1. Context

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

1.106.1 Boot the system [3]

1.106.2 Change runlevels and shutdown or reboot system [3]

2 Objective

Description of Objective
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:

/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

3 init: the mother of all processes

/sbin/init
“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

4 Using init to change mode of system

Telling init what to do
By sending signals directly (as root) or by running various commands, which relay to init:
telinit Tell init to reload inittab, re-execute itself or switch runlevels
5. Runlevels

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.

5 Runlevels

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`.

6 inittab

/etc/inittab

id: runlevels : action : process

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

id:S: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

6.1 Starting terminals

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

/etc/inittab

# Trap CTRL-ALT-DELETE
c0::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"

6.1 Starting terminals

/etc/inittab

# Run gettys in standard runlevels
#co:2345:respawn:/sbin/agetty ttyS0 38400 vt100
l1:2345:respawn:/sbin/mingetty tty1
l2:2345:respawn:/sbin/mingetty tty2
l3:2345:respawn:/sbin/mingetty tty3
l4:2345:respawn:/sbin/mingetty tty4
l5:2345:respawn:/sbin/mingetty tty5
l6:2345:respawn:/sbin/mingetty tty6

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

# 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
7 Shutting down the system

Initiating a shutdown

    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

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