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 + display manager.
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 majour 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