



# Now That We Can Checkpoint Containers What's Next?

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Cloud Native Rejekts 2022, May 15

# Agenda

Background

Use cases

Future

# Checkpoint/Restore in Userspace

## CRIU

# Multiple Integrations Exist

# Container Live Migration

## OpenVZ

# Container Live Migration

## Borg

# Container Live Migration

## LXC/LXD

# Container Live Migration

## Docker



# Container Live Migration

## Podman

# Container Live Migration

## CRI-O

<https://github.com/cri-o/cri-o/pull/4199>

# Container Live Migration

## Kubernetes

<https://github.com/kubernetes/kubernetes/issues/3949>

# Forensic Container Checkpointing

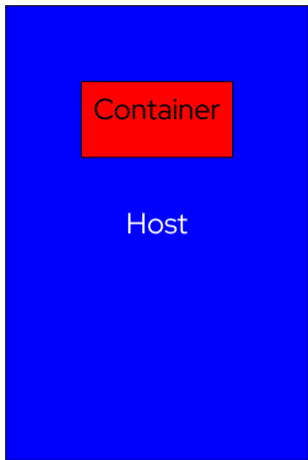
`https://github.com/kubernetes/enhancements/pull/1990`

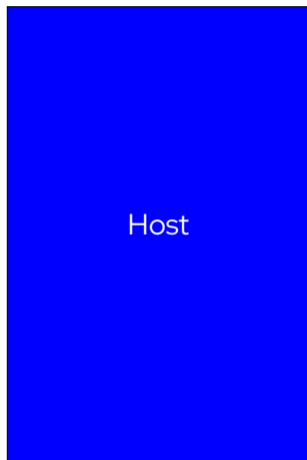
`https://github.com/kubernetes/enhancements/pull/3264`

