# Systemd

## ??

Linux ???????????? SysV Init Script?**Systemd** ????????? CentOS 7 ????????

???? SysV Init ???????????????

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- How to enable rc.local shell script on systemd while booting Linux system
- [RHEL] Overview of systemd for RHEL 7
- [RHEL] How to configure a command, script, or daemon to run after boot has finished in RHEL 7, 8
- How to Find Systemd or Any Other init System in Linux (debugpoint.com)

??? Linux?

- CentOS 7+
- Ubuntu 16.04+

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- Supervisor
  ?????? Ubuntu 9.10?Mac OS X (10.4/10.5/10.6)?Solaris (10 for Intel) ? FreeBSD 6.1 ???????? Python 2.4????? Python 3?

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- /etc/systemd/system ??????????
- /lib/systemd/system ????????????

## How to determine

```
↪  ps --no-headers -o comm 1
systemd
```

## ?????

/etc/systemd/system/backup.service

```
[Unit]
Description=Backup daemon

[Service]
Type=simple
ExecStart=/path/to/backup

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

TIP:

> ❝ multi-user.target ???? Run Level 3
>
> ???????? http://0pointer.de/blog/projects/systemd-for-admins-3.html

## ?????????

- How to create a systemd service in Linux (linuxhandbook.com)
- How to Create a Systemd Service Unit in Linux (tecmint.com)

/etc/systemd/system/freepbx.service

```
[Unit]
Description=Freepbx
After=mariadb.service

[Service]
Type=oneshot
RemainAfterExit=yes
ExecStart=/usr/sbin/fwconsole start
ExecStop=/usr/sbin/fwconsole stop

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

?????????

```
systemctl enable freepbx
```

systemctl ??

```
# 檢視服務設定檔內容
systemctl cat freepbx.service

# 檢視服務底層參數
systemctl show freepbx.service

# 編輯服務設定檔
systemctl edit freepbx.service
```

# ????

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```
# Reload Systemd
systemctl daemon-reload

# 啟動服務
systemctl start <service-name>

# 檢查服務狀態
systemctl status <service-name>
systemctl is-active <service-name>
systemctl is-enabled <service-name>

# 關閉服務
systemctl stop <service-name>

# 啟用:自動啟動
systemctl enable <service-name>

# 關閉:自動啟動
systemctl disable <service-name>

# 列出設為自動啟用的服務
systemctl list-unit-files --type=service --state=enabled
```

```
# □□□□□□□□□□
systemctl cat <service-name>
```

## ??????

```
# View status of all services and units
systemctl
systemctl | grep ssh

# list active services
systemctl list-units --type=service
systemctl --type service
systemctl -t service

# List all the RUNNING systemd services
systemctl list-units --type=service --state=running

# List all LOADED systemd services including the inactive ones
systemctl list-units --type=service
systemctl --type service

# List all the INACTIVE systemd services
systemctl list-units --all --type=service --state=inactive

# List all the INSTALLED systemd services
systemctl list-unit-files --type=service

# List all systemd services that will be run at each boot automatically
systemctl list-unit-files --type=service --state=enabled
```

## ?????

```
# Halt the system
systemctl halt

# Poeroff the system
systemctl poweroff

# Reboot the system
```

```
systemctl reboot

# Reboot the system into UEFI settings
systemctl reboot --firmware-setup
```

## ?????????

```
# Find which target unit is used by default
# GUI mode: graphical.target
# Text mode: multi-user.target
systemctl get-default
ls -l /etc/systemd/system/default.target

# To change boot target to the text mode
sudo systemctl set-default multi-user.target

# To change boot target to the GUI mode
sudo systemctl set-default graphical.target

# Optional: Listing all systemd targets
systemctl list-units --type target

# To immediately switch to the GUI login
systemctl isolate graphical.target
```

# Journalctl

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- How to Use journalctl to Read Linux System Logs

```
# View the log of the specified service
journalctl -u <service-name>
journalctl -f -u <service-name>        # -f View live updates
journalctl -e -u <service-name>        # -e Jump to the end page of the log
journalctl -n 50 -u <service-name>     # -n Show the most recent n number of log lines


# 快速統計/檢視所有服務錯誤日誌清單
# <行數統計> <服務的指令>
# 可加入自動檢查通知
```

```
journalctl --no-pager --since today \
--grep 'fail|error|fatal' --output json|jq '._EXE' | \
sort | uniq -c | sort --numeric --reverse --key 1

