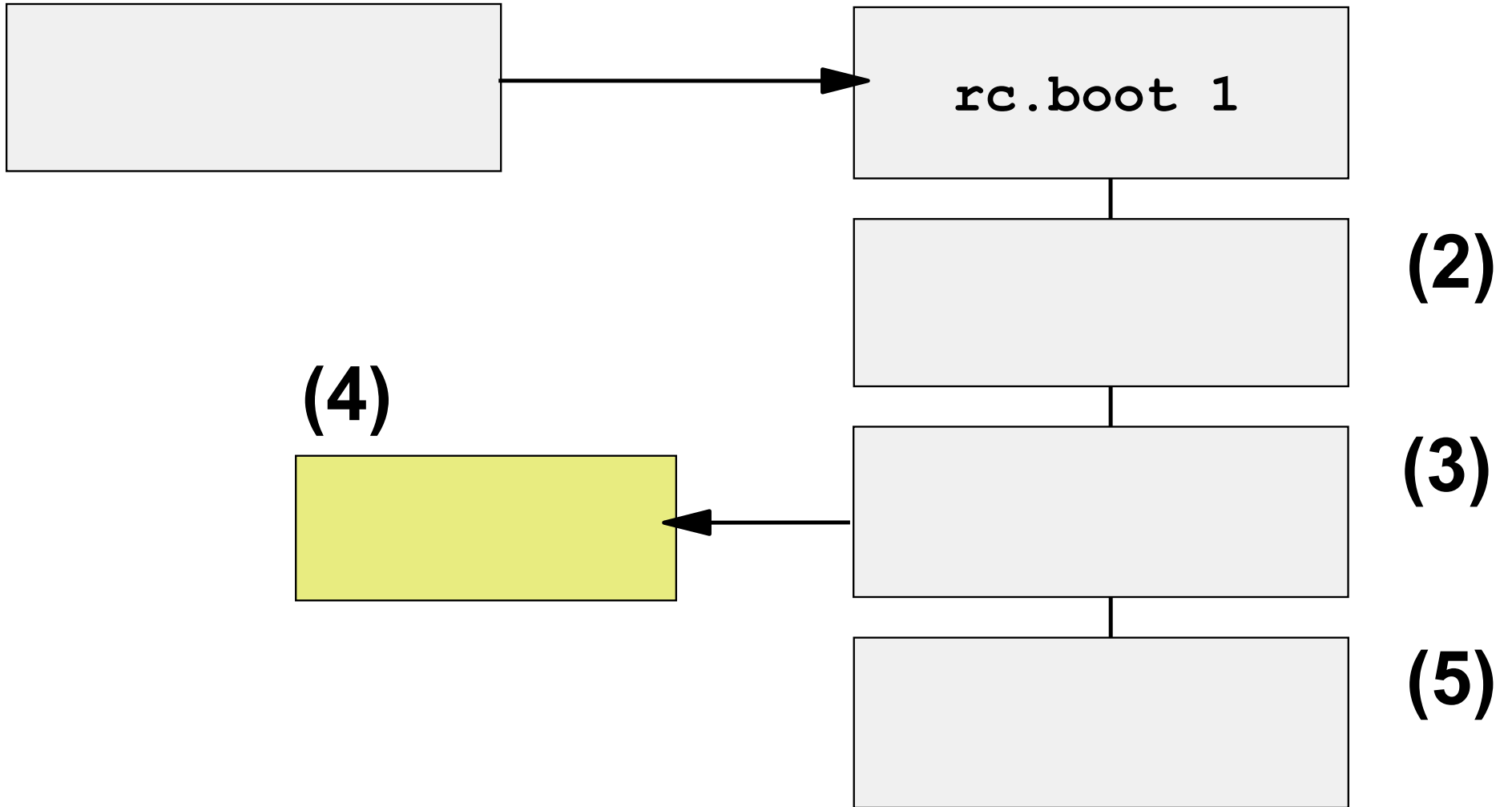


rc.boot Summary

	Where From	Action	Phase Config_Rules
<code>rc.boot 1</code>	<code>/dev/ram0</code>	<code>restbase</code> <code>cfgmgr -f</code>	1
<code>rc.boot 2</code>	<code>/dev/ram0</code>	<code>ipl_varyon</code> <code>rootvg</code> Merge /dev Copy ODM	
<code>rc.boot 3</code>	<code>rootvg</code>	<code>cfgmgr -p2</code> <code>cfgmgr -p3</code> <code>savebase</code>	2-normal 3-service

