THE WHY AND HOW OF CONTAINERS

Ann Guilinger
athenahealth
Twitter: @aguilinger

SOFTWARE HISTORY

Servers and Virtual Machines and Containers oh my!

HISTORY

➤ Software needs to run on some machine

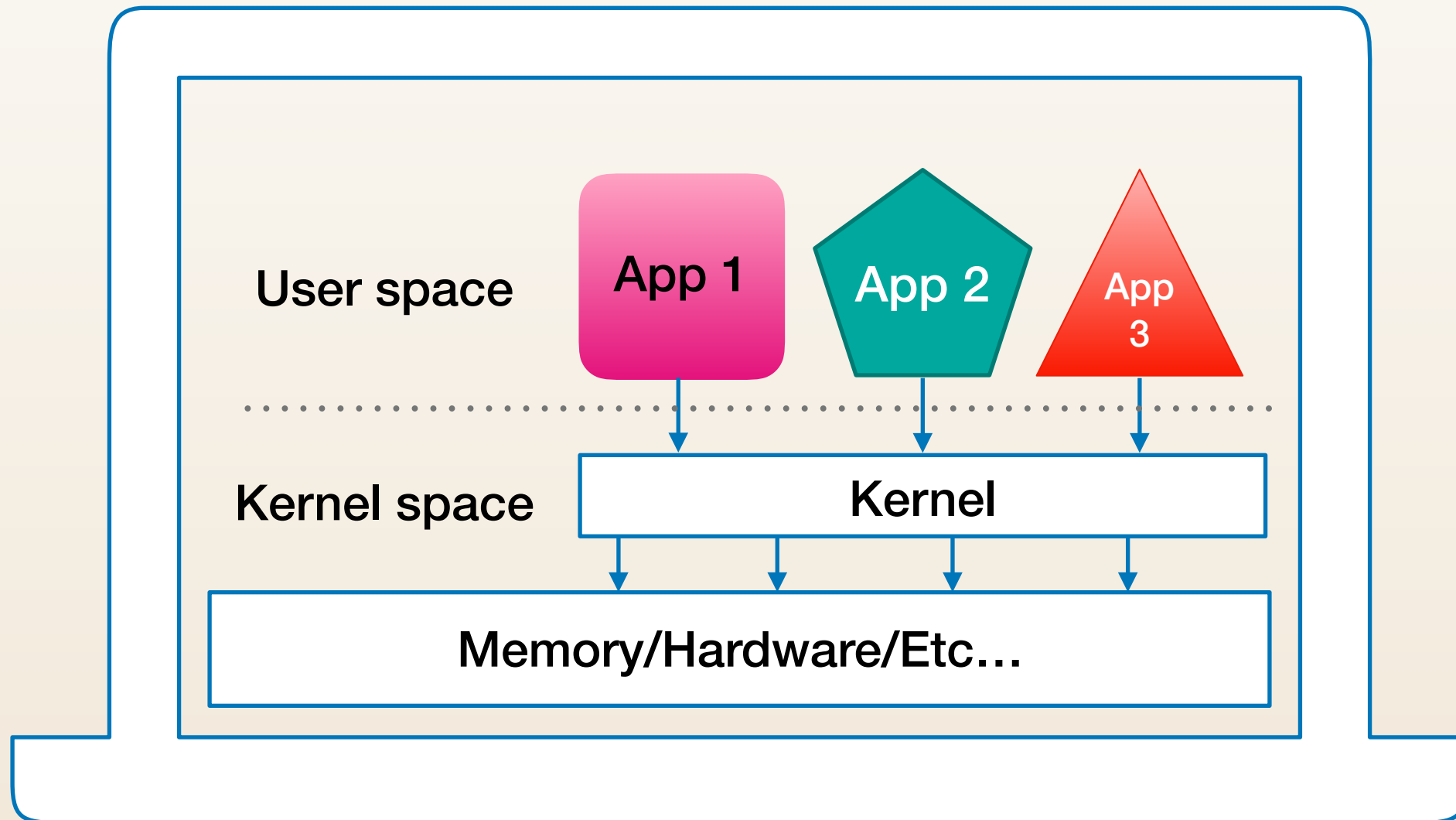Physical servers   Virtual Machines   Containers

