CRIU를 이용한 Docker Container 체크포인트 성능평가

한예진, 최종무

KSC2021

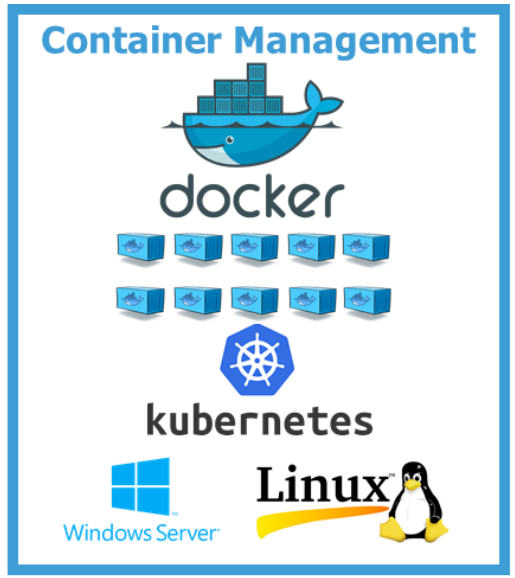
Dankook University

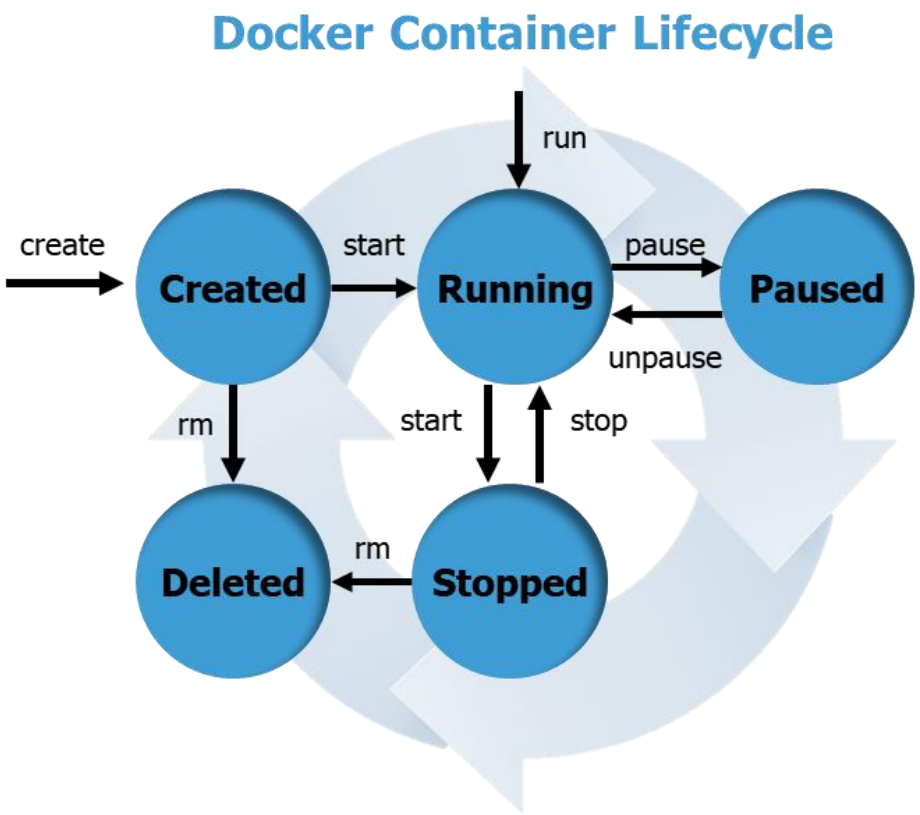
Presentation by Yejin, Han

hyj0225@gmail.com

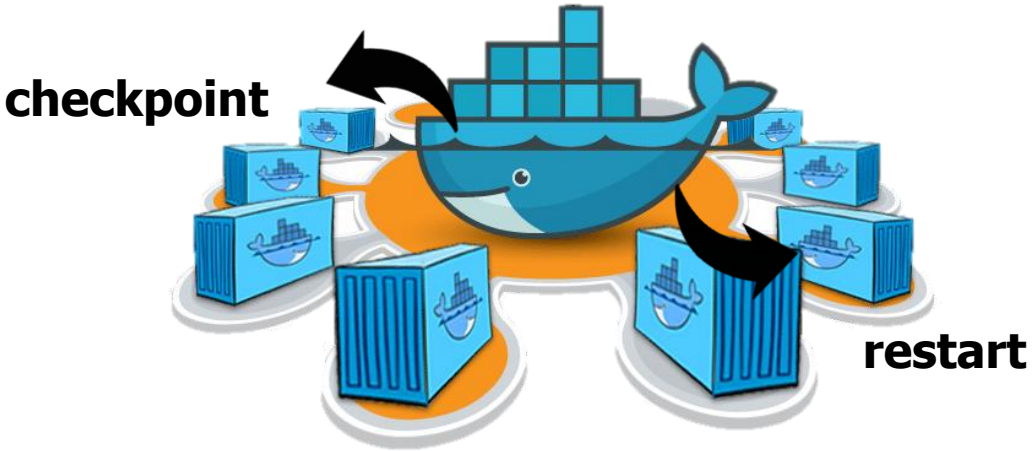
Contents

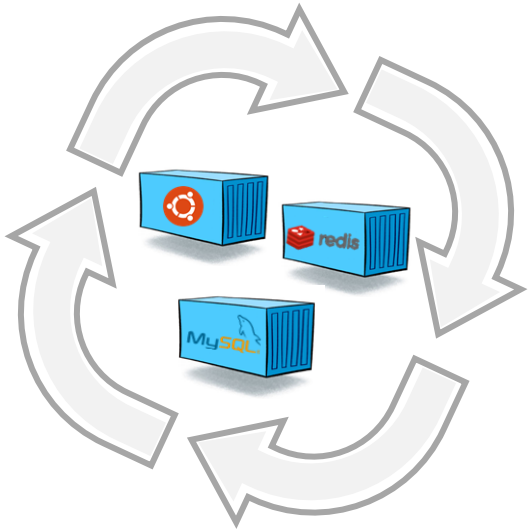
- Modern cloud data centers adopt container technologies such as docker
- Container lifecycle management is essential where numerous containers are running



