systemd
and
Linux Watchdog

Run a program at...
login? = .profile file
boot? = systemd

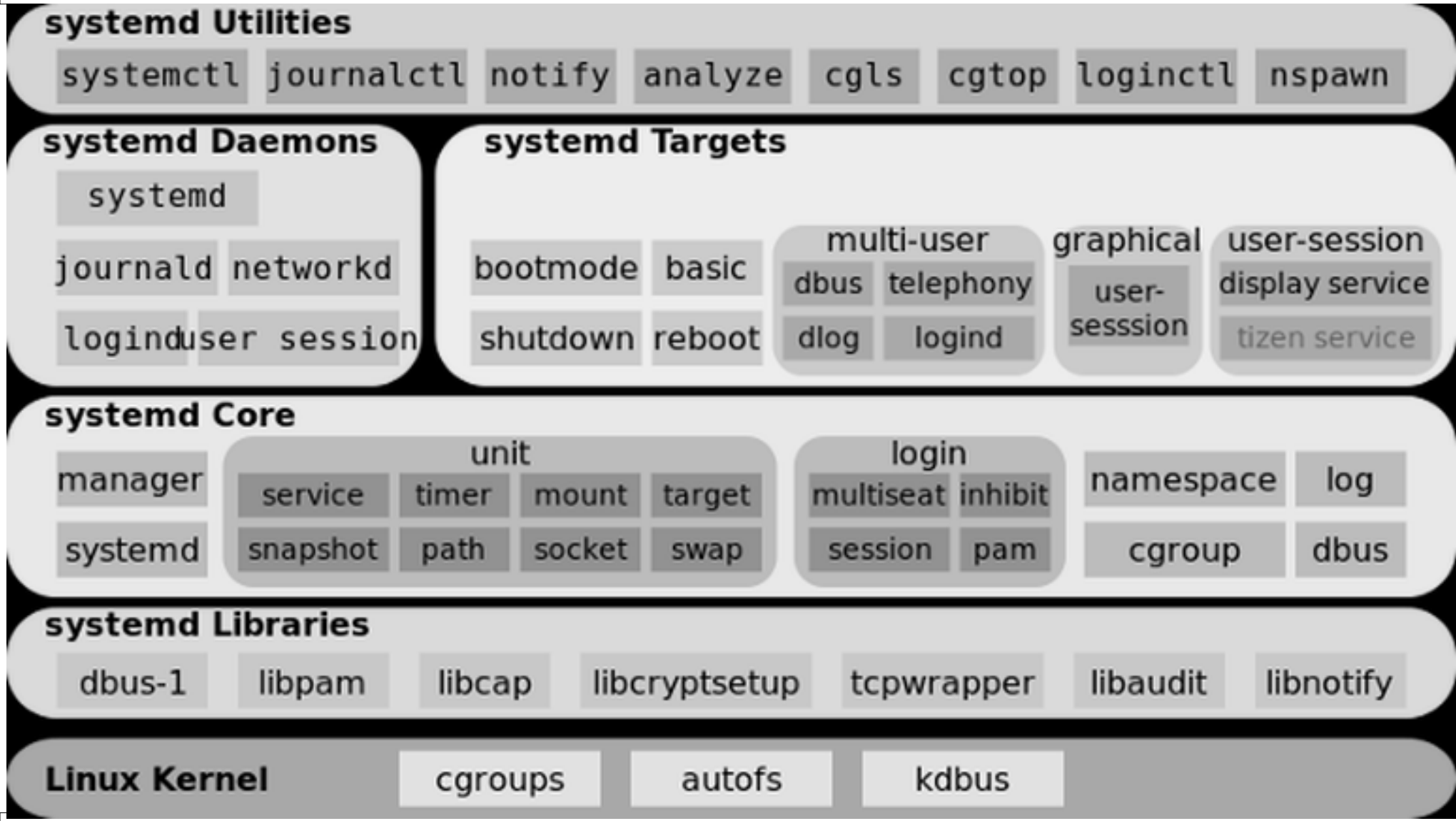
What to do if software locks up?

systemd

- systemd used by most Linux distros as first user-space application to be run by the kernel.
  - 'd' means daemon:

    ...
  - Use systemd to run programs at boot (and many other things).

Jack of All Trades



https://www.zdnet.com/article/linus-torvalds-and-others-on-linuxs-systemd/

systemd

- Replaces old “init” system:
  - Manages dependencies and allows concurrency when starting up applications
  - Does many things: login, networking, mounting, etc
- Controversy
  - Violates usual *nix philosophy of do one thing well.
    http://www.zdnet.com/article/linus-torvalds-and-others-on-linuxs-systemd/
  - Some lead developers are said to have a bad attitude towards fixing “their” bugs.
- It's installed on the Beaglebone, so we'll use it!
  - Copy your code to BBG's eMMC (vs run over NFS).

Create a systemd service

- Setup .service file:
  (bbg)$ cd /lib/systemd/system
  (bbg)$ sudo nano foo.service

Assume 11-HttpsProcTimer example installed to /opt/

Use absolute paths

```
[Unit]
Description=HTTPS server to view /proc on port 8042

[Service]
User=root
WorkingDirectory=/opt/10-HttpsProcTimer-copy/
ExecStart=/usr/bin/node /opt/10-HttpsProcTimer-copy/server.js
SyslogIdentifier=HttpsProcServer

[Install]
WantedBy=multi-user.target
```

Controlling a Service

- Configure to run at startup
  (bbg)$ systemctl enable foo.service
- Manually Starting/Stopping
  (bbg)$ systemctl start foo.service
  - Can replace start with stop or restart
- Status
  (bbg)$ systemctl status foo.service
  (bbg)$ journalctl -u foo.service
  (bbg)$ systemctl | grep HTTPS

Demo: Browse to https://192.168.7.2:3042 after reboot

Startup Script Suggestions

- If your app needs some startup steps, try a script:
  - copy app to file system (not running via NFS)
  - add 10s delay at startup
    - I have found that some hardware configuration commands can fail if done too soon.
  - add 1s delay between commands
    - Allows the system time for the previous setup action to complete.
  - change to the required directory

Linux Watchdog

Watchdog

- Watchdog Timer
  Guards against system locking-up:
  - Working software periodically "hits" (*pets*!) the WD.
  - ..
- Applications
  - Most embedded systems use a watchdog:
    allow it to recover from faults (SW and some HW).
  - Critical in applications where humans cannot reboot.

Watchdog Usage

- Usage
  - Opening "file" /dev/watchdog; starts timer
  - Writing anything to it resets timeout
    If timeout expires it resets board.
  - What should happen when the program exits?..

- Console demo
  (bbg)$ cat > /dev/watchdog
- Can compile kernel to disallow turning off watchdog:
  - CONFIG_WATCHDOG_NOWAYOUT