# view journal entries for time zones
journalctl --utc

# view only errors, warnings, etc in journal logs
# Error codes
# 0: emergency
# 1: alerts
# 2: critical
# 3: errors
# 4: warning
# 5: notice
# 6: info
# 7: debug
journalctl -p 0

# When you specify the error code, it shows all messages from that code and above.
# For example, if you specify the below command, it shows all messages with priority 2, 1 and
0
journalctl -p 2

# view journal logs for a specific boot
journalctl --list-boots

# To view a specific boot number you the first number or the boot ID as below.
journalctl -b -45
journalctl -b 8bab42c7e82440f886a3f041a7c95b98

# □□□□□□□□
# -p 3 □□ error □□□□
journalctl -xb -p 3

# view journal logs for a specific time, date duration
journalctl --since "2020-12-04 06:00:00"
journalctl --since "2020-12-03" --until "2020-12-05 03:00:00"
journalctl --since yesterday
journalctl --since 09:00 --until "1 hour ago"
```

```
journalctl --since "1 hour ago"
journalctl --since "1 hour ago" -u cron

# see Kernel specific journal logs
journalctl -k

# see journal logs for a service name
journalctl -u NetworkManager.service
# By PID
journalctl _PID=1111
journalctl -o verbose _PID=1111

# If you do not know the service name, you can use the below
# command to list the systemd services in your system.
systemctl list-units --type=service

# view journal logs for a user, group
id -u debugpoint
journalctl _UID=1000 --since today

# view journal logs for an executable
journalctl /usr/bin/gnome-shell --since today

# Check the disk usage
journalctl --disk-usage

# Set the log clearance
sudo journalctl --vacuum-time=2d
sudo journalctl --vacuum-size=500M
```

# Timer

```
systemctl list-timers
systemctl list-unit-files --type timer
```

# Application firewalls

An application firewall, unlike a gateway (router) or system level firewall, is meant to limit the networking of a single application. It can be used to prevent a compromised service from seeing into the local network, prevent programs from calling home, plug metadata leaks, or more tightly control a program's network access.

The `systemd` firewall directives is built on Linux kernel features. The required Kernel features might not be enabled in your specific environment (especially when using a custom kernel or container). Testing is key, as it is with any network filter and security solution. You should always test to verify that your firewall set up blocks and allows the traffic you specify.

- systemd application firewalls by example

# Run a custom script

## After mounting NFS

Listing mount systemd units

```
sudo systemctl list-units --type=mount
```

/root/bin/nfs-optimiation.sh:

```
#!/bin/bash
device_number=$(stat -c '%d' /cbz_efs/)
((major = (device_number & 0xFFF00) >> 8))
((minor = (device_number & 0xFF) | ((device_number >> 12) & 0xFFF00)))
_dev="/sys/class/bdi/$major:$minor/read_ahead_kb"
echo "DRVICE: $_dev"
echo "CURRENT VALUE: $(cat $_dev)"
echo "$0 called after mount /cbz_efs/"
echo 15000 > "$_dev"
```

Creating a new service unit

```
sudo chmod +x -v /root/bin/nfs-optimiation.sh


# Create a new systemd unit name after-cbz_efs-mount
sudo systemctl edit --force --full after-cbz_efs-mount
```

unit: after-cbz_efs-mount

```
[Unit]
Description=Script to run after fstab mount for /cbz_efs/
Requires=cbz_efs.mount
After=cbz_efs.mount
RequiresMountsFor=/cbz_efs

[Service]
ExecStart=/root/bin/nfs-optimiation.sh

[Install]
WantedBy=cbz_efs.mount
```

Activating the unit

```
sudo systemctl daemon-reload
sudo systemctl enable after-cbz_efs-mount
sudo systemctl start after-cbz_efs-mount
sudo systemctl status after-cbz_efs-mount
```

## After starting network

Create: `/etc/systemd/system/multi-user.target.wants/connection.service`

```
[Unit]
Description = making network connection up
After = network.target

[Service]
ExecStart = /root/scripts/conup.sh

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

Script: `/root/scripts/conup.sh`

```
#!/bin/bash
nmcli connection up enp0s3
```

Activating the service

```
sudo systemctl daemon-reload
sudo systemctl enable connection.service
sudo systemctl start connection.service
sudo systemctl status connection.service
```

# ??????

## coredumpctl

```
# 列出系統所有 core dump
coredumpctl

# 列出指定 program 的 core dump
coredumpctl dump <program-name>

# 列出指定 PID
coredumpctl dump _PID=XXX

# 分析特定 core dump 的內容
coredumpctl gdb <PID>

# 預設 core dump files 路徑
/var/lib/systemd/coredump
```

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