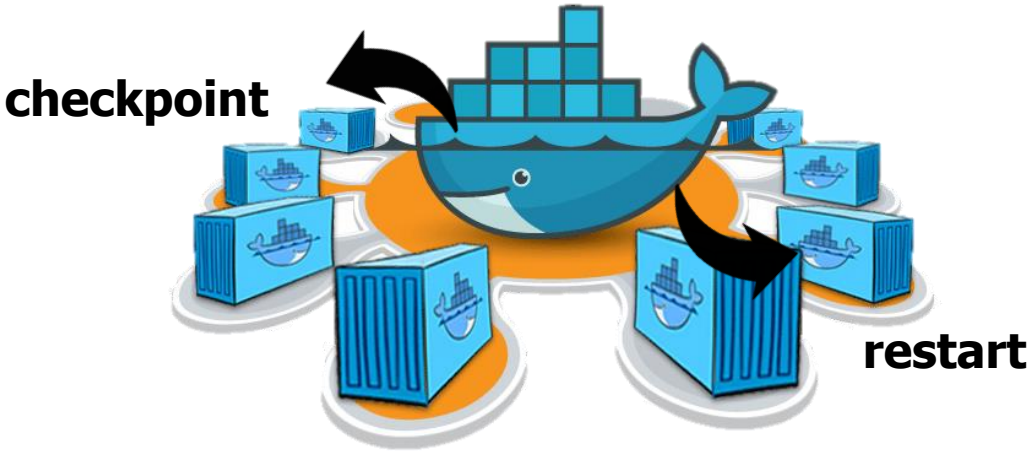


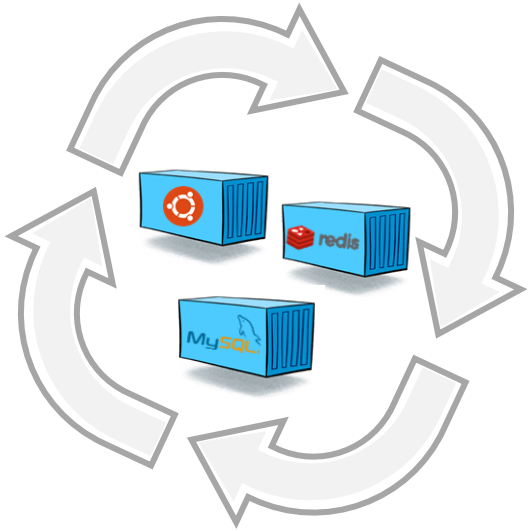
- Checkpoint & Restart is required to load balancing between multiple container resources
- To provide Quality of Service, it is necessary to minimize the Checkpoint & Restart time





- Checkpoint & Restart is required to load balancing between multiple container resources
- To provide Quality of Service, it is necessary to minimize the Checkpoint & Restart time
- What if there's interfecence between container checkpoint jobs?



