> **Name:**
> **netid:**
> **Collaborators:**
> **Repo** https://github.com/jamesdupark-archive/cs553-c-container

Introduction

`unshare`

`pid` `mount` `network`
`chroot` `alpine`
`ip`
`veth`

`alpine`
`chroot` `alpine`
`proc` `veth`

Prior Work/Novelty

`lxc`
switching to their
own proprietary system, `libcontainer` `lxc`

`man`
`unshare` `lxc-unshare`
`unshare` `lxc`
`unshare`
Moravcik
(2020) `lxc` `docker`

`lxc` Putri (2016)
`lxc` `lxd` `lxc`

`lxd` `lxc` `lxc` `lxd`

Technical Outline

`container.c` `clone`
`fork`
`clone`
`CLONE_NEWPID` `CLONE_NEWNS` `CLONE_NEWNET`

`setup_sysimg` `alpine`

`dd` `create_container`
`chroot` `proc`
`veth` `veth`
`UP` `execvp`
`veth` `fork` `execvp`
`ip`
`veth`
`sleep`
`make ccontainer` `Makefile` `ccontainer`
`sudo`
`-D BENCHMARK` `make bench` `Makefile`
`container.c`
`execvp`

`setup_sysimg`
`bench`

Key Metrics/Benchmarking

This article

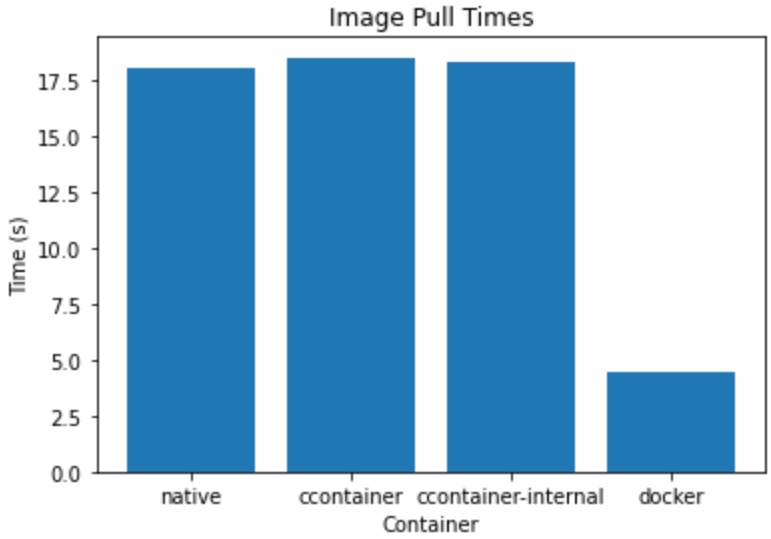
1. **Image Pull Performance** `alpine`
2. **Startup Time**
3. **Networking Performance**
4. **Disk I/O Performance**
5. **Resource Utilization (Memory and CPU)**