→

time

SERVERS

➤ Physical servers

   ➤ Computers running code natively

SERVERS

SERVERS

➤ The good

SERVERS

➤ The good

  ➤ You can run your applications

SERVERS

➤ The good

   ➤ You can run your applications

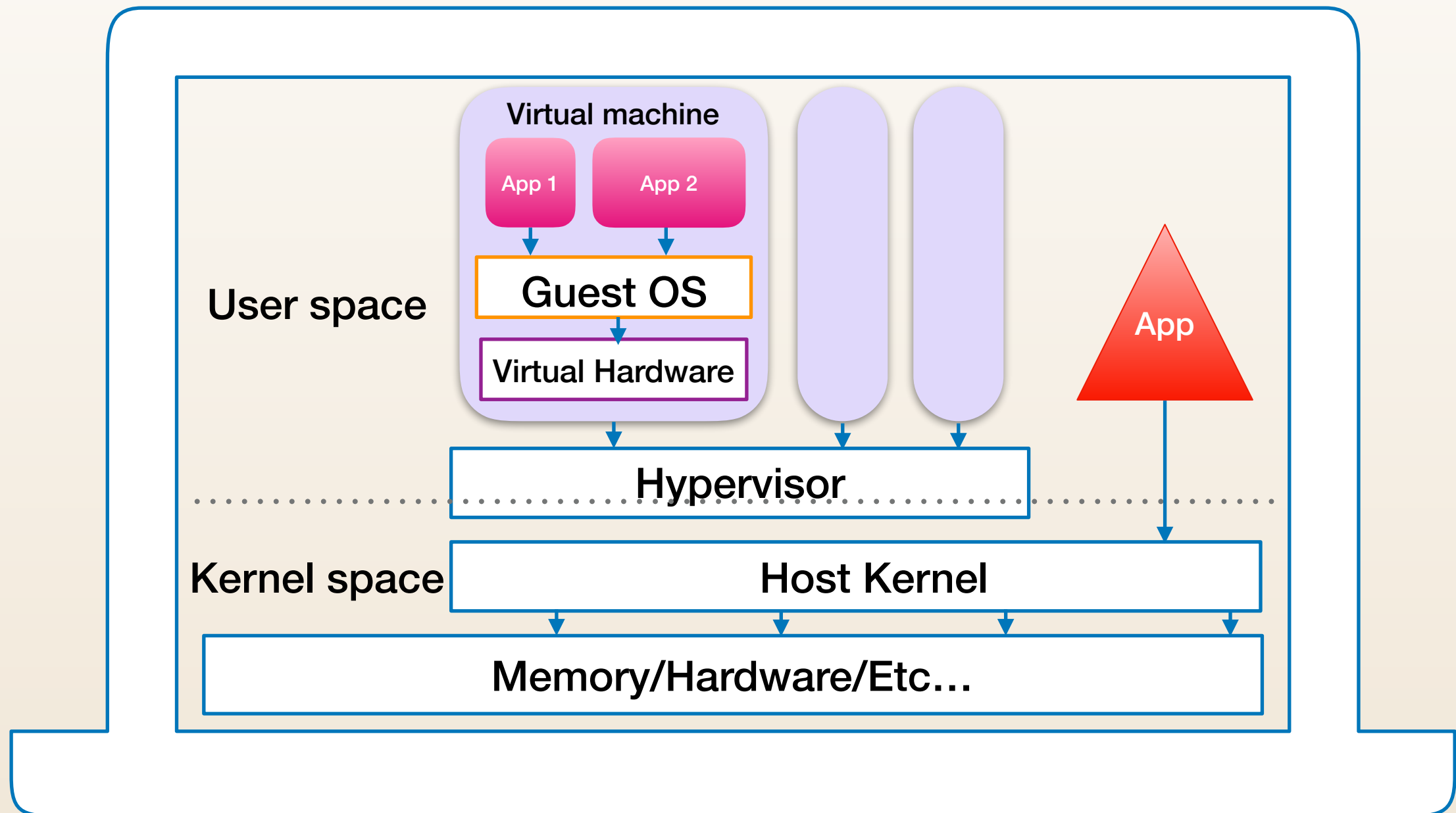➤ The bad

SERVERS

➤ The good

  ➤ You can run your applications

➤ The bad

  ➤ Environments are different between machines

SERVERS

➤ The good

    ➤ You can run your applications

➤ The bad

    ➤ Environments are different between machines

    ➤ Too many/too few resources

VIRTUAL MACHINES

➤ VM

➤ Operating systems running on operating systems

VIRTUAL MACHINES

VIRTUAL MACHINES

➤ The good

VIRTUAL MACHINES

➤ The good

    ➤ Isolated environments

VIRTUAL MACHINES

➤ The good

   ➤ Isolated environments

   ➤ Can set up OS image and copy around

VIRTUAL MACHINES

➤ The good

  ➤ Isolated environments

