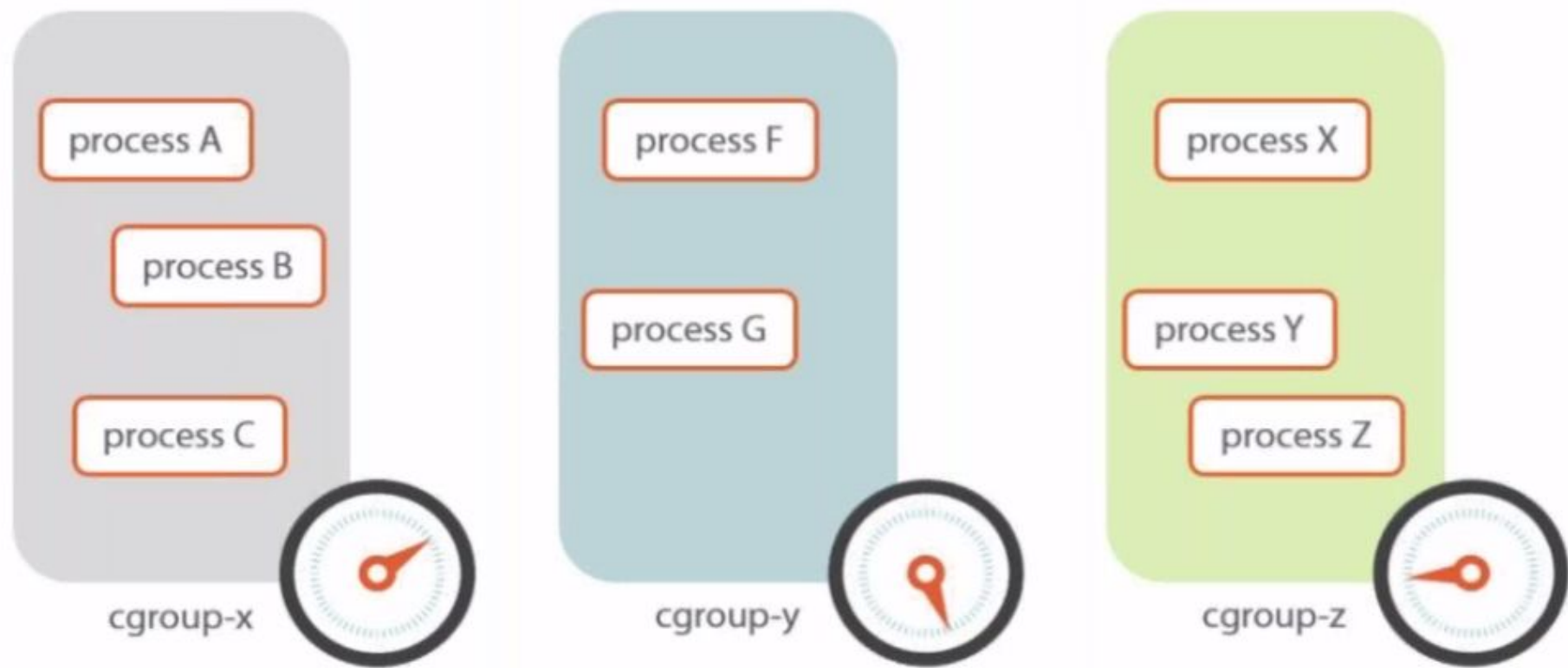


Docker Control Groups

Control Groups (cgroups)



We can Manage Docker resources with Cgroups

- Memory,
- CPU,
- Disk I/O(Volumes),
- Network,
- etc

free -h

lscpu

cat /proc/cpuinfo

docker stats

By default, a container has no resource constraints (restrictions) and can use as much of a given resource as the host's kernel scheduler allows.

But, We can control (restrictions) memory , CPU, disk , network for a container by cgroups

while Create a container by "docker run" command.

Memory

There are two basic types of memory.

RAM is first type of memory:

Random access memory (RAM), is used to store data and very speed I/O, RAM is volatile memory, the data stored in RAM is lost if the server is turned off.

Hard drives are magnetic media used for long-term storage of data and programs. Magnetic media is nonvolatile; the data stored on a disk remains even when power off.

RAM vs HHD

Swap space is the second type of memory.

The primary function of swap space is to substitute hard disk space for RAM memory when real RAM fills up and more space is needed.

The total amount of memory in a **Linux computer** is the RAM plus swap space and is referred to as virtual memory.

Total memory = ram + swap

Total memory = 2 GB ram + 4 GB swap from HHD = 6 GB

support swap limit capabilities or the cgroup:

- `vi /etc/default/grub`
- add the following two key-value pairs:
- `GRUB_CMDLINE_LINUX="cgroup_enable=memory swapaccount=1"`
- `sudo update-grub`
- `sudo reboot`

We can control memory by below options

1) `-m` or `--memory=`

it represents, The maximum amount of memory the container can use, min 4mb

2) `--memory-swap*`

it represents the total amount of memory and swap also

3) `--memory-reservation`

it request additional memory, after hitting in to memory limit, to preventing service outages

Exp1: By default, containers can use as much memory and swap memory as need.

```
# docker run myimage:1
```

Ex2: set memory limit only, container can use 300M memory, swap memory 600M

```
# docker run -m 300m myimage:1
```

Ex3: set memory limit, disabled swap memory limit, container can use 300M memory, as much swap memory as need

```
# docker run -m 300m --memory-swap -1 myimage:1
```

EX4: We set both memory and swap memory, container can use 300m memory and 1G swap memory.

```
# docker run -m 300M --memory-swap 1G myimage:1
```

hard limit : It is actual memory

soft limit : Exp: To set a hard limit, the container be allowed to use more than 500MB of RAM. Alternatively, we could set a soft limit. It is request to additional memory

Soft limits ensure our container can still request additional memory of 200MB after hitting its limit 300MB, to preventing service outages

EX5:

```
# docker run -m 300M --memory-reservation 200M myimage:1
```

,

EX6:

```
# docker run -it --memory-reservation 1G myimage:1
```

Only set a soft limit is memory-reservation. To set a soft limit of 1GMB.

CPU

`--cpus=<value> :`

Specify how much of the available CPU resources a container can use. For instance, if the host machine has two CPUs and you set `--cpus="1.5"`,

specifies the percentage of available CPU resources a container can use

Exp: `docker run --name c1 --cpus=.5 -m 300M -d -p 8081:80 nginx`

`--cpuset-cpus :`

Limit the specific CPUs or cores a container can use, On a 4 core host machine we can specify 0-3. We can specify a single core or even multiple cores

Exp: `docker run --name c2 --cpuset-cpus=0 -m 500M -d -p 8082:80 nginx`

Docker GUI

<https://www.portainer.io/>

```
$ docker run -d -p 9000:9000 --restart always -v /var/run/docker.sock:/var/run/docker.sock  
-v /opt/portainer:/data portainer/portainer
```

http://DOCKER_HOST:9000