

System Run-levels

Introduction

- Run-levels are modes that a Unix/Linux operating system can use to initialize groups of services (mostly obsolete)
 - For comparison Windows has similar function but not the same (safe mode, safe mode with networking, normal mode)
- Traditionally “init” process was used to initialize the system after boot
- “systemd” or other process have replaced “init” in majority of distros
 - run-levels are still implemented (via “sysvinit”) for backward compatibility
- Read This: <https://en.wikipedia.org/wiki/Runlevel>

Standard Linux Run-levels

- NOTE: It is up to the distro to follow this, meaning this varies from distro to distro
- You can switch modes by typing `init <mode>` in terminal:
 - `sudo init 6`

ID	Name	Description
0	Halt	Shuts down the system.
1	Single-user mode	Mode for administrative tasks. ^{[2][b]}
2	Multi-user mode	Does not configure network interfaces and does not export networks services. ^[c]
3	Multi-user mode with networking	Starts the system normally. ^[1]
4	Not used/user-definable	For special purposes.
5	Start the system normally with appropriate display manager (with GUI)	Same as runlevel 3 + <u>display manager</u> .
6	Reboot	Reboots the system.

/sbin/init

- The first process executed after boot (init = initialization)
 - PID = 1
 - Parent of every process started on the system
 - Automatically adopts all orphan processes
- Many Linux based OSes have diverged from using the traditional init in favour of other Startup and initialization methods
 - Example: systemd, launchd, OpenRC
- Read This: <https://en.wikipedia.org/wiki/Init>

Config files and Commands

- `who -r`
- `sudo init <run-level>`
- `runlevel`
- `/etc/inittab` file has the configuration for each runlevel
- Actual process or executable: `/sbin/init`
 - This process starts running after kernel boots
 - Checks the `/etc/inittab` for configuration of the run-level
 - Loads all services serially, one after another, waiting for each one to load before loading the next
 - This is the major drawback of `init`, primary cause of delay in starting up a system
 - Chances are your Linux distro is using an alternative system for initialization!

Run-level in Ubuntu

- Read the manual:
 - `man 8 runlevel`
 - OR <https://manpages.ubuntu.com/manpages/focal/en/man8/runlevel.8.html>

Run-level	target
0	poweroff.target
1	rescue.target
2, 3, 4	multi-user.target
5	graphical.target
6	reboot.target

Systemd

- Read about systemd here:
 - <https://en.wikipedia.org/wiki/Systemd>

systemd Utilities

systemctl journalctl notify analyze cglsgctop loginctl nspawn

systemd Daemons

systemd
journald networkd
logind user session

systemd Targets

bootmode basic multi-user graphical user-session
shutdown reboot dbus telephony dlog loginind user-session display service tizen service

systemd Core

manager unit login namespace log
systemd service timer mount target multiseat inhibit session pam cgroup dbus
snapshot path socket swap

systemd Libraries

dbus-1 libpam libcap libcryptsetup tcpwrapper libaudit libnotify

Linux Kernel

cgroups autofs kdbus