  ➤ Can set up OS image and copy around

➤ The bad

VIRTUAL MACHINES

- ➤ The good

  - ➤ Isolated environments

  - ➤ Can set up OS image and copy around

- ➤ The bad

  - ➤ Set up entire operating system

VIRTUAL MACHINES

➤ The good

   ➤ Isolated environments

   ➤ Can set up OS image and copy around

➤ The bad

   ➤ Set up entire operating system

   ➤ Files very large

VIRTUAL MACHINES

➤ The good

  ➤ Isolated environments

  ➤ Can set up OS image and copy around

➤ The bad

  ➤ Set up entire operating system

  ➤ Files very large

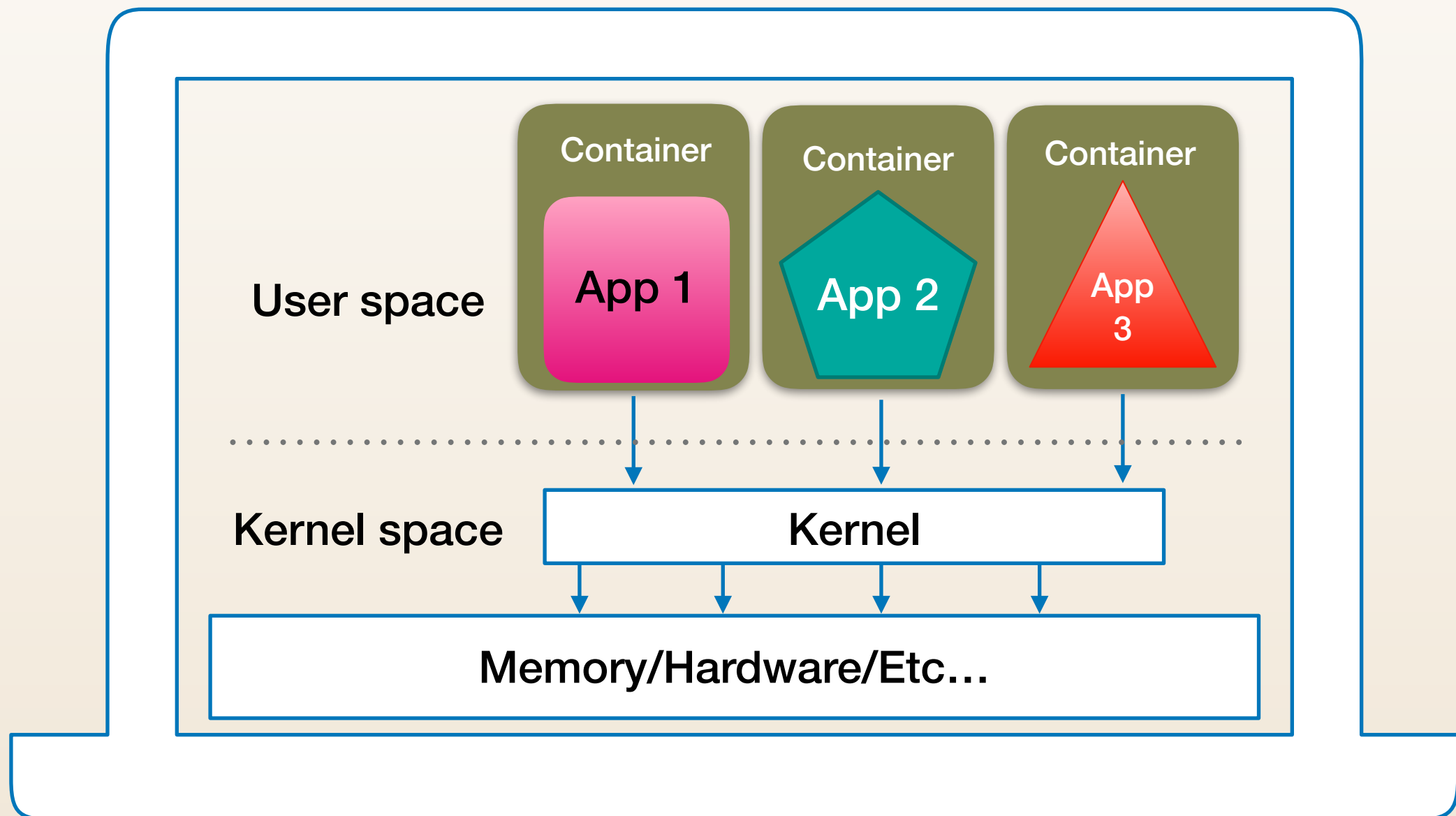 ➤ Need hypervisor to control things

VIRTUAL MACHINES

- The good

  - Isolated environments

  - Can set up OS image and copy around

- The bad

  - Set up entire operating system

  - Files very large

  - Need hypervisor to control things

Lots of resources that are *not* your application!

