Things to do while you are waiting

• Course slides are available at: https://hprc.tamu.edu/training/aces_containers.html

• Log into TAMU VPN (if you’re off campus)

• Get ready to launch a terminal on the FASTER cluster for interactive exercises (ask if you don’t know how).
Introduction to Containers Tutorial

featuring Charliecloud on the FASTER cluster

an HPRC + LANL Training Collaboration

February 14, 2023
Outline

Morning
- Overview of Containers
- Connecting to the FASTER cluster
- Charliecloud Exercises
- Charliecloud Q&A

Afternoon
- Charliecloud Tech Lab (separate registration)
Course Objectives

The researcher should be able to:
- Decide whether containers are right for you
- Find container images in repositories
- Use Charliecloud at HPRC for basic container tasks
Learning Resources

- HPRC Wiki [https://hprc.tamu.edu/wiki/SW:Charliecloud](https://hprc.tamu.edu/wiki/SW:Charliecloud)
- HPRC on Youtube [https://www.youtube.com/c/TexasAMHPRC](https://www.youtube.com/c/TexasAMHPRC)
- Charliecloud Manual [https://hpc.github.io/charliecloud/](https://hpc.github.io/charliecloud/)
- Docker Manual [https://docs.docker.com/](https://docs.docker.com/)
- Other container courses:
Overview of Containers
Introduction to Containers

- Containers make Applications more portable.
- Unlike in VMs, the OS Kernel is not duplicated.

Virtual Machine

- User Application
- Guest Binaries
- Guest Libraries
- Guest OS Kernel
- Virtual Machine Manager
- Host OS Kernel
- Hardware

Host OS Kernel

Local Build or “Bare metal”

- User Application
- Host Binaries
- Host Libraries
- Host OS Kernel
- Hardware

Container

- User Application
- Guest Binaries
- Guest Libraries
- Container Runtime
- Host OS Kernel
- Hardware
Popular Containers

Instant deployment to users on different devices!

- LXC 2008
- Docker 2013
- Singularity 2015
- Shifter 2016
- Charliecloud 2017
- Podman 2018

Last week! Today!
Basics

Containers come in two parts:

- **Image:**
  - A file containing all the parts of an environment, libraries and applications
  - Generally built by experts
  - Found in online repositories

- **Runtime:**
  - Compatibility layer translates between the container environment and the host operating system
  - Runtime is installed by cluster administrators
Why use Containers?

- **Shareability**:  
  ○ Share your container image file by uploading to a public repository  
  ○ Use images shared by others

- **Portability**:  
  ○ Use images on any computer with the same architecture (x86-64)

- **Reproducibility**:  
  ○ Container users are largely unaffected by changes to the cluster environments
Overview of Charliecloud

Proceed to Charliecloud Tutorial Document
Exercises coming up next

Log into FASTER via HPRC Portal
Accessing the HPRC Portal

- HPRC webpage: [hprc.tamu.edu](http://hprc.tamu.edu), Portal dropdown menu
Accessing FASTER via the HPRC Portal (TAMU)

Log-in using your TAMU NetID credentials.
Accessing FASTER via the HPRC Portal (ACCESS)

Log-in using your ACCESS credentials.

Select the Identity Provider appropriate for your account.
Shell access via the HPRC Portal

Access through (most) web browsers
–Top Banner Menu “Clusters” -> “Shell Access”

OnDemand provides an integrated, single access point for all of your HPC resources.

Message of the Day

IMPORTANT POLICY INFORMATION

- Unauthorized use of HPRC resources is prohibited and subject to criminal prosecution.
- Use of HPRC resources in violation of United States export control laws and regulations is prohibited and legal residents.
- Sharing HPRC account and password information is in violation of State Law. Any shared accounts will be subject to termination.
- Authorized users must also adhere to ALL policies at: https://hprc.tamu.edu/policies
Charliecloud Tutorial

with exercises
Tutorial Complete
Conclusion

• Run Containers on clusters! It’s easy.
• HPRC supports Charliecloud
• Convert Docker to Charliecloud!
• Ask for help!
Questions
Join Us for Charliecloud Tech Lab this afternoon!

register at
hprc.tamu.edu/training/aces_containers_techlab.html
Learning Resources

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- HPRC on Youtube [https://www.youtube.com/c/TexasAMHPRC](https://www.youtube.com/c/TexasAMHPRC)
- Charliecloud Manual [https://hpc.github.io/charliecloud/](https://hpc.github.io/charliecloud/)
- Docker Manual [https://docs.docker.com/](https://docs.docker.com/)
- Other container courses:
Thank you

Contact: help@hprc.tamu.edu