

Module 2: Linux Namespaces



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**.

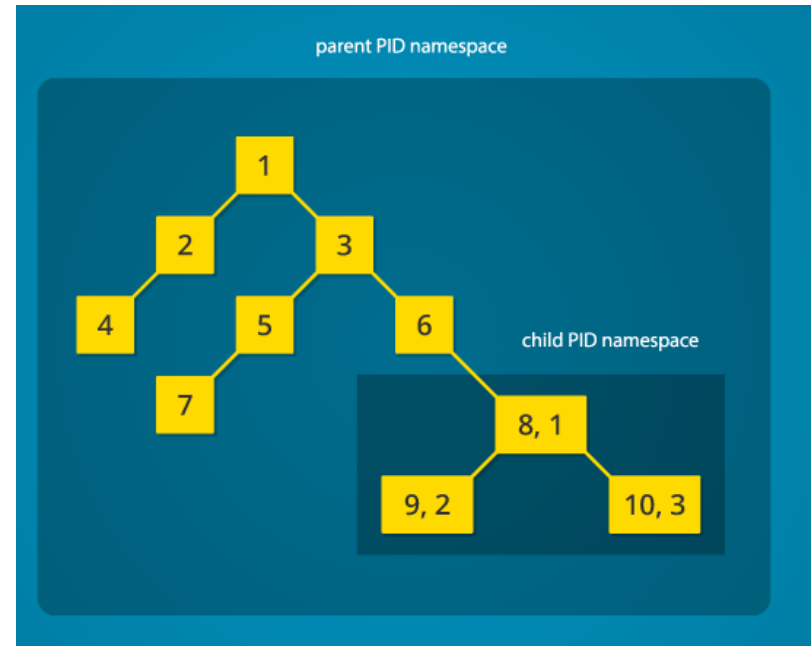


Fig.: [Mahmud Ridwan](https://www.toptal.com/linux/separation-anxiety-isolating-your-system-with-linux-namespaces), <https://www.toptal.com/linux/separation-anxiety-isolating-your-system-with-linux-namespaces>

- **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

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