CONTAINERS

➤ Back to running processes straight on machines

➤ Isolation/control provided by containers

CONTAINERS

➤ In brief - containers controlled through cgroups and namespaces

namespaces

namespaces

cgroups
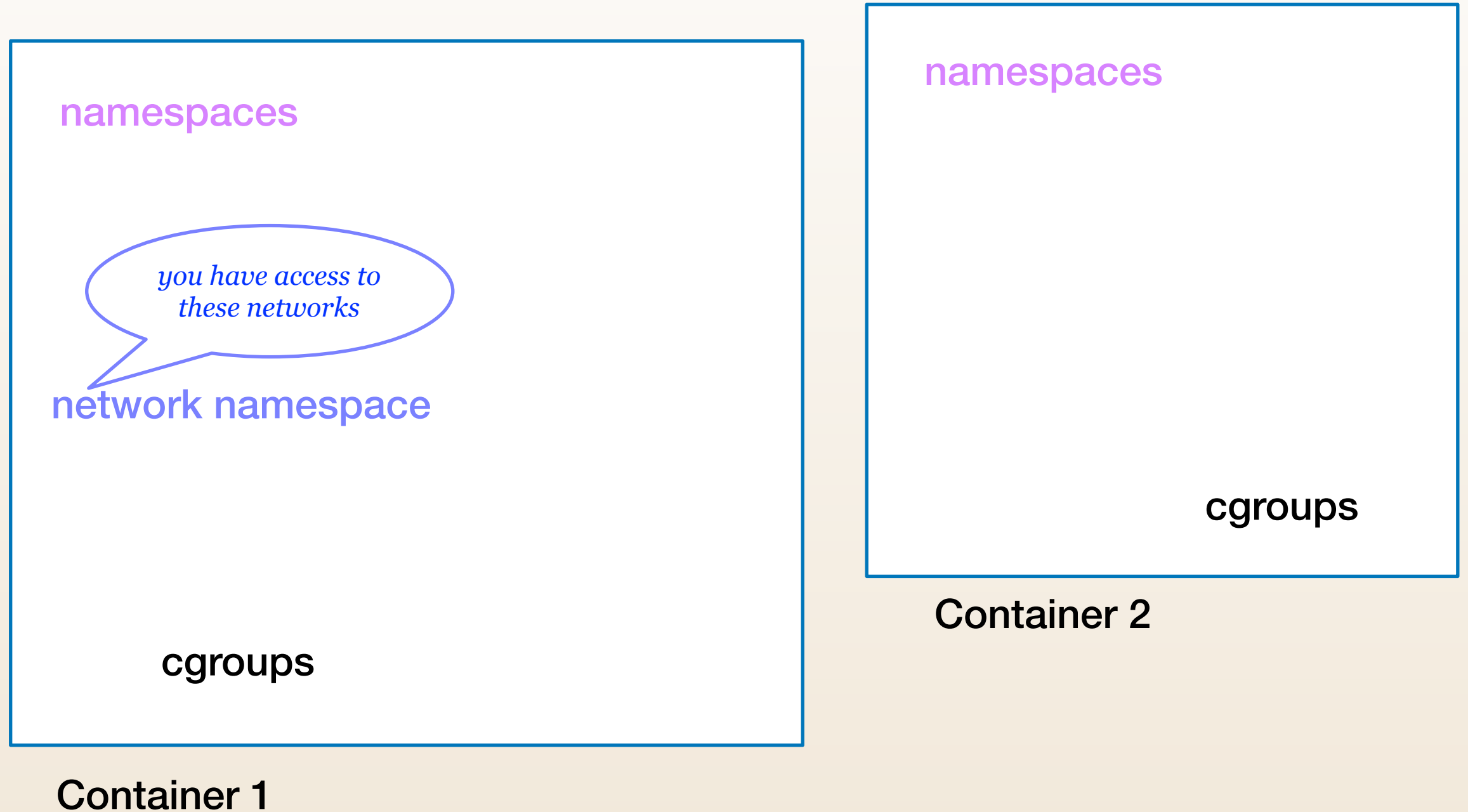
Container 2

cgroups

Container 1