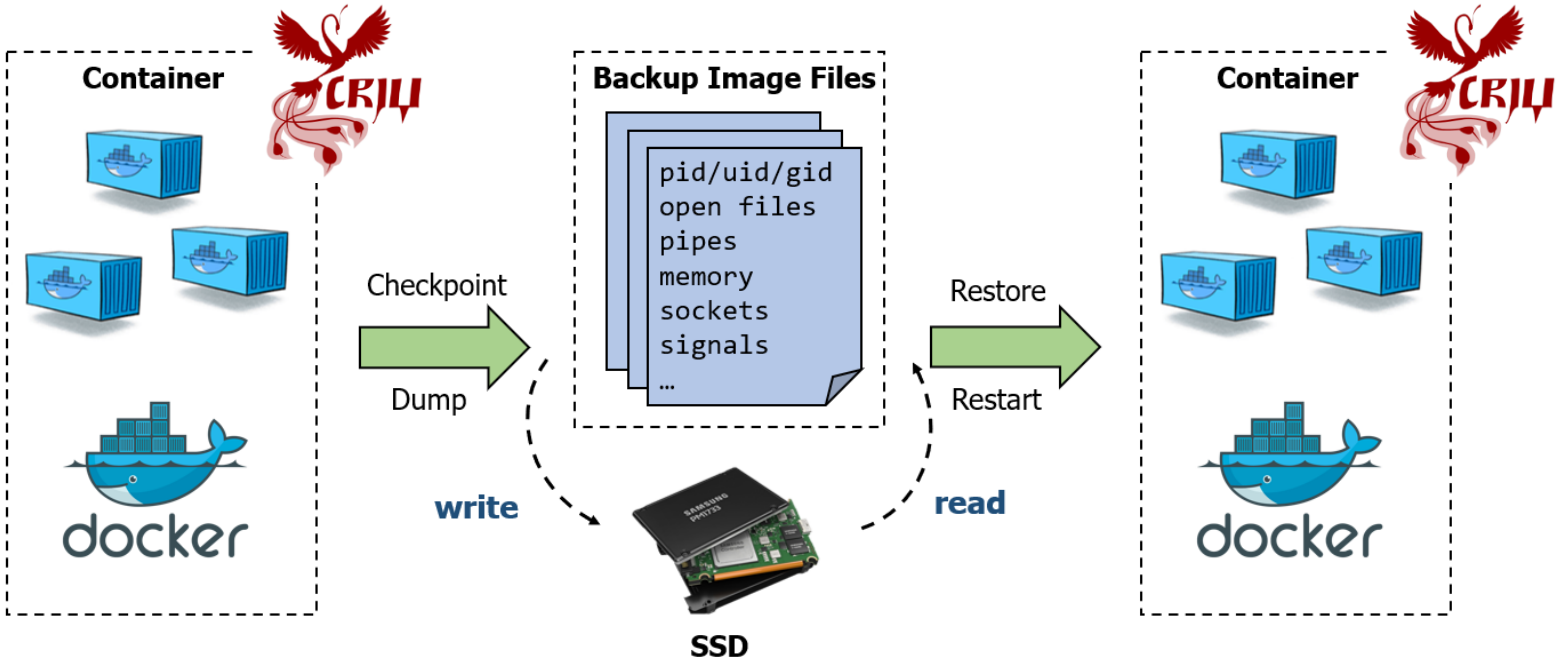


?

Interference between checkpoint jobs

Docker container checkpoint and Restore

- Freeze a running container by checkpointing it to a disk as a collection of files.
- Later, using the files, the container can be restored from the point it was frozen at.
- This is accomplished using CRIU, which is an external dependency of this feature.

