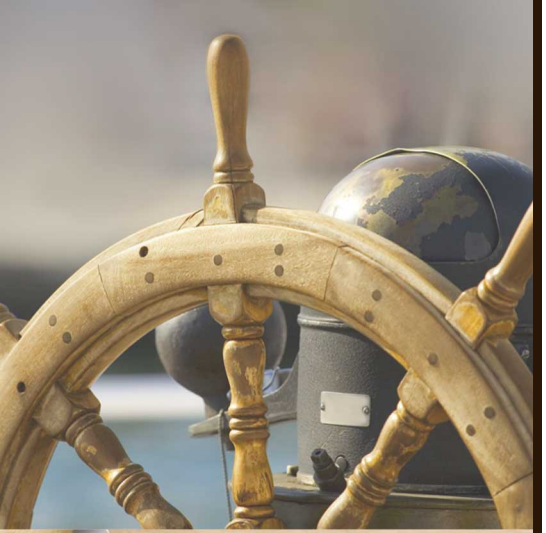

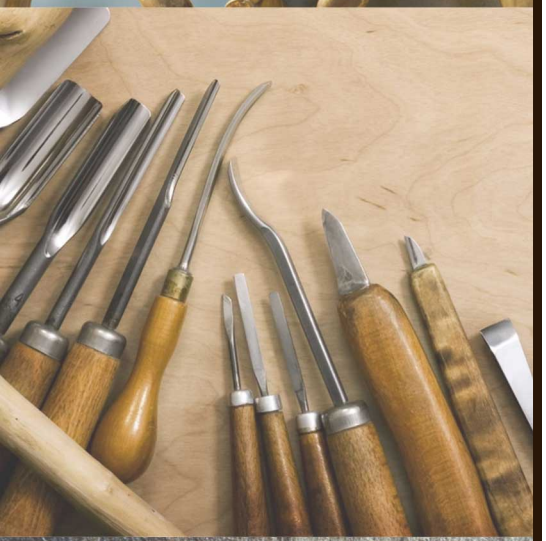

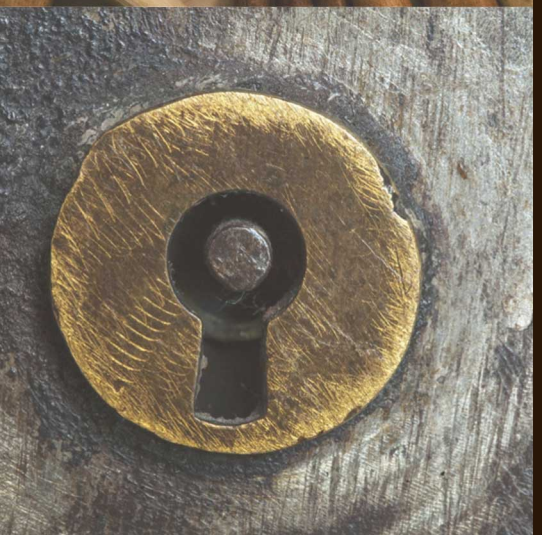

RMLL MONTPELLIER 2014

systemd: Evolution, Revolution or Decline ?

"Huh? What's this systemd thingie doing as PID 1 ?"

Matthieu CERDA

Who are you ?

