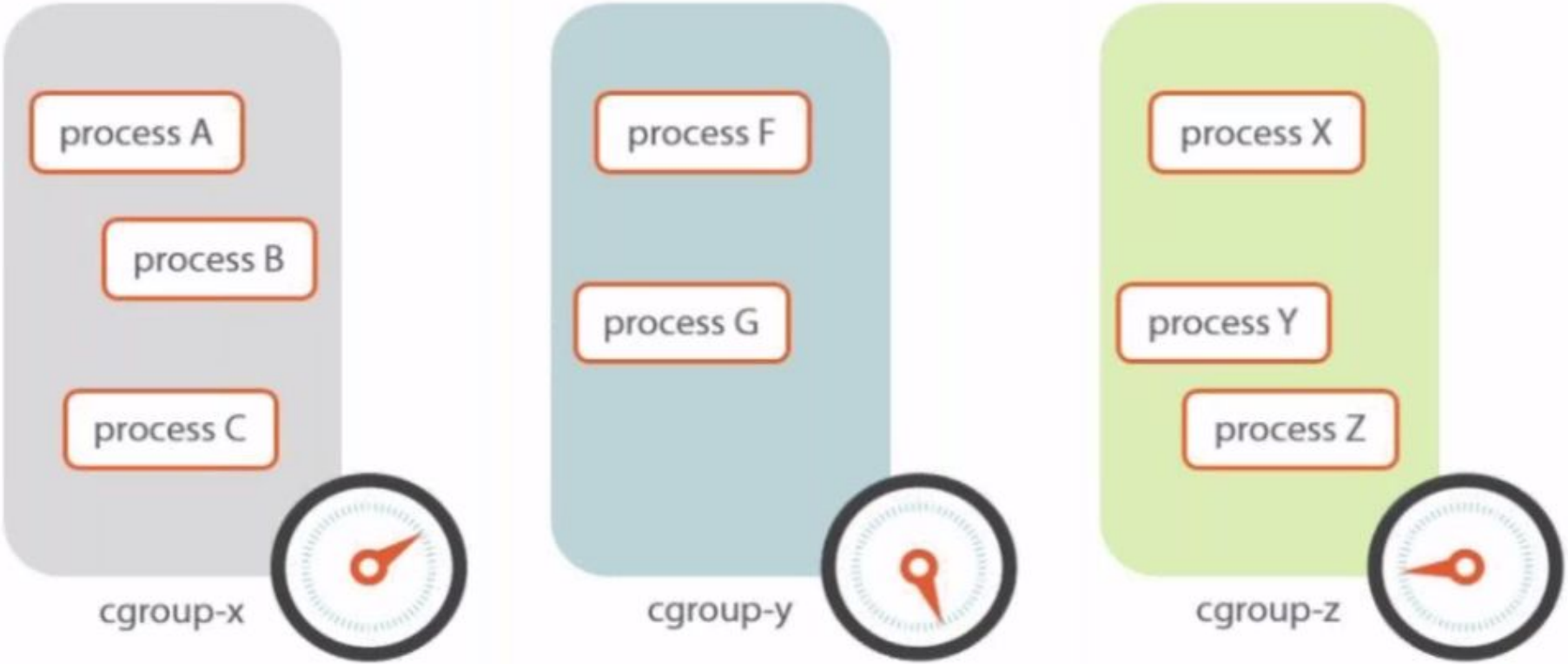
Docker Control Groups

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 HDD = 6GB

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 -d myimage:1
```

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

```
# docker run -d -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 sets 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
```