CONTAINERS

➤ In brief - containers controlled through cgroups and namespaces

CONTAINERS

➤ In brief - containers controlled through cgroups and namespaces

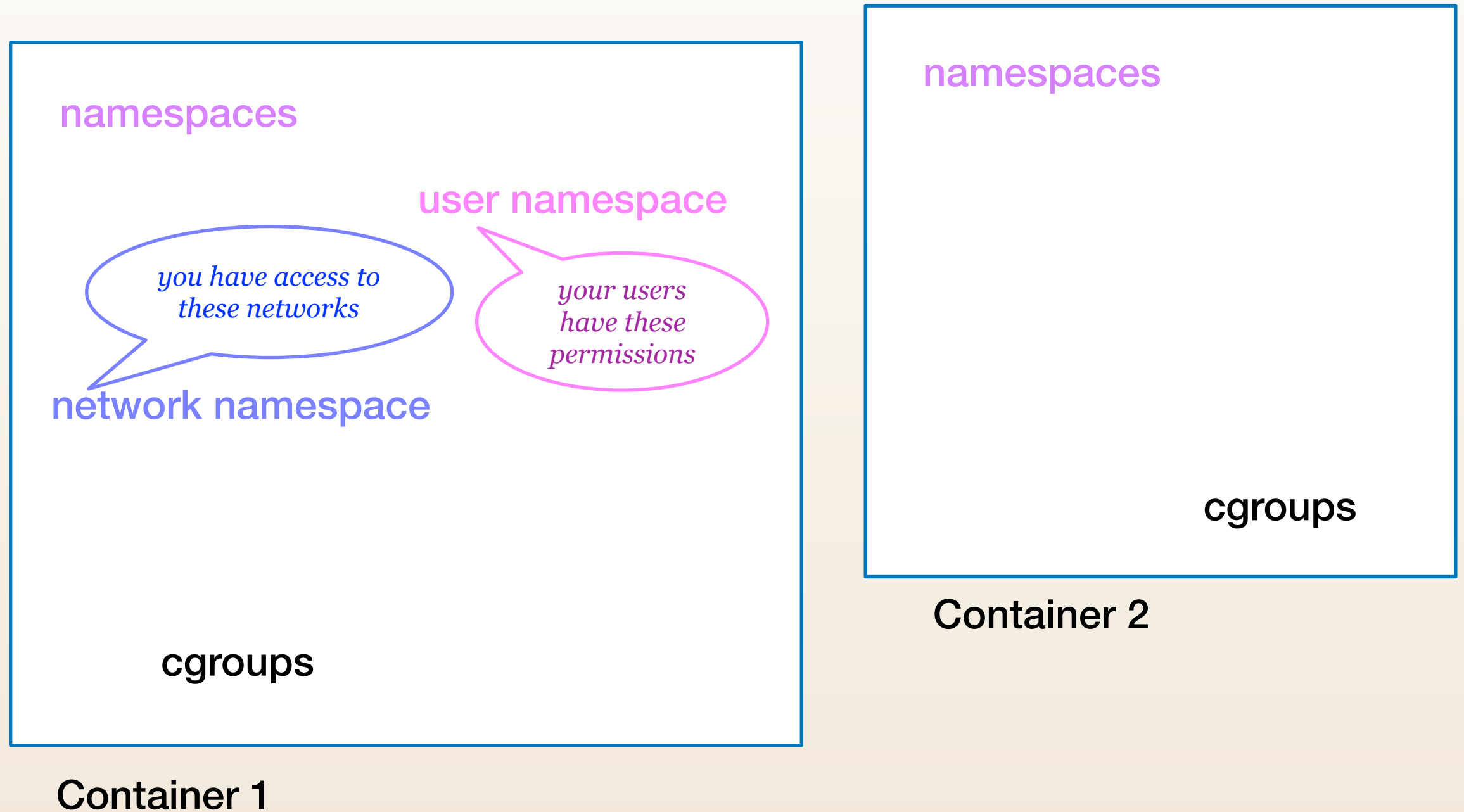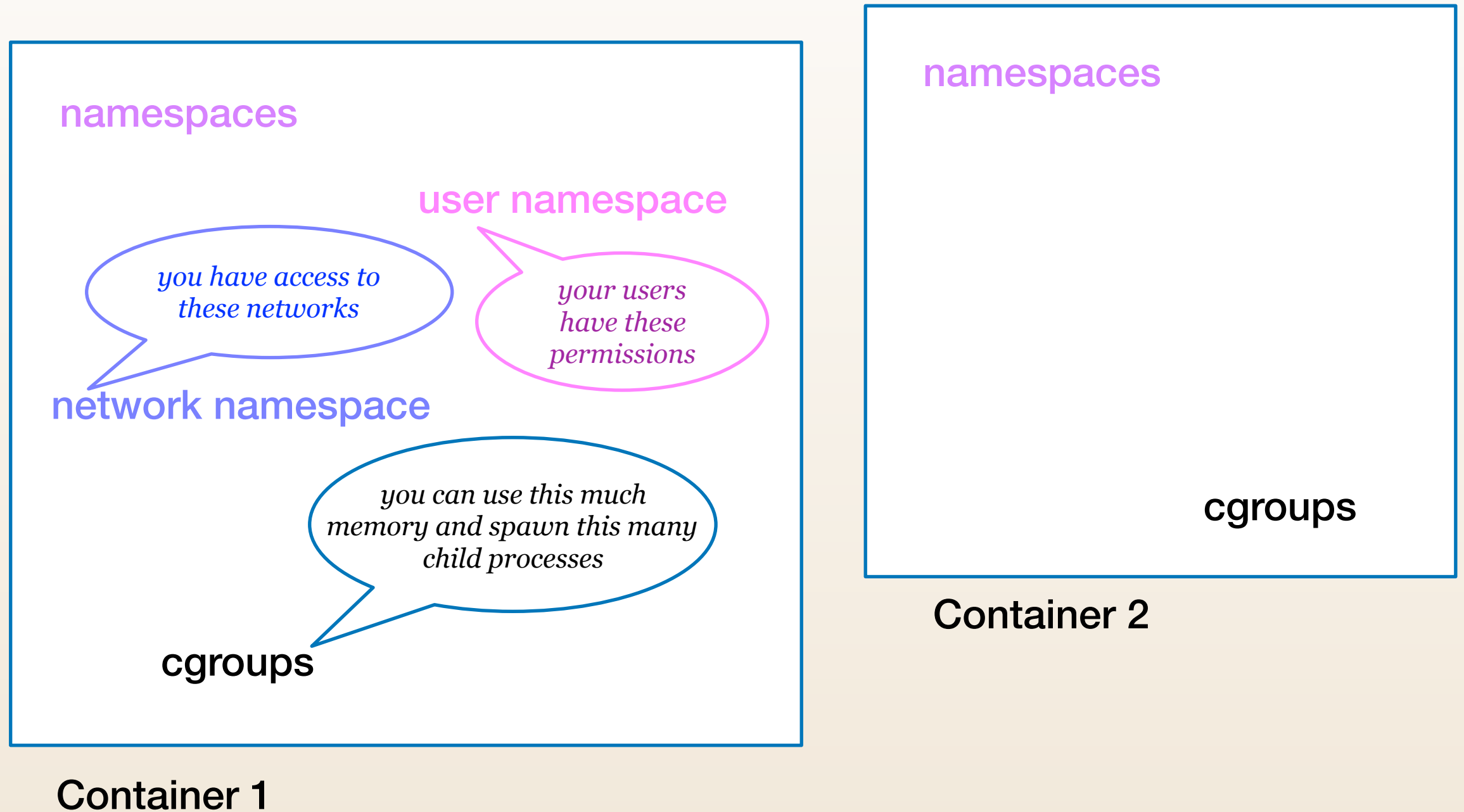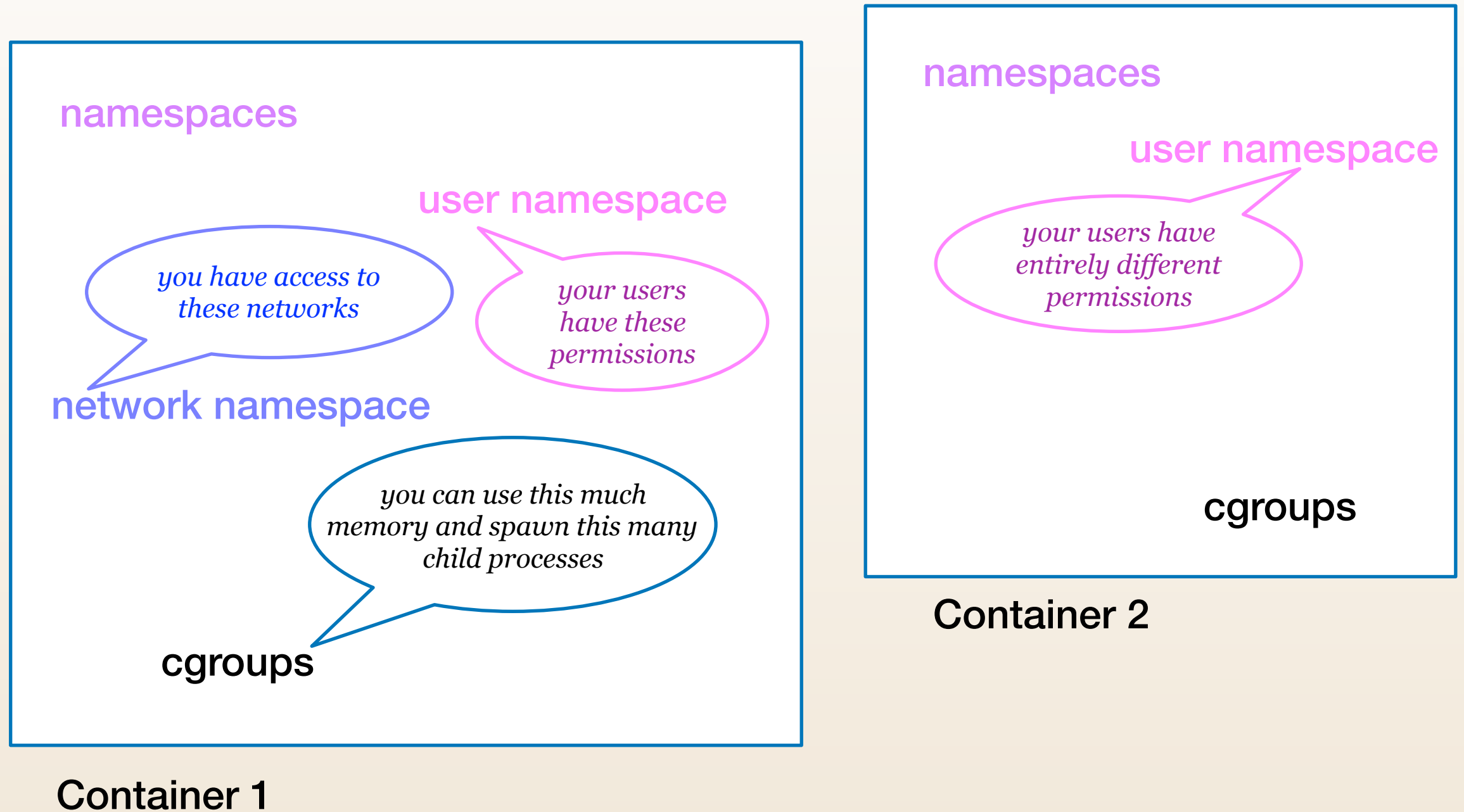# CONTAINERS