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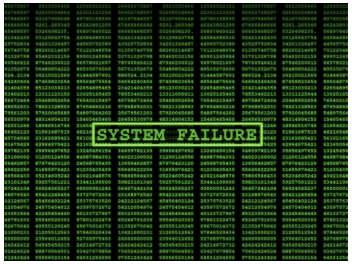
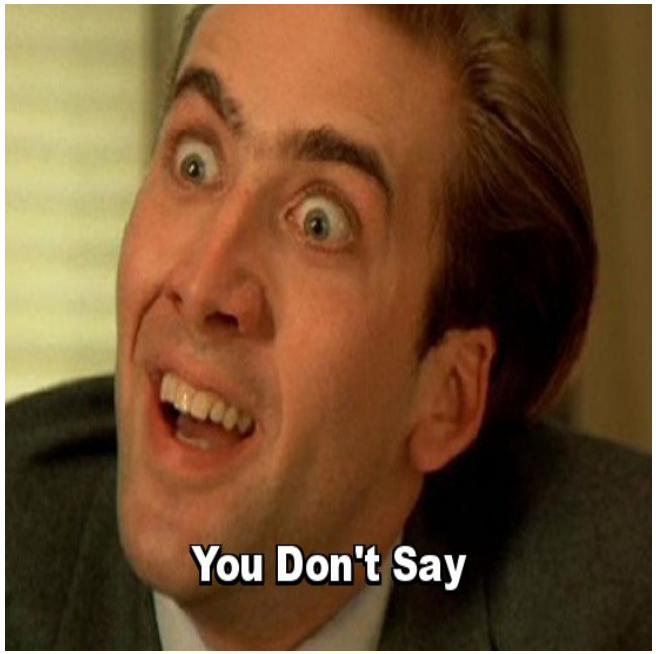


Job	System engineer at Normation
CFEngine	*Enthusiast, power user and trainer*
Rudder	*Integrator, packager*
Infrastructure	*Team member*

What are we going to talk about



Systemd
(but not only)

What are we going to talk about

- The current situation of open init systems
- What is systemd?
- What can we do with it?
- Why all this controversy about it?

Today's major open init systems (1/2)

• **SysVinit** / **BSDinit**: Historical, shell script based simple init systems, using LSB extensions on GNU/Linux and dependency tags on BSD to add dependencies.

• **Upstart**: Ubuntu's init flavour, uses specific configuration files (“jobs”) to manage services.

• **OpenRC**: Gentoo's init flavour, enhanced SysVinit version with more powerful service configuration / dependency handling.

Today's major open init systems (2/2)

- **SMF**: Solaris init system, using XML + shell scripts to define how a service is to be managed.

- **launchd**, uses plist (xml/binary xml) files to define how a service is to be managed.

- *src, runit, daemon-tools, epoch, ...

Why so many reimplementations ?

- **Performance**: init used to work in a serialized fashion, one script after the other. Long / hung scripts = slow / hung boot.

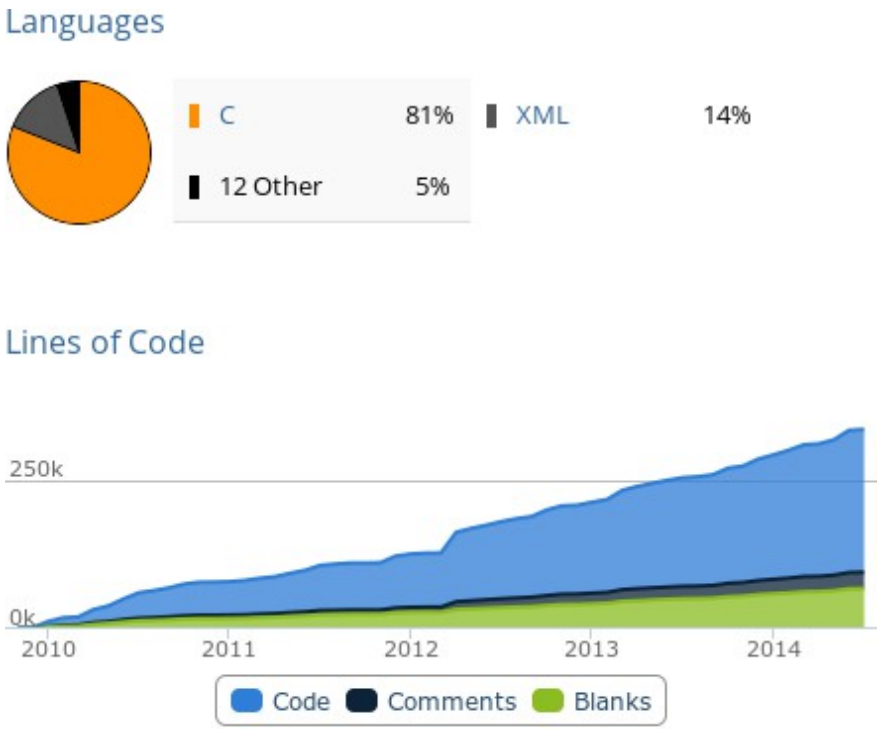
- **Definition**: No dependency definition, restart behaviour, ...)