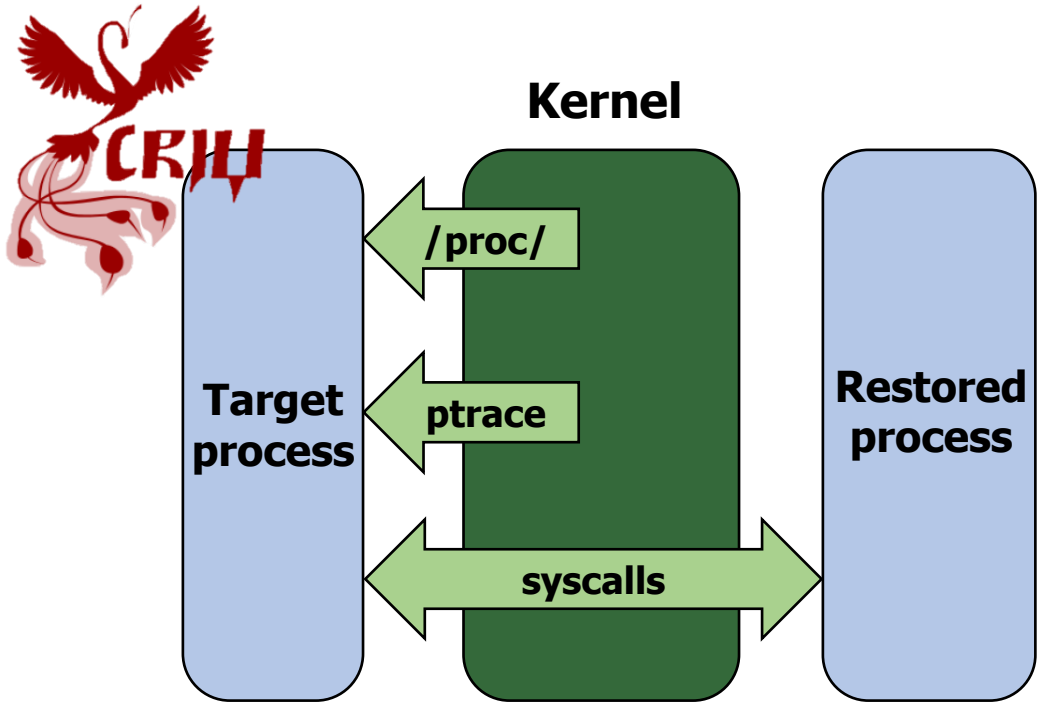


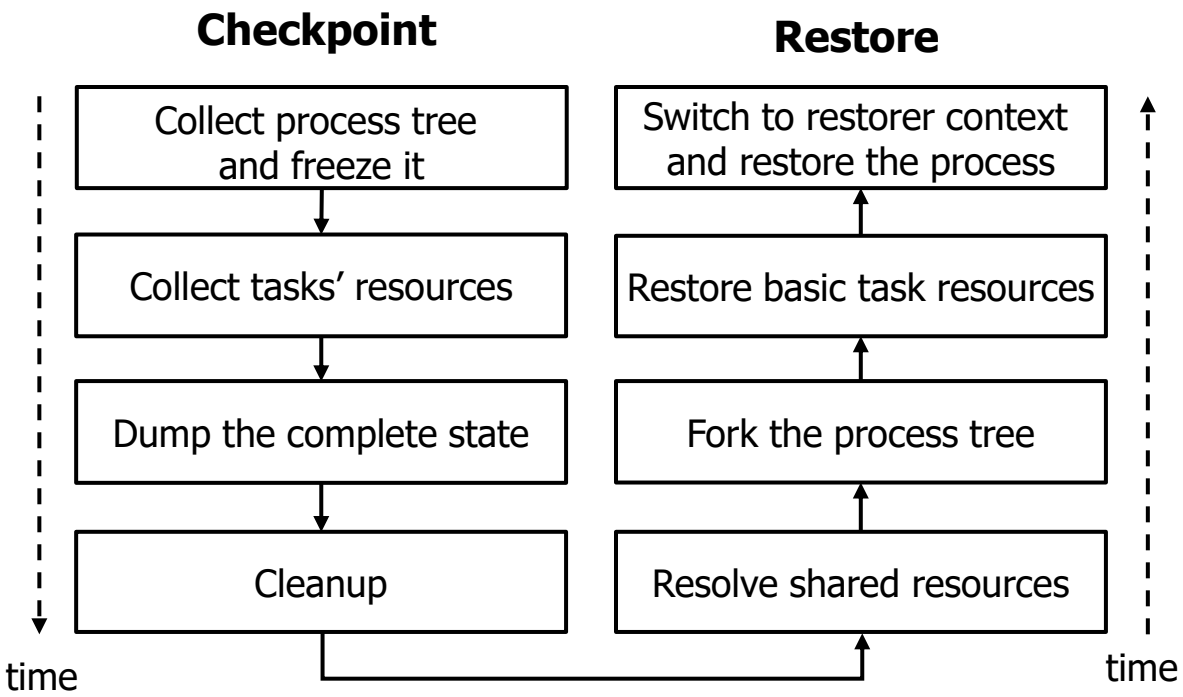

```
$ docker checkpoint create
```

```
$ docker start --checkpoint
```

CRIU (Checkpoint and Restore in Userspace)

- CRIU is a Linux software to checkpoint and restore Linux processes.
- The checkpoint procedure relies on */proc* file system and *ptrace* system call.
- The restore procedure is done by CRIU morphing itself into the target process.



