

1.106.2

Change runlevels and shutdown or reboot system

Weight 3

Linux Professional Institute Certification — 102

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Outline

Context

Objective

`init`: the mother of all
processes

Using `init` to change mode
of system

Runlevels

`inittab`

Starting terminals

Shutting down the system

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Topic 106 Boot, Initialization, Shutdown and Runlevels [6]

Where we are up to

1.106.1 Boot the system [3]

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Description of Objective

1.106.2 Change runlevels and shutdown or reboot system

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Candidates should be able to manage the runlevel of the system. This objective includes changing to single user mode, shutdown or rebooting the system.

Candidates should be able to alert users before switching runlevel, and properly terminate processes. This objective also includes setting the default runlevel.

Key files, terms, and utilities include:

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`/etc/inittab` — Configuration file for
`/sbin/init`

`shutdown` — command to reboot or shut
system down

`init` — first process started by the
kernel with process ID equal to 1

“init” is the process started by the kernel after booting. It is up to `init` to start the rest of the system. The usual “SysV init” does this according to `/etc/inittab`.

The kernel also treats process ID 1 (`init`) specially:

- ▶ PID 1 is skipped by various “kill all” operations, etc
- ▶ “orphaned” child processes are adopted by PID 1

Telling `init` what to do

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By sending signals directly (as root) or by running various commands, which relay to `init`:

`telinit` Tell `init` to reload `inittab`, re-exec itself or switch runlevels

`shutdown` Initiate a shutdown by doing some book-keeping and then signalling `init`

`halt`, `reboot`, `poweroff` Tools used to initiate or finalise special kinds of shutdown

`runlevel` Find out current or previous runlevel

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The Linux Standards Base (http://refspecs.freestandards.org/LSB_3.0.0/LSB-Core-generic/LSB-Core-generic/runlevels.html) defines the following standard runlevels that all distributions should follow to be compliant:

- 0 halt
- 1 single user mode
- 2 multiuser with no network services exported
- 3 normal/full multiuser
- 4 reserved for local use, default is normal/full multiuser
- 5 multiuser with a display manager or equivalent
- 6 reboot

Passed through via kernel command line, `telinit` or default in `/etc/inittab`.

/etc/inittab

id : runlevels : action : process

```
# /etc/inittab: init(8) configuration.
```

```
id:5:initdefault:
```

```
# System initialization.
```

```
si::sysinit:/etc/rc.d/rc.sysinit
```

```
# /etc/init.d executes the S and K scripts
```

```
# scripts when change runlevel.
```

```
10:0:wait:/etc/rc.d/rc 0
```

```
11:1:wait:/etc/rc.d/rc 1
```

```
12:2:wait:/etc/rc.d/rc 2
```

```
13:3:wait:/etc/rc.d/rc 3
```

```
14:4:wait:/etc/rc.d/rc 4
```

```
15:5:wait:/etc/rc.d/rc 5
```

```
16:6:wait:/etc/rc.d/rc 6
```

/etc/init.d/rc runs all the “K” scripts in /etc/rcN.d/, followed by the “S” scripts.

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```
# Trap CTRL-ALT-DELETE
ca::ctrlaltdel:/sbin/shutdown -t3 -r now

# When our UPS tells us power has
# failed, assume we have a few minutes
# of power left.  Schedule a shutdown
# for 2 minutes from now.
# This does, of course, assume you have
# powerd installed and your
# UPS connected and working correctly.

pf::powerfail:/sbin/shutdown -f -h +2 "Power Failure; System Shutting Down"

# If power was restored before the shutdown kicked in, cancel it.
pr:12345:powerokwait:/sbin/shutdown -c "Power Restored; Shutdown Cancelled"
```

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```
# Run gettys in standard runlevels
#co:2345:respawn:/sbin/agetty ttyS0 38400 vt100
1:2345:respawn:/sbin/mingetty tty1
2:2345:respawn:/sbin/mingetty tty2
3:2345:respawn:/sbin/mingetty tty3
4:2345:respawn:/sbin/mingetty tty4
5:2345:respawn:/sbin/mingetty tty5
6:2345:respawn:/sbin/mingetty tty6

# Run xdm in runlevel 5
x:5:once:/etc/X11/prefdm -nodaemon

#co:2345:respawn:/sbin/agetty ttyS0 38400 vt100
S1:2345:respawn:/sbin/mgetty ttyS1
```

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```
# Example how to put a getty on a serial line (for a terminal)
#
#T0:23:respawn:/sbin/getty -L ttyS0 9600 vt100
#T1:23:respawn:/sbin/getty -L ttyS1 9600 vt100

# Example how to put a getty on a modem line.
#
#T3:23:respawn:/sbin/mgetty -x0 -s 57600 ttyS3
```

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Initiating a shutdown

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`shutdown [options] time [message]` Popular options:

-r Reboot

-h Halt

-c Cancel a running shutdown

“time” can be *HH:MM* (eg 17:30) or *+minutes* (eg +5) or “now”

Examples:

```
shutdown -r now
```

```
shutdown -h 17:30 Scheduled hardware maintenance
```

Topics Covered

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