- **Security**: Every process is awarded full root privileges by default and have to handle privilege dropping by itself.

- **Ego**: “Mine is bigger.”

systemd ID card

http://www.freedesktop.org/wiki/Software/systemd/



- Created / Maintained by Lennart Poettering and Kay Sievers
- Drop-in replacement for SysVinit, “unit” based.
- GNU/Linux specific

systemd goals

- Replace SysVinit, D-Bus and udev with enhanced features
- Completely separate the system and the applications
- Provide unified system components
- Enable the use of an “appliance” type of operating system

Service management capabilities

- Uses systemd “units”
- Provides:
  - A possibility to make sure a service is always started
  - A possibility to restrict a process to a specific Cgroup
  - Native Socket / D-Bus activation

Service management capabilities

Example: OpenSSH unit (Debian)

```
[Unit]
Description=OpenBSD Secure Shell server
After=network.target auditd.service
ConditionPathExists=!/etc/ssh/sshd_not_to_be_run

[Service]
EnvironmentFile=-/etc/default/ssh
ExecStart=/usr/sbin/sshd -D $SSHD_OPTS
ExecReload=/bin/kill -HUP $MAINPID
KillMode=process
Restart=on-failure

[Install]
WantedBy=multi-user.target
Alias=sshd.service
```

Socket activation capabilities

Example: CUPS socket unit (Debian)

```
[Unit]
Description=CUPS Printing Service Sockets

[Socket]
ListenStream=/var/run/cups/cups.sock
BindIPv6Only=ipv6-only

[Install]
WantedBy=sockets.target
```

This unit will start the service provided by the “cups” unit if someone tries to access /var/run/cups/cups.sock

Process isolation

- One may want a process to be started with an isolated environment for security reasons

- systemd provides several ways to run a process in a restricted environment:

  - Traditionnal chroots, using the “RootDirectory” unit specification

  - Namespace restrictions, to forbid some operations to the service (Example: InaccessibleDirectories to forbid access to a directory)

  - Containerization: Using a lightweight containerization approach

systemd containers

- It's like a limited LXC, way easier to use.
- One example is worth thousand words:
  - Spawn a shell inside a Debian testing installation

```
# debootstrap --arch=amd64 testing ~/debian/
# systemd-nspawn -D ~/debian/
```

  - Boot an ArchLinux OS inside a container

```
# pacstrap -c -d ~/arch/ base
# systemd-nspawn -bD ~/arch/
```

  - Reboot your own root inside a container (with btrfs or ZFS)

```
# btrfs subvolume snapshot / /.tmp
# systemd-nspawn --private-network -D /.tmp -b
```

systemd in a Cloud / Virtualized environment

- Systemd tends to become a standard in those kind of environments
- Provides interesting abstraction of processes
- systemd-nspawn is a great ally for testing/continuous integration environments
- Docker + systemd + etcd = CoreOS
  - http://coreos.com
  - Clustered GNU/Linux based Docker appliance serving OS

Controversy (1/2)

- Monopoly
- GNU/Linux centrism
- Code complicated and bloated
- Too many services under the same management
- GNOME relationship

Controversy (2/2)

- Public communication is... rough.
- Broken transition from SysVinit
- Forced adoption by absorbing essential services (udev)
- Inconsistent utility syntax

Questions ? :)