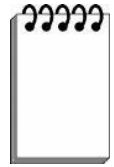
Presentation 4: Linux Namespaces (22.10.18)



Namespaces + cgroups

Namespaces: Lightweight process virtualization.

- **Different processes should have different views of the system resources.**
- **This allows different processes on a system to be isolated from each other. (process virtualization)**
- **Namespaces are built directly into Linux starting with kernel version 2.4.19 (year 2002). Therefore no hypervisor is necessary for the isolation of processes.**

cgroups: control groups is a resource management solution.

- **Resources are assigned to a group of processes. The use of resources is monitored. In particular, it can be limited and prioritized.**
- **First approaches starting with Linux kernel version 2.6.24. Starting with Ubuntu 12.10.**

Applications: Linux Containers (LXC), Docker.

Important namespaces

- **PID namespace**

  Groups processes that see each other.
  No view to the outside.
  First process in the respective namespace gets the PID 1.

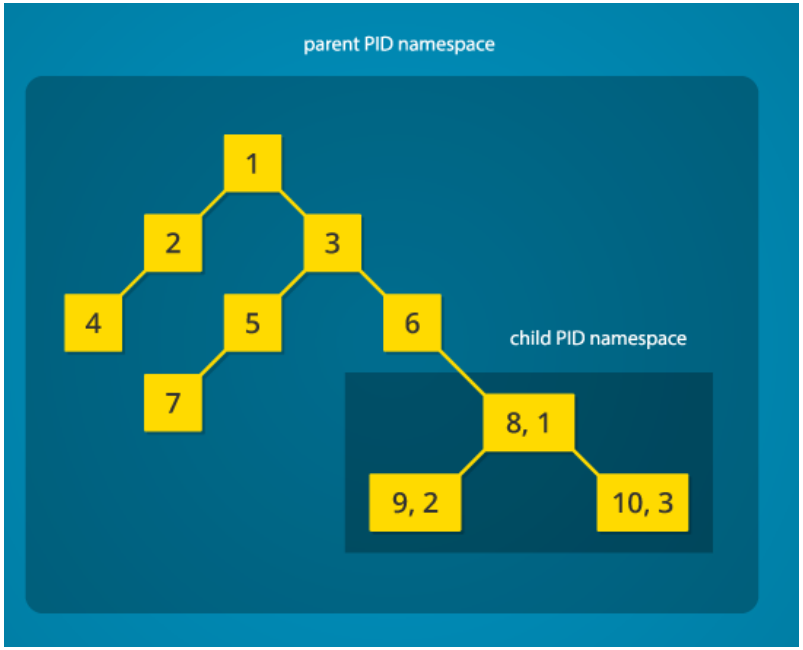


Fig.: Mahmud Ridwan, https://www.toptal.com/linux/separation-anxiety-isolating-your-system-with-linux-namespaces

- **Network namespace**

  The interfaces in the namespace can be fully used in the namespace without conflicting with the interfaces outside the namespace.

- **Mount namespace**

  File systems can be mounted without affecting the host system.

- **… + Cgroup / IPC / User / UTS Namespace**

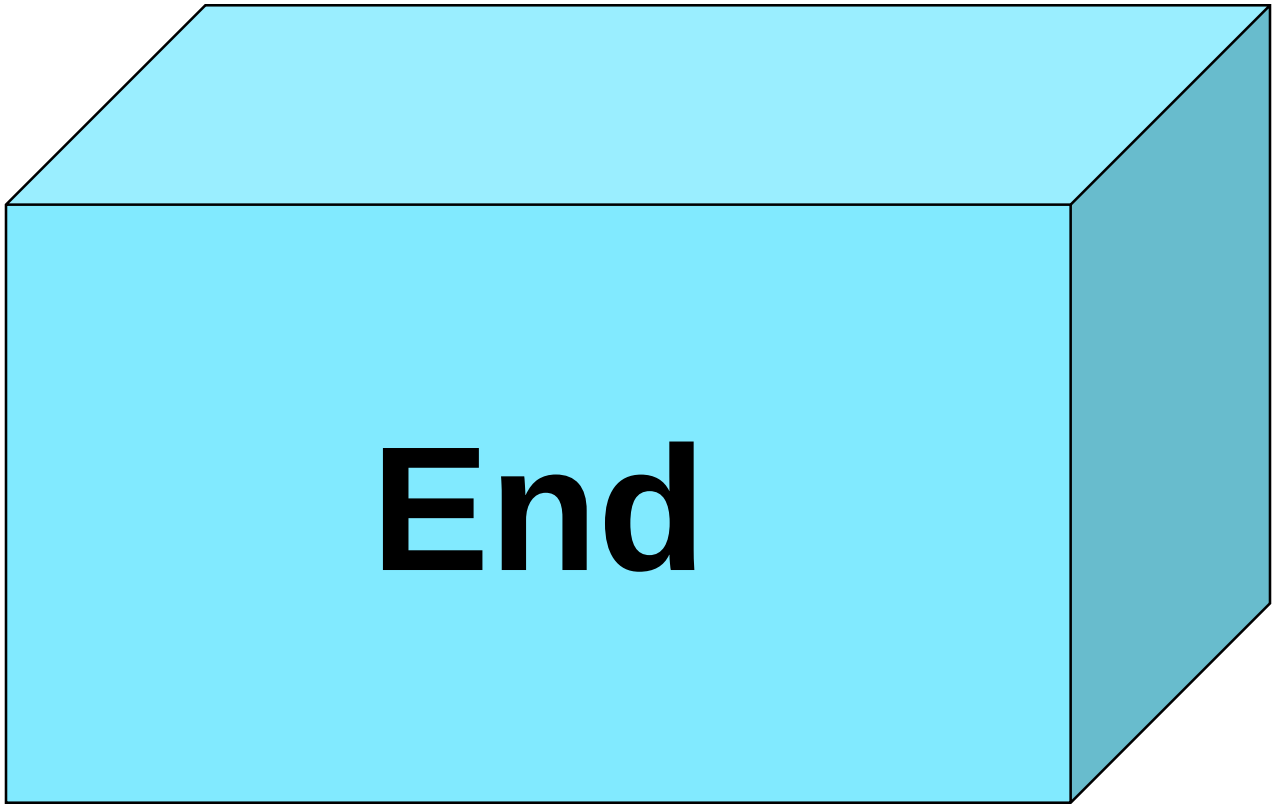
Short demo

Create a new PID namespace and switch to it.

The Linux command unshare is used for this purpose. (http://manpages.ubuntu.com/manpages/xenial/man1/unshare.1.html)

`unshare`

`--fork`	Split off the specified program as a child.
`--pid`	Split off the PID namespace. remark: With --net the network namespace is split off.
`--mount-proc`	Mount the proc filesystem (= interface to the kernel) on the mountpoint /proc
`program`	Program that is started first in the new PID namespace.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