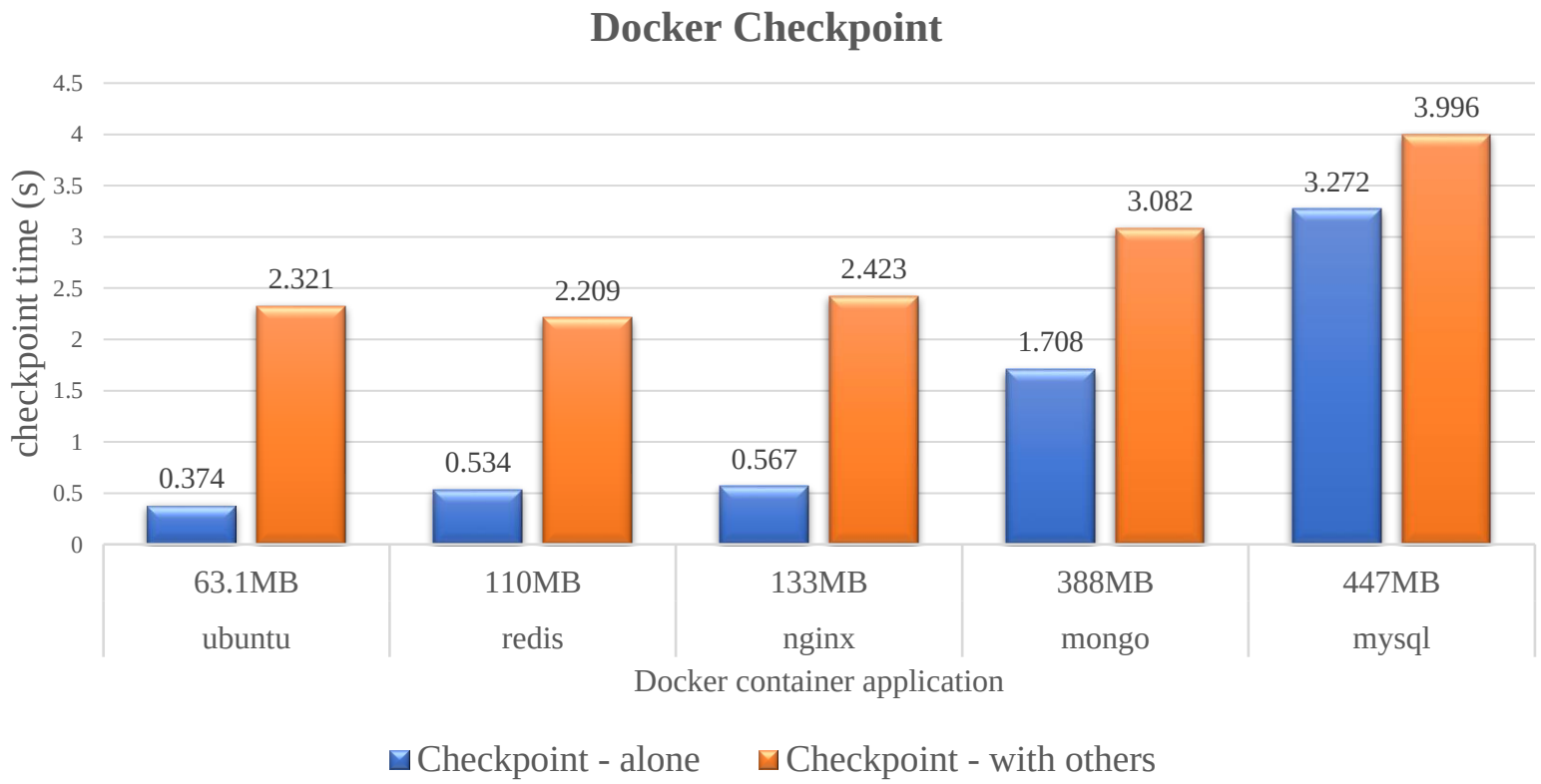


Evaluation Environment

CPU	Intel® Core™ i5-4440, 3.10GHz
Memory	32 GB
Storage	Samsung 850 PRO 256GB SSD (SATA Interface)
Kernel	Linux 5.7.7
Tool	CRIU v.3.15

