CRIU and the PID dance

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Checkpoint/Restore in Userspace

CRIU

CRIU

As transparent as possible

As transparent as possible

PID stays the same

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Independent of PID namespaces

CRIU morphs itself into the to be restored process

`clone()` for each PID/TID

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PID dance

PID dance

`open()` `/proc/sys/kernel/ns_last_pid`

`write()` (PID - 1) to `ns_last_pid`

`close()` `ns_last_pid`

`clone()`

`getpid()`

Avoiding the PID dance (2010):

`eclone()`

`https://lore.kernel.org/patchwork/patch/198220/`

Avoiding the PID dance (2019):

`clone3()`

"In general, clone3() is extensible and allows for the implementation of new features."

`https://git.kernel.org/pub/scm/linux/kernel/git/torvalds/linux.git/commit/?id=7f192e3cd316ba58c`

clone3() with set_tid

```
1         struct clone_args args = {0};
2         args.set_tid = 2019;
3         syscall(__NR_clone3, args, sizeof(struct clone_args));
```

Relax CAP_SYS_ADMIN

Relax CAP_SYS_ADMIN

Rootless Container Migration

Relax CAP_SYS_ADMIN

MPI Checkpoint/Restore

Relax CAP_SYS_ADMIN

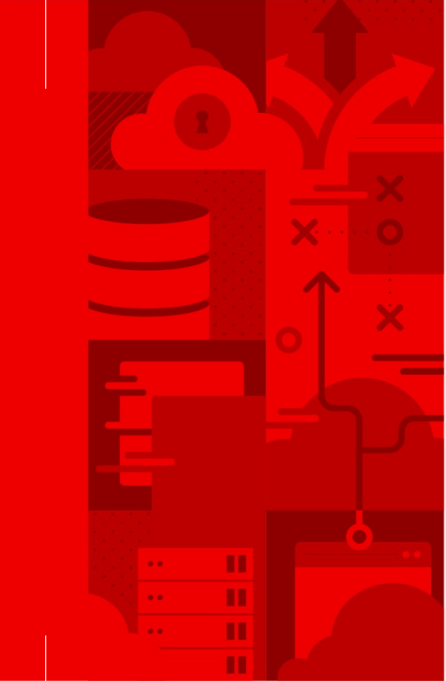
CAP_RESTORE

https://lisas.de/~adrian/criu-and-the-pid-dance-article.pdf

https://lore.kernel.org/patchwork/patch/198220/

https://git.kernel.org/pub/scm/linux/kernel/git/torvalds/linux.git/commit/?id=7f192e3cd316ba58c

https://twitter.com/adrian__reber



Thank you

Red Hat