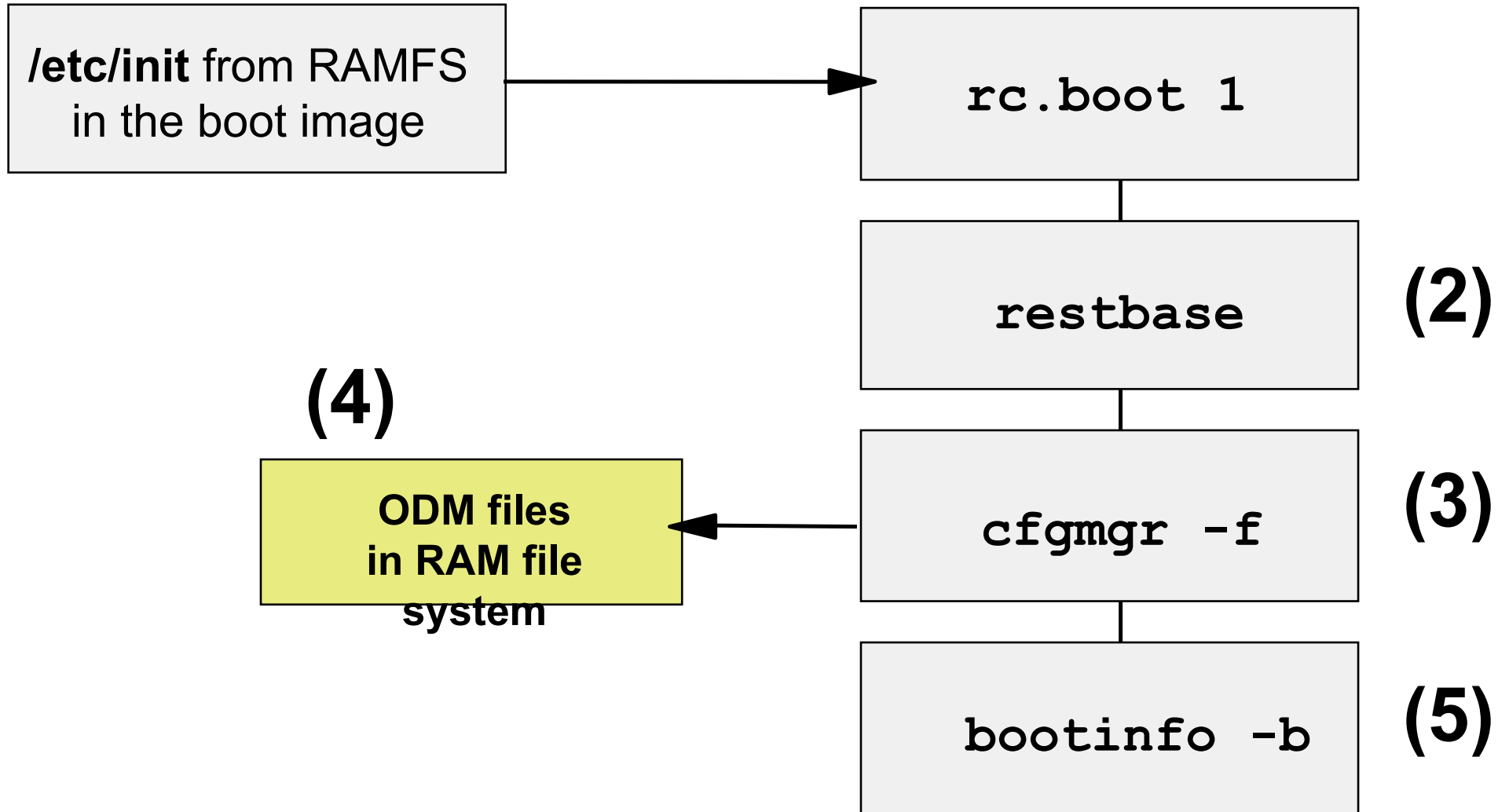
Let's Review: rc.boot 1

(1)