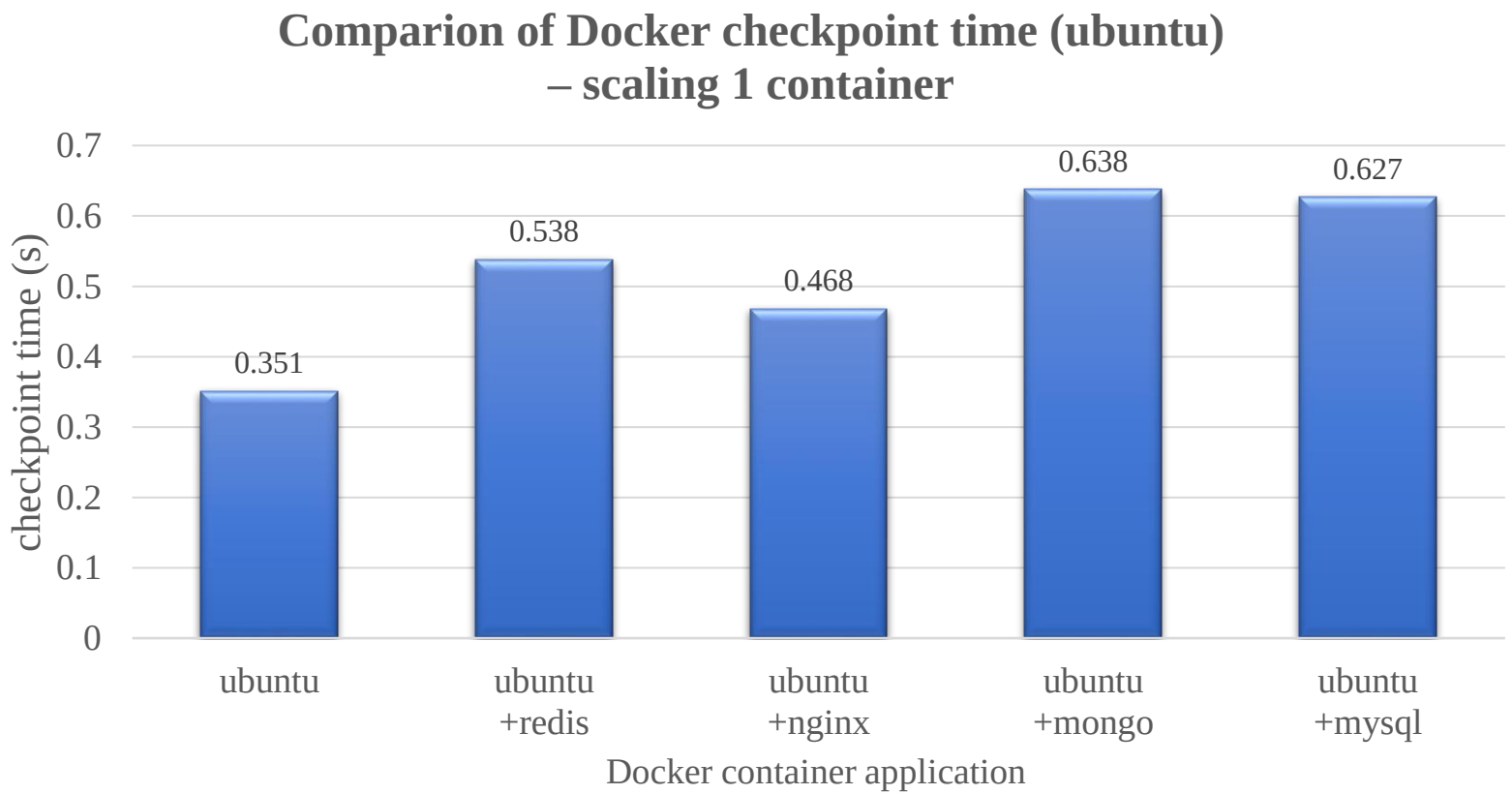
Docker container checkpoint interference

- The checkpoint time increases with the application image size.
- There are intervention between checkpoint jobs when the checkpoint occurs concurrently.