➤ In brief - containers controlled through cgroups and namespaces

CONTAINERS

➤ In brief - containers controlled through cgroups and namespaces

CONTAINERS

➤ In brief - containers controlled through cgroups and namespaces
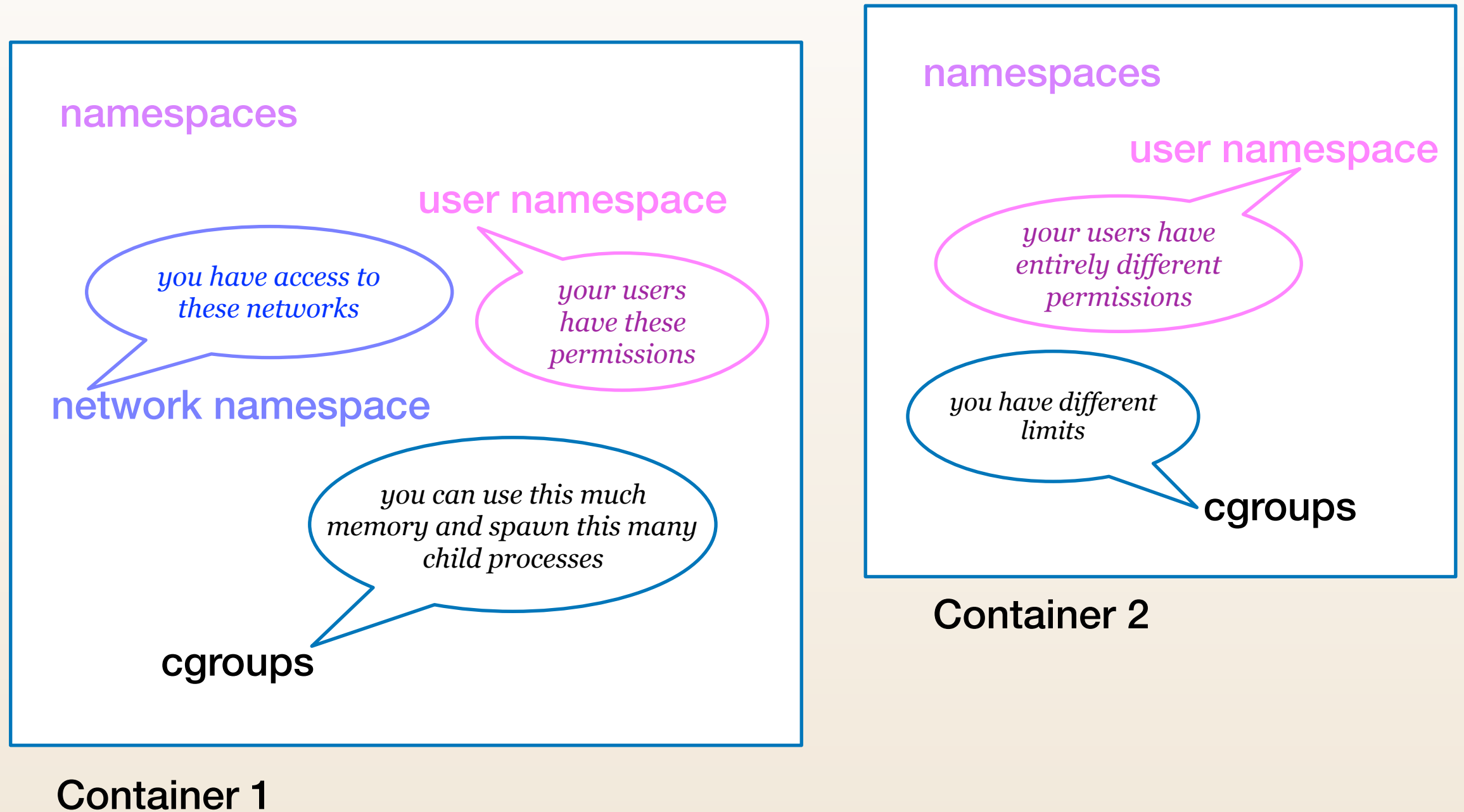
CONTAINERS

CONTAINERS

➤ The good

CONTAINERS

➤ The good

  ➤ Small packages - move around easily

CONTAINERS

➤ The good

    ➤ Small packages - move around easily

    ➤ More space for applications

CONTAINERS

- ➤ The good
  - ➤ Small packages - move around easily
  - ➤ More space for applications
- ➤ The bad

CONTAINERS

- ➤ The good
  - ➤ Small packages - move around easily
  - ➤ More space for applications
- ➤ The bad
  - ➤ Security?

CONTAINERS

- ➤ The good
  - ➤ Small packages - move around easily
  - ➤ More space for applications
- ➤ The bad
  - ➤ Security?
  - ➤ Network set-up

CONTAINERS