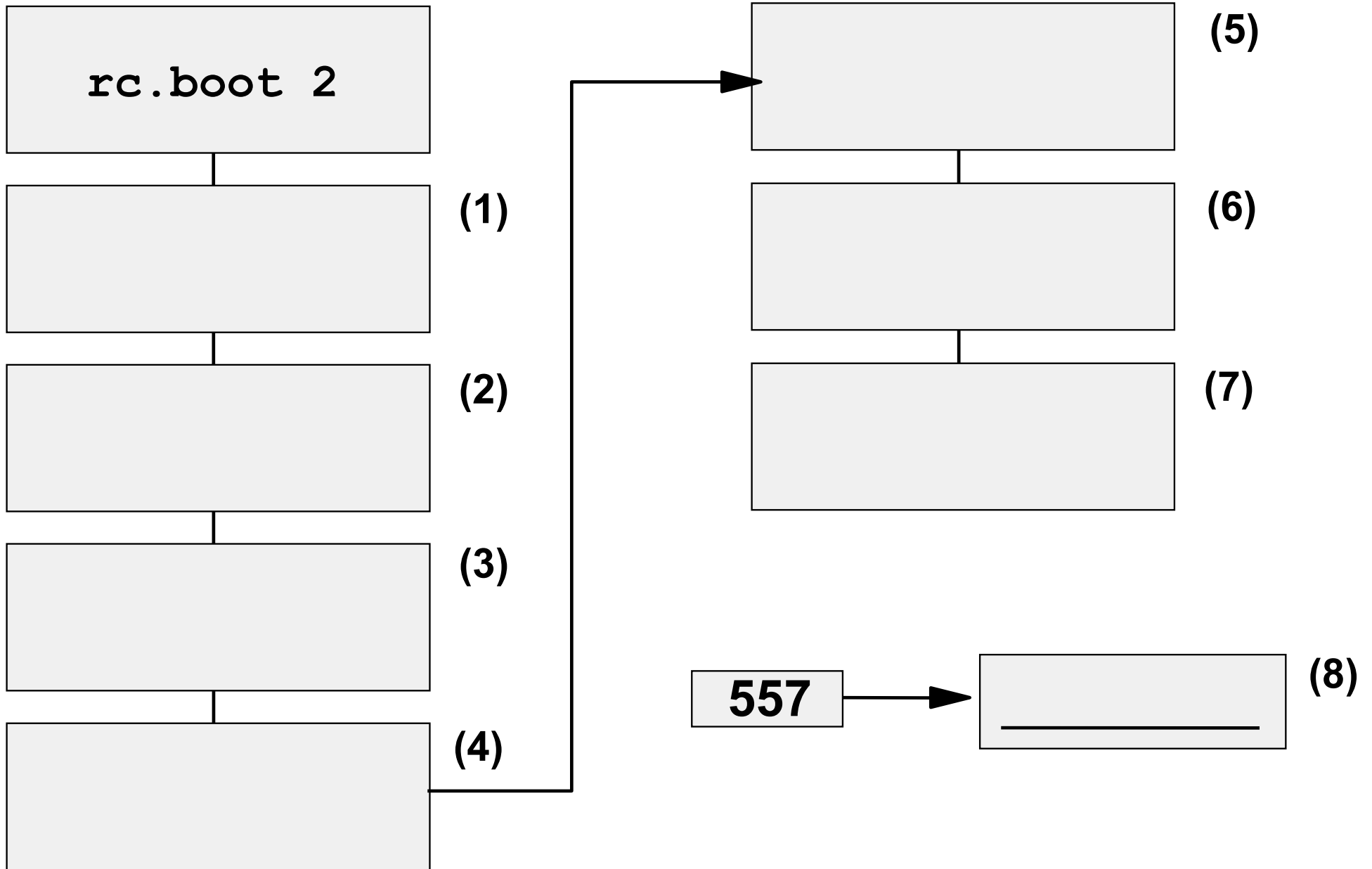


Let's Review Solution: rc.boot 1

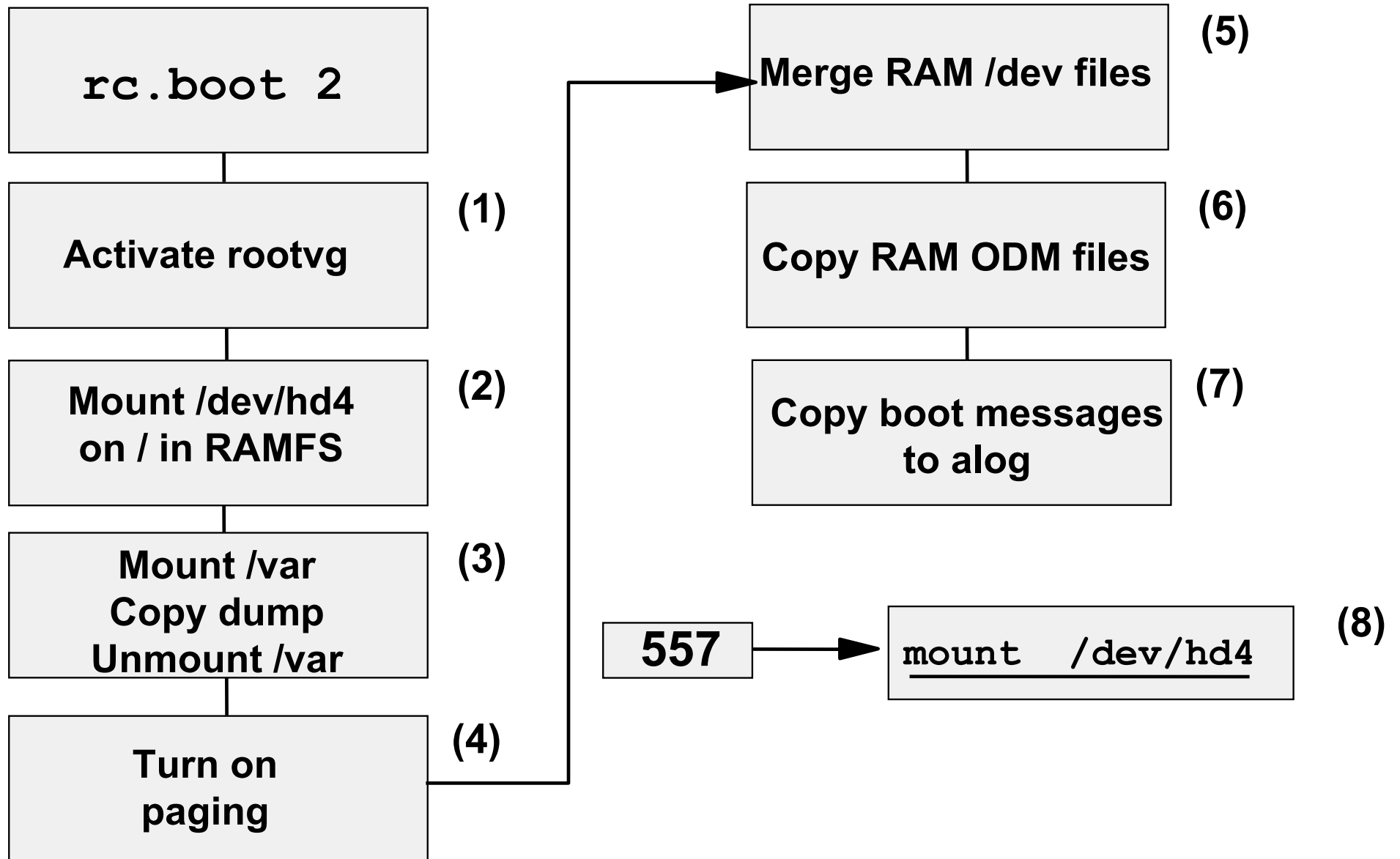
(1)