Image Pull Performance

`time`

`alpine`
`cd` `ls`

`ccontainer`



`ccontainer`

`ccontainer`

`ccontainer` `fork`

`\dev\zero`

`time`

`time`

`bench`

`imgpull.sh`

`ccontainer`

`build`

`docker_imgpull.txt`

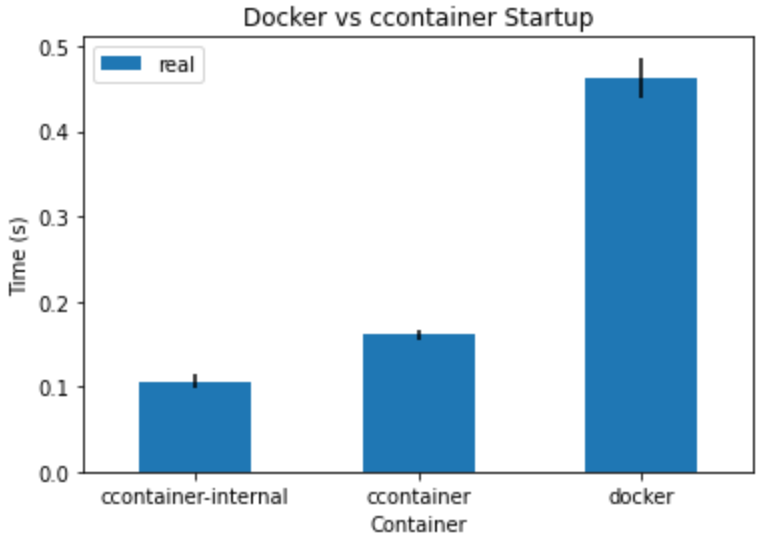
`time`

`curl` `tar`

Startup Time

`time`

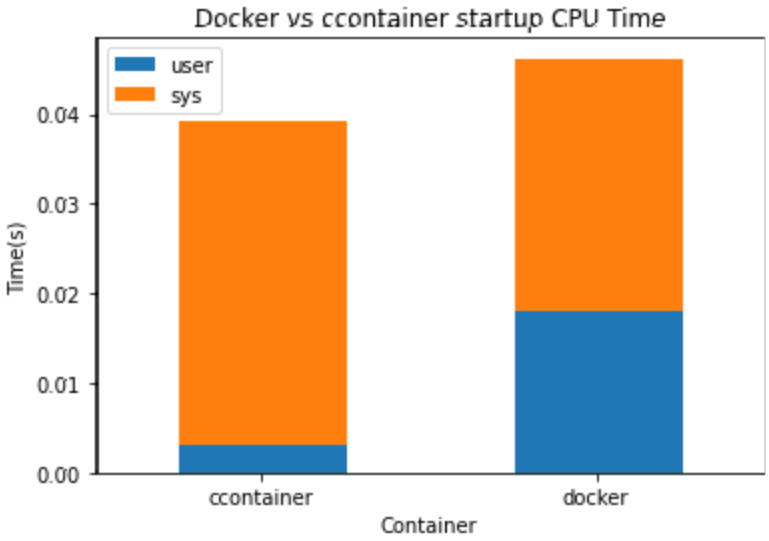
`main` `execv` `sh`



`ccontainer` `time`

`ccontainer`

`ccontainer`



`sys`

`ccontainer`

`ccontainer`

`sem_wait` `waitpid`

`fork, execvp` `sys`

`time`

Networking Performance

`ping`

`-f`

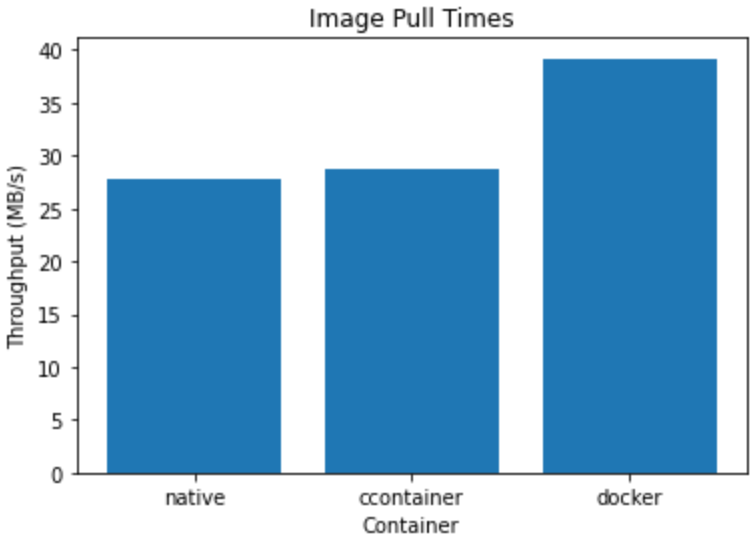
times (ms)	`ccontainer`	`docker`

`veth`

`ping`

Disk I/O Performance

`dd` `/dev/zero`



`ccontainer`

Resource Utilization

`ps`

`docker` `ccontainer`

COMMAND	%CPU	%MEM

`ccontainer`

Known Issues & Future Work

`ccontainer` Networking

`veth`

`ping`

`alpine` `apk`

`hey` `iperf3`

Option Parsing

`ccontainer`

Daemonization

`docker`

`ccontainer`

`ccontainer`

`veth`

`ccontainer`

`ccontainer`

`veth`

`ccontainer`

daemon

Security

`ccontainer` `execvp`

`$PATH`

`sh` `$PATH`