`https://github.com/kubernetes/kubernetes/pull/104907`

# Use Cases

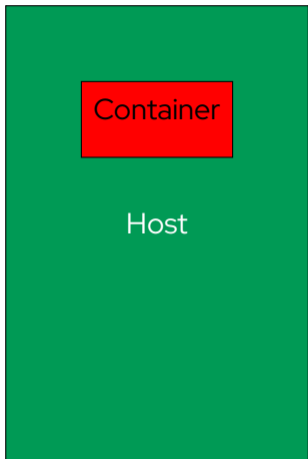
# Reboot and Save State



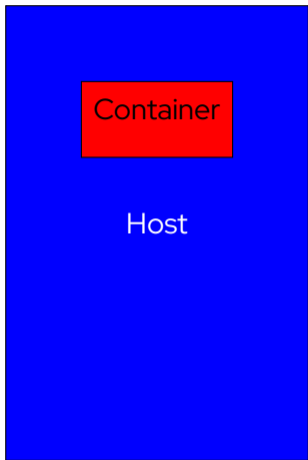


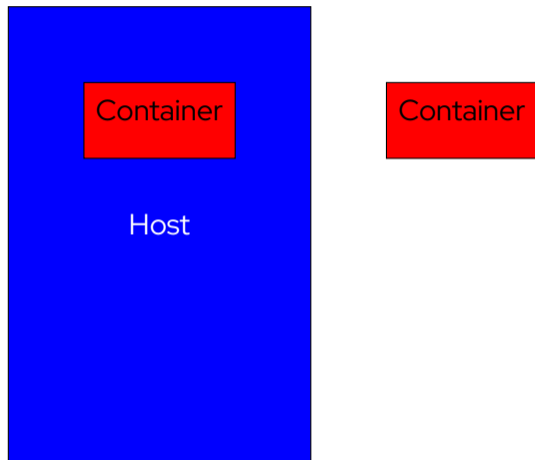


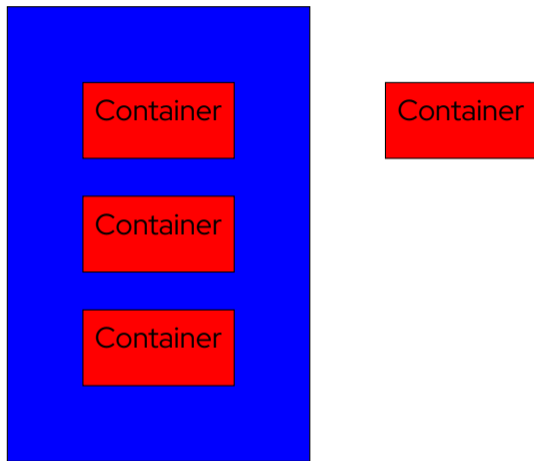
Container



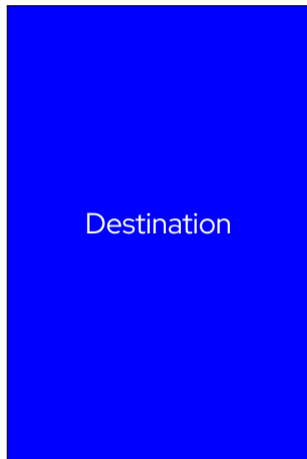
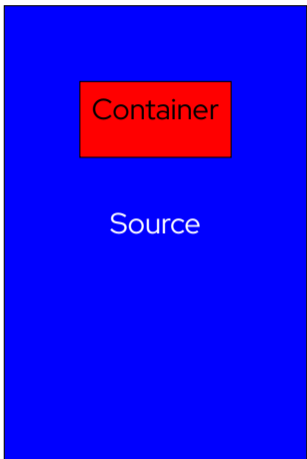
# Quick Startup



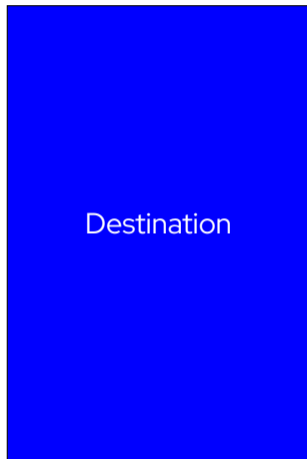
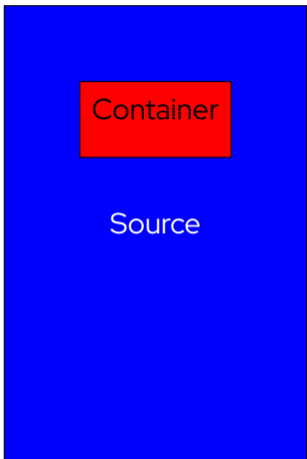


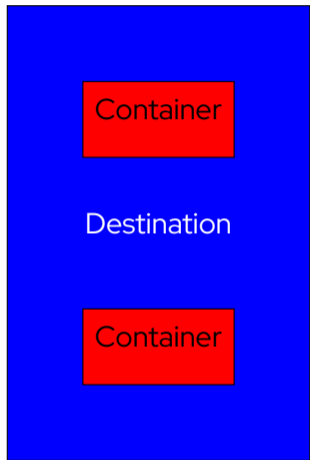
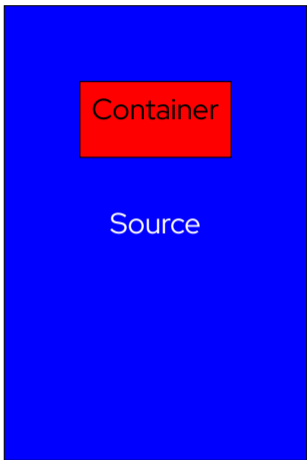


# Container Live Migration









What's next?

kubectl checkpoint

# Separate restore command

# Pod Checkpoint/Restore

```
kubectl migrate
```

# Scheduler Integration



# Summary

- CRIU can checkpoint and restore containers
- Integrated in different containers engines
- Used in production
- Reboot into new kernel without losing container state
- Start multiple copies
- Migrate running containers
- Forensic container checkpointing (KEP #2008)
- Restore via `run` command



**Thank you**