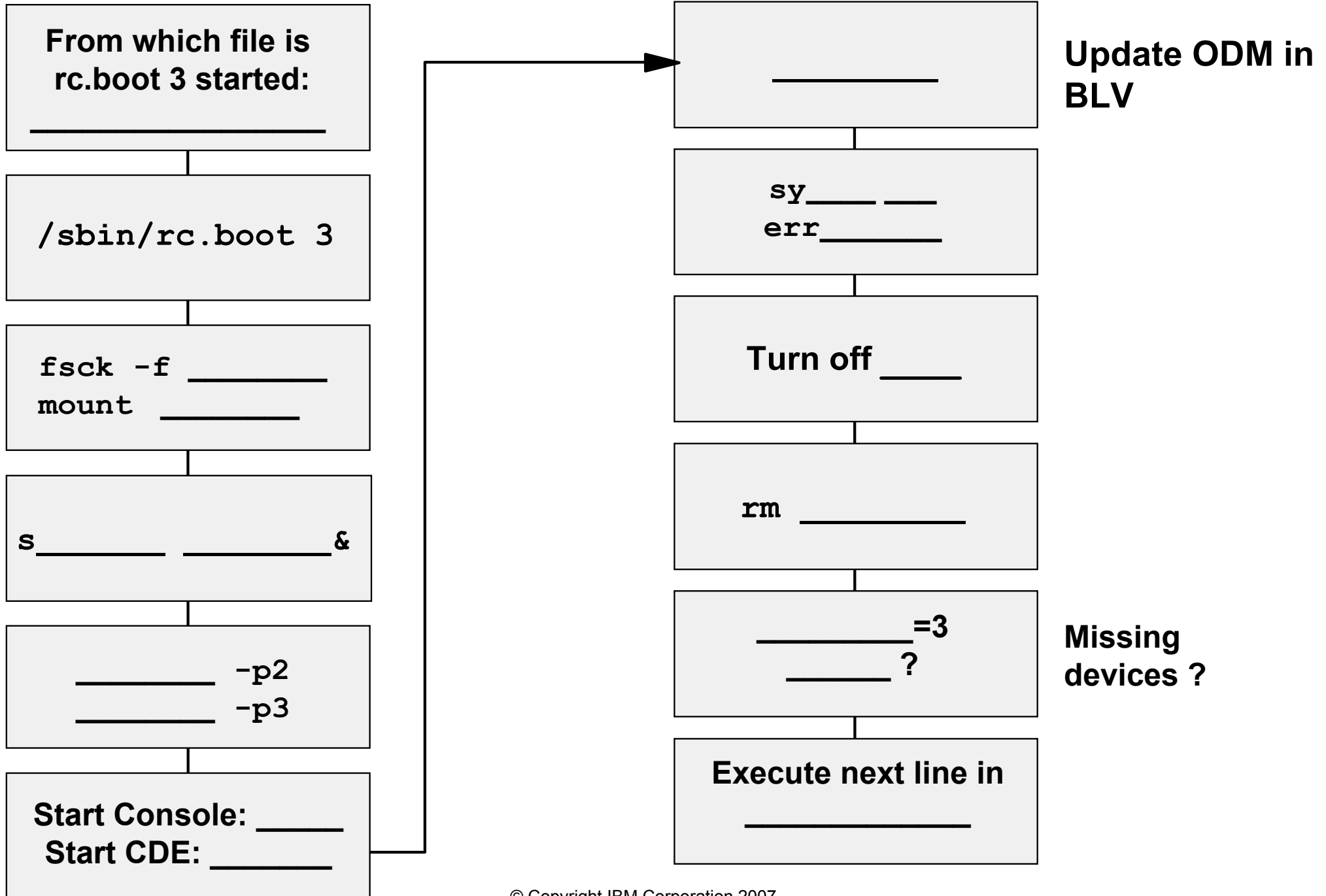
Let's Review: rc.boot 2



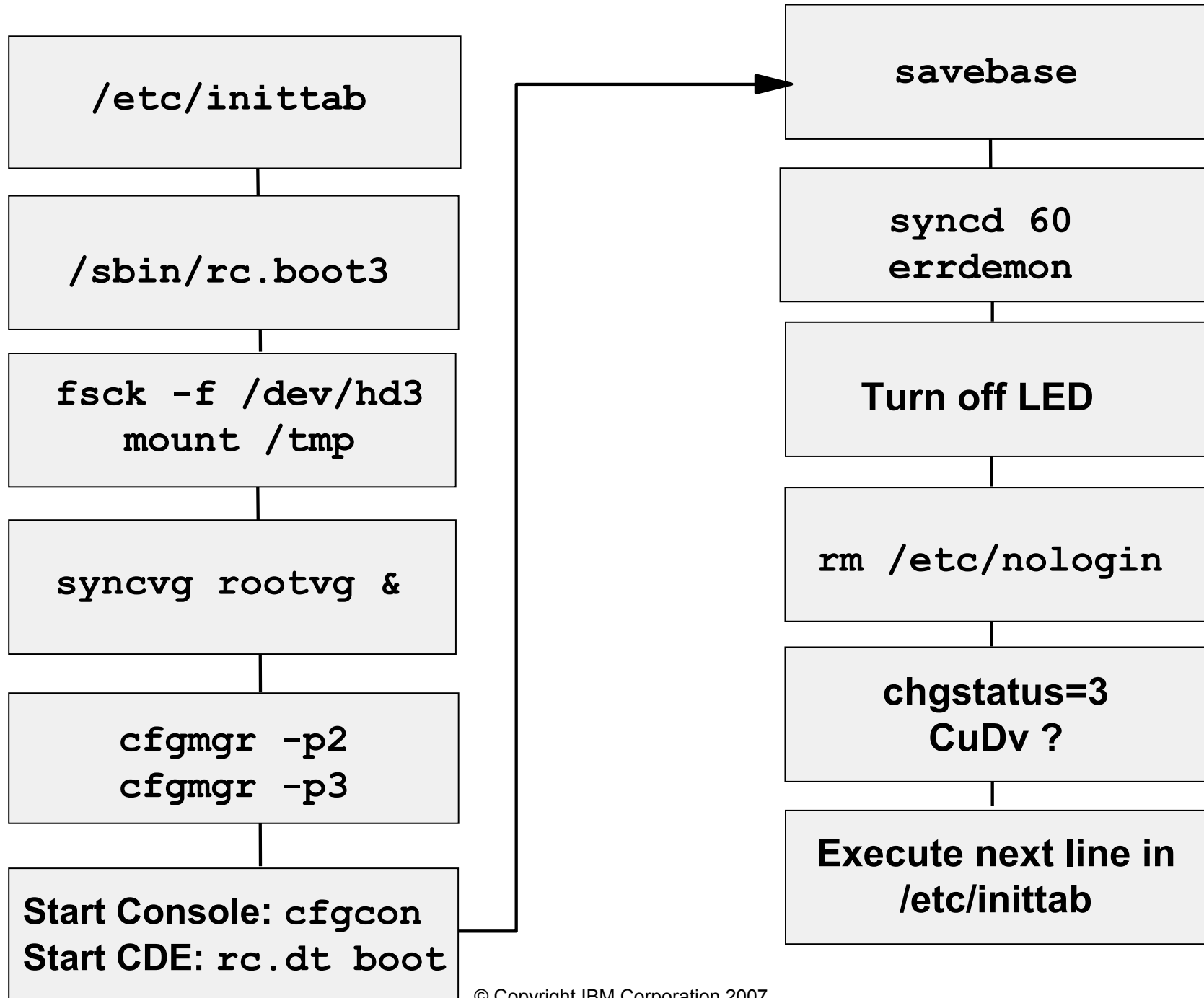
Let's Review Solution: rc.boot 2



Let's Review: rc.boot 3

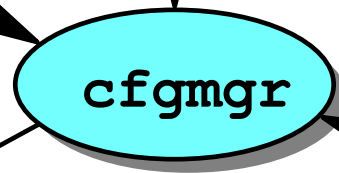
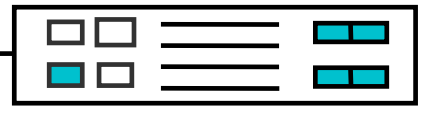
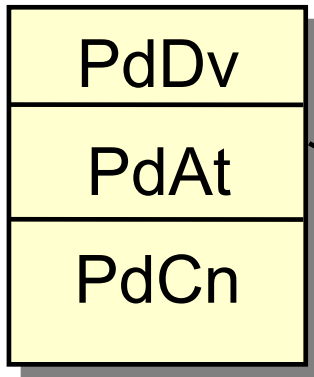


Let's Review Solution: rc.boot 3

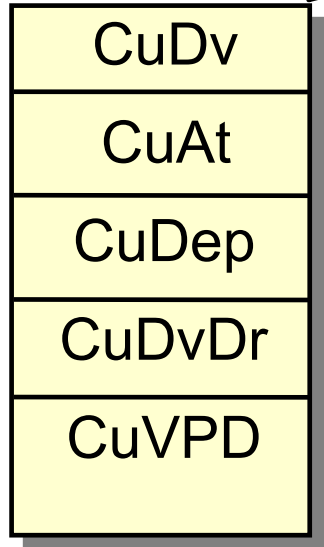


Configuration Manager

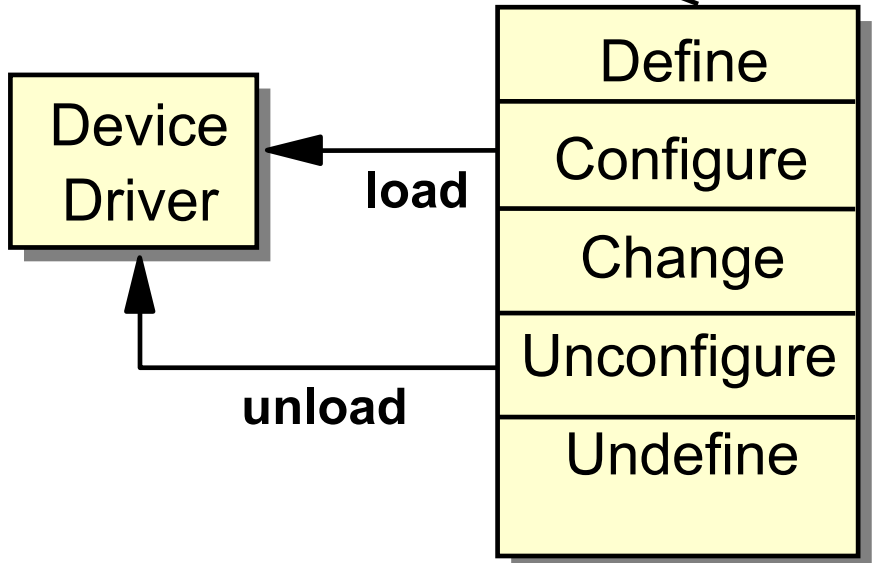
Predefined



Customized



Methods



Config_Rules Object Class

Phase	seq	boot	rule	
1	10	0	/etc/methods/defsys	← cfgmgr -f
1	12	0	/usr/lib/methods/deflvm	
2	10	0	/etc/methods/defsys	
2	12	0	/usr/lib/methods/deflvm	← cfgmgr -p2
2	19	0	/etc/methods/ptynode	(Normal boot)
2	20	0	/etc/methods/startlft	
3	10	0	/etc/methods/defsys	
3	12	0	/usr/lib/methods/deflvm	← cfgmgr -p3
3	19	0	/etc/methods/ptynode	(Service boot)
3	20	0	/etc/methods/startlft	
3	25	0	/etc/methods/starttty	

cfgmgr Output in the Boot Log Using alog

```
# alog -t boot -o
-----
attempting to configure device 'sys0'
invoking /usr/lib/methods/cfgsys_rspc -l sys0
return code = 0
***** stdout *****
bus0
***** no stderr *****
-----
attempting to configure device 'bus0'
invoking /usr/lib/methods/cfgbus_pci bus0
return code = 0
***** stdout *****
bus1, scsi0
***** no stderr *****
-----
attempting to configure device 'bus1'
invoking /usr/lib/methods/cfgbus_isa bus1
return code = 0
***** stdout *****
fda0, ppa0, sa0, sioka0, kbd0
***** no stderr *****
```

/etc/inittab File

```
init:2:initdefault:
brc::sysinit:/sbin/rc.boot 3 >/dev/console 2>&1 # Phase 3 of system boot
powerfail::powerfail:/etc/rc.powerfail 2>&1 | alog -tboot > /dev/console #
mkatmpvc:2:once:/usr/sbin/mkatmpvc >/dev/console 2>&1
atmsvcd:2:once:/usr/sbin/atmsvcd >/dev/console 2>&1
tunables:23456789:wait:/usr/sbin/tunrestore -R > /dev/console 2>&1 # Set tunab
securityboot:2:bootwait:/etc/rc.security.boot > /dev/console 2>&1
rc:23456789:wait:/etc/rc 2>&1 | alog -tboot > /dev/console # Multi-User checks
rcemgr:23456789:once:/usr/sbin/emgr -B > /dev/null 2>&1
fbcheck:23456789:wait:/usr/sbin/fbcheck 2>&1 | alog -tboot > /dev/console # ru

srcmstr:23456789:respawn:/usr/sbin/srcmstr # System Resource Controller
rctcpip:23456789:wait:/etc/rc.tcpip > /dev/console 2>&1 # Start TCP/IP daemons
mkcifs_fs:2:wait:/etc/mkcifs_fs > /dev/console 2>&1
sniinst:2:wait:/var/adm/sni/sniprei > /dev/console 2>&1
rcnfs:23456789:wait:/etc/rc.nfs > /dev/console 2>&1 # Start NFS Daemons
cron:23456789:respawn:/usr/sbin/cron
piobe:2:wait:/usr/lib/lpd/pioint_cp >/dev/null 2>&1 # pb cleanup
cons:0123456789:respawn:/usr/sbin/getty /dev/console
qdaemon:23456789:wait:/usr/bin/startsrc -sqdaemon
writesrv:23456789:wait:/usr/bin/startsrc -swritesrv
uprintfd:23456789:respawn:/usr/sbin/uprintfd
shdaemon:2:off:/usr/sbin/shdaemon >/dev/console 2>&1 # High availability
```

**Do not use an editor to change /etc/inittab.
Use mkitab, chitab, rmitab instead !**

System Hang Detection

- System hangs:
 - High priority process
 - Other
- What does **shdaemon** do?
 - Monitors system's ability to run processes
 - Takes specified action if threshold is crossed
- Actions:
 - Log error in the Error Log
 - Display a warning message on the console
 - Launch recovery login on a console
 - Launch a command
 - Automatically REBOOT system

Configuring shdaemon

```
# shconf -E -l prio
sh_pp      disable      Enable Process Priority Problem

pp_errlog  disable      Log Error in the Error Logging
pp_eto     2           Detection Time-out
pp_eprio   60          Process Priority

pp_warning enable      Display a warning message on a console
pp_wto     2           Detection Time-out
pp_wprio   60          Process Priority
pp_wterm   /dev/console Terminal Device

pp_login   enable      Launch a recovering login on a console
pp_lto     2           Detection Time-out
pp_lprio   100        Process Priority
pp_lterm   /dev/console Terminal Device

pp_cmd     disable     Launch a command
pp_cto     2           Detection Time-out
pp_cprio   60          Process Priority
pp_cpath   /home/unhang      Script

pp_reboot  disable     Automatically REBOOT system
pp_rto     5           Detection Time-out
pp_rprio   39          Process Priority
```

Resource Monitoring and Control (RMC)

- Based on two concepts:
 - Conditions
 - Responses
- Associates predefined responses with predefined conditions for monitoring system resources
- Example: Broadcast a message to the system administrator when the **/tmp** file system becomes 90% full

RMC Conditions Property Screen: General Tab

Condition /tmp space used Properties @ aix

General Monitored Resources

Name: /tmp space used

Management scope: Local Machine

Monitored: No

Resource class: File System

Monitored property: PercentTotUsed

Event expression: PercentTotUsed > 90

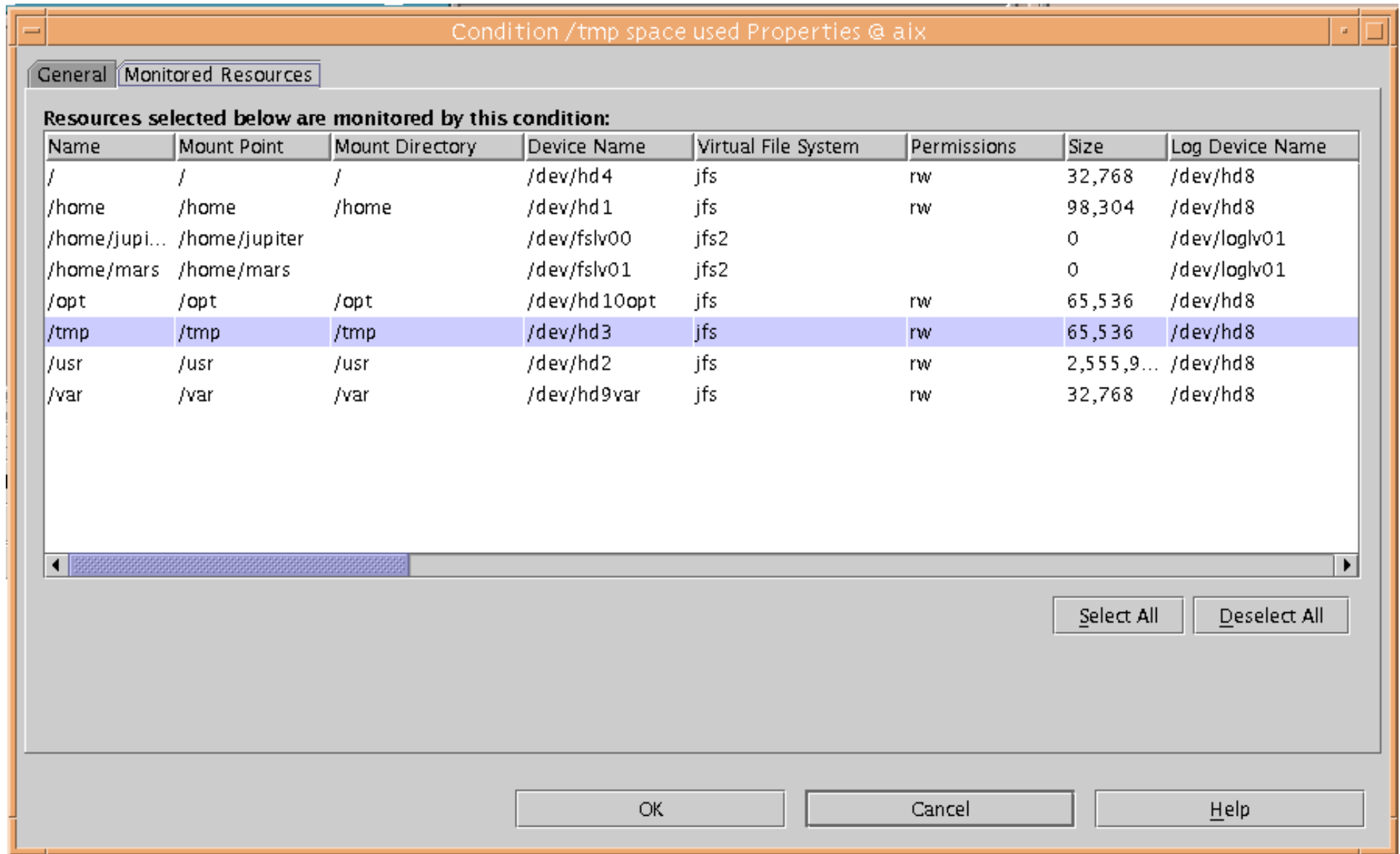
Event description: An event will be generated when more than 90 percent of the total space in the /tmp directory is in use.

Rearm expression: PercentTotUsed < 75

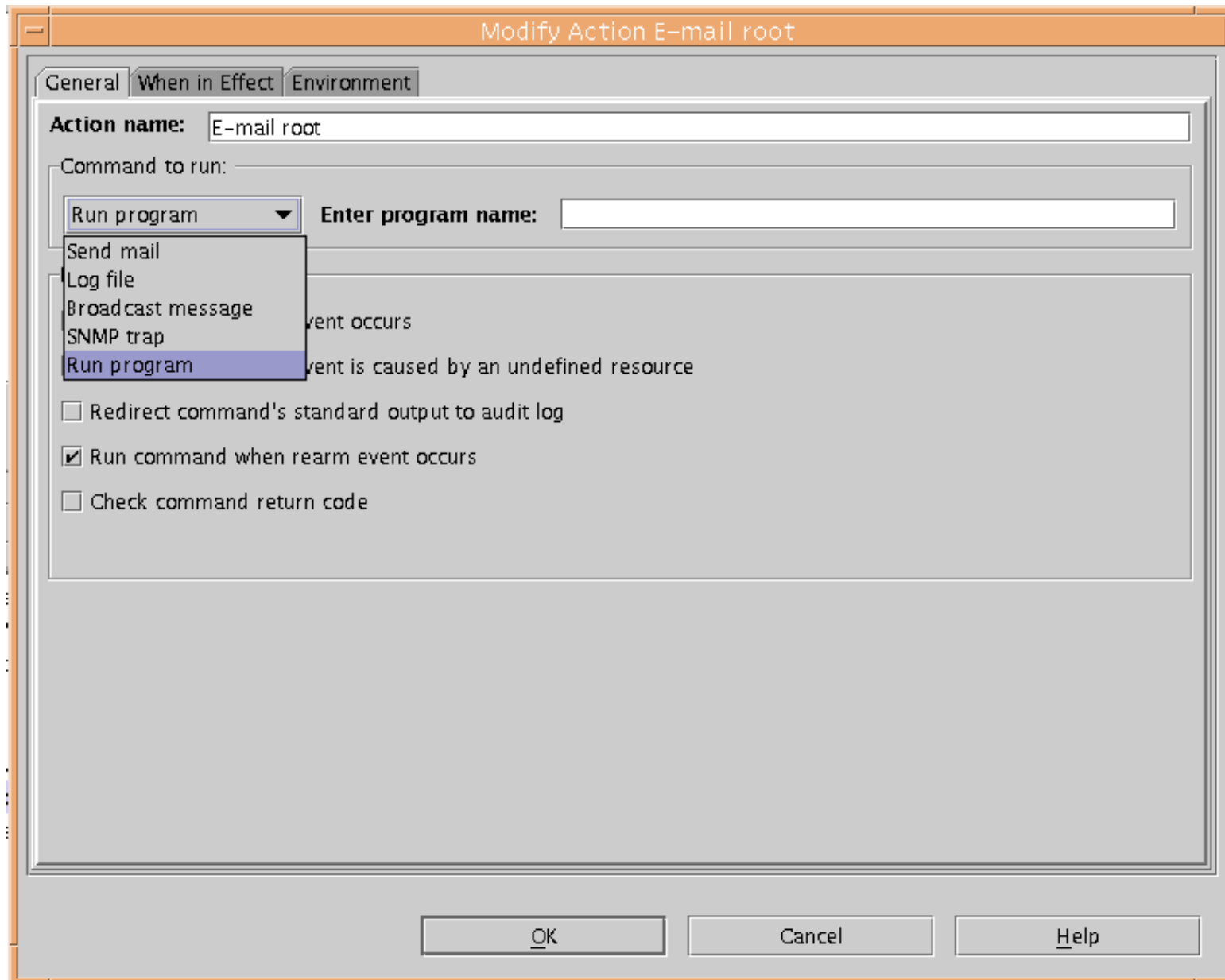
Rearm description: The event will be rearmed when the percent of the space used in the /tmp directory falls below 75 percent.

Severity: Informational

RMC Conditions Property Screen: Monitored Resources Tab



RMC Actions Property Screen: General Tab



RMC Actions Property Screen: When in Effect Tab

The screenshot shows a dialog box titled "Modify Action E-mail root" with three tabs: "General", "When in Effect", and "Environment". The "When in Effect" tab is active. It contains two main sections: "Periods when the action should be taken:" and "Specify when the action should be taken:". The first section has a table with columns "Time" and "Date", and buttons "Add", "Remove", and "Modify". The second section has radio buttons for "Time of Day" (All day, Time period) and checkboxes for "Day of Week" (Everyday, Monday-Sunday). It also includes "From" and "To" time pickers, "Set", and "Undo" buttons. At the bottom are "OK", "Cancel", and "Help" buttons.