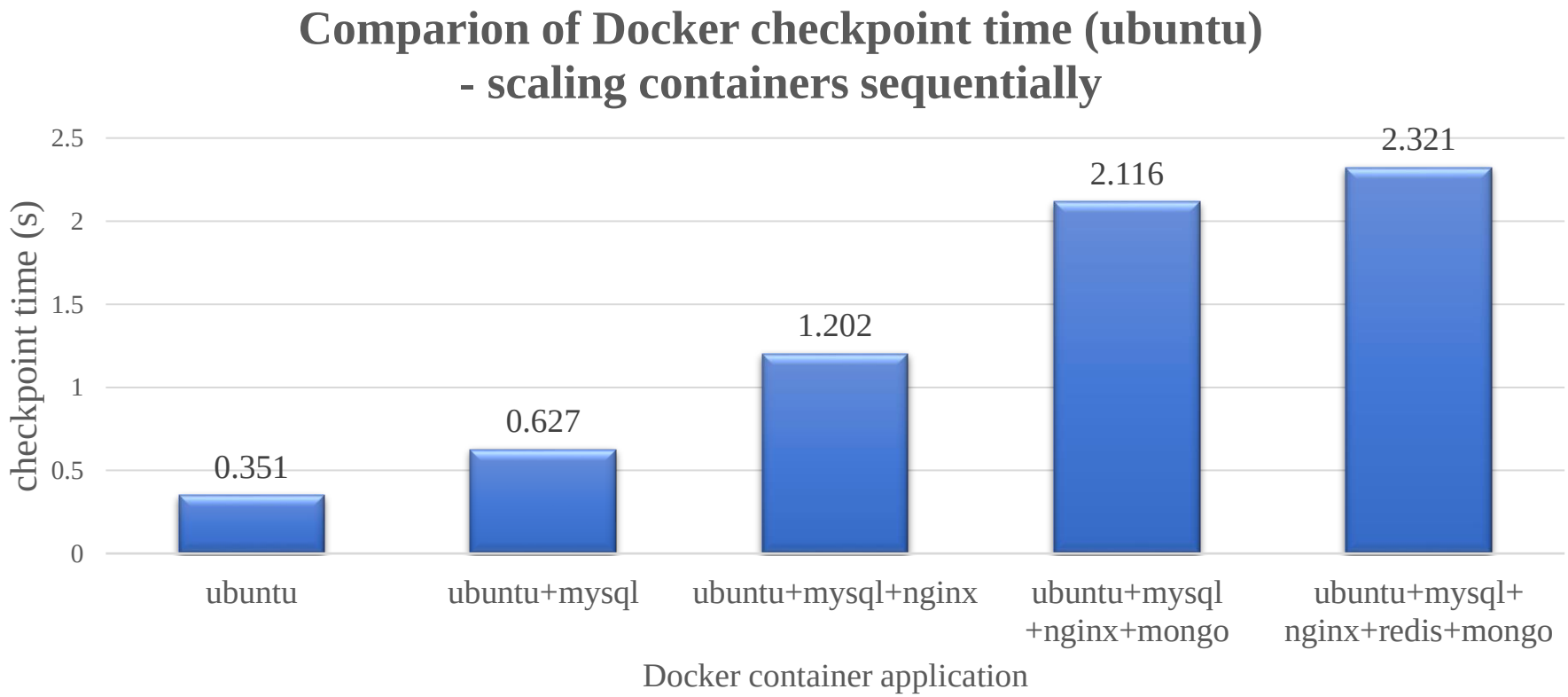
Ubuntu container checkpoint interference : with 1 container

- Compared to the situation in which two containers are running, a performance interference may occur significantly in a situation in which multiple containers are running concurrently.



Ubuntu container checkpoint interference : with multiple containers

- The more the container is additionally increased, the more linearly the checkpoint time is increased



6. Conclusion

- Docker container checkpoint time increases with the application image size.
- While several containers are running, checkpoint time greatly increases because of interference between concurrent checkpoint jobs.
- Further research is needed to achieve improved performance by minimizing interference when containers are running together.

CRIU를 이용한 Docker Container 체크포인트 성능평가

한예진, 최종무

KSC2021

Dankook University

Thank You!

Presentation by Yejin, Han

hyj0225@gmail.com

Reference

- https://www.capgemini.com/ch-en/2019/10/empower-your-business-in-the-cloud-with-docker-enterprise-as-a-service/
- https://k21academy.com/docker-kubernetes/docker-container-lifecycle-management/