Time	Date
All day	Everyday
17:00-23:00	Monday, Tuesday, Wednesday, Thursd...

Buttons: Add, Remove, Modify

Specify when the action should be taken:

Time of Day:
 All day
 Time period

From: 00:00
To: 00:00

Day of Week:
 Everyday
 Monday
 Tuesday
 Wednesday
 Thursday
 Friday
 Saturday
 Sunday

Buttons: Set, Undo

Bottom Buttons: OK, Cancel, Help

Boot Problem Management

Check	LED	User Action
Bootlist wrong?	LED codes cycle	Power on, press F1 , select Multi-Boot, select the correct boot device.
/etc/inittab corrupt? /etc/environment corrupt?	553	Access the rootvg . Check /etc/inittab (empty, missing or corrupt?). Check /etc/environment .
Boot logical volume or boot record corrupt?	20EE000B	Access the rootvg . Re-create the BLV: <code># bosboot -ad /dev/hdiskx</code>
JFS/JFS2 log corrupt?	551, 552, 554, 555, 556, 557	Access rootvg before mounting the rootvg file systems. Re-create the JFS/JFS2 log: <code># logform -v jfs /dev/hd8</code> or <code># logform -v jfs2 /dev/hd8</code> Run fsck afterwards.
Superblock corrupt?	552, 554, 556	Run fsck against all rootvg file systems. If fsck indicates errors (not an AIX file system), repair the superblock as described in the notes.
rootvg locked?	551	Access rootvg and unlock the rootvg : <code># chvg -u rootvg</code>
ODM files missing?	523 - 534	ODM files are missing or inaccessible. Restore the missing files from a system backup.
Mount of /usr or /var failed?	518	Check /etc/filesystem . Check network (remote mount), file systems (fsck) and hardware.

Let's Review: /etc/inittab File

<code>init:2:initdefault:</code>	
<code>brc::sysinit:/sbin/rc.boot 3</code>	
<code>rc:2:wait:/etc/rc</code>	
<code>fbcheck:2:wait:/usr/sbin/fbcheck</code>	
<code>srcmstr:2:respawn:/usr/sbin/srcmstr</code>	
<code>cron:2:respawn:/usr/sbin/cron</code>	
<code>rctcpip:2:wait:/etc/rc.tcpip</code> <code>rcnfs:2:wait::/etc/rc.nfs</code>	
<code>qdaemon:2:wait:/usr/bin/startsrc -sqdaemon</code>	
<code>dt:2:wait:/etc/rc.dt</code>	
<code>tty0:2:off:/usr/sbin/getty /dev/tty1</code>	
<code>myid:2:once:/usr/local/bin/errlog.check</code>	

Let's Review Solution: /etc/inittab File

<code>init:2:initdefault:</code>	Determine initial run-level
<code>brc::sysinit:/sbin/rc.boot 3</code>	Startup last boot phase
<code>rc:2:wait:/etc/rc</code>	Multiuser initialization
<code>fbcheck:2:wait:/usr/sbin/fbcheck</code>	Execute /etc/firstboot , if it exists
<code>srcmstr:2:respawn:/usr/sbin/srcmstr</code>	Start the System Resource Controller
<code>cron:2:respawn:/usr/sbin/cron</code>	Start the <code>cron</code> daemon
<code>rctcpip:2:wait:/etc/rc.tcpip</code> <code>rcnfs:2:wait::/etc/rc.nfs</code>	Startup communication daemon processes (<code>nfsd</code> , <code>biod</code> , <code>ypserv</code> , and so forth)
<code>qdaemon:2:wait:/usr/bin/startsrc -sqdaemon</code>	Startup spooling subsystem
<code>dt:2:wait:/etc/rc.dt</code>	Startup CDE desktop
<code>tty0:2:off:/usr/sbin/getty /dev/tty1</code>	Line ignored by <code>init</code>
<code>myid:2:once:/usr/local/bin/errlog.check</code>	Process started only one time

Checkpoint

1. From where is `rc.boot 3` run?

3. Your system stops booting with LED 557:

- In which `rc.boot` phase does the system stop?

- What are some reasons for this problem?

- _____

- _____

- _____

4. Which ODM file is used by the `cfgmgr` during boot to configure the devices in the correct sequence?

- What does the line `init:2:initdefault:` in `/etc/inittab` mean?

Checkpoint Solutions

1. From where is `rc.boot 3` run?

From the `/etc/inittab` file in `rootvg`

3. Your system stops booting with LED 557:

- In which `rc.boot` phase does the system stop? `rc.boot 2`
- What are some reasons for this problem?
 - Corrupted BLV
 - Corrupted JFS log
 - Damaged file system
- Which ODM file is used by the `cfgmgr` during boot to configure the devices in the correct sequence? `Config_Rules`
- What does the line `init:2:initdefault:` in `/etc/inittab` mean?

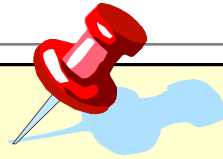
This line is used by the `init` process, to determine the initial run level (2=multiuser).

Exercise 4: System Initialization Part 2



- Repair a corrupted log logical volume
- Analyze and fix a boot failure

Unit Summary



- After the boot image is loaded into RAM, the `rc.boot` script is executed three times to configure the system
- During `rc.boot 1`, devices to varyon the `rootvg` are configured
- During `rc.boot 2`, the `rootvg` is varied on
- In `rc.boot 3`, the remaining devices are configured
- Processes defined in `/etc/inittab` file are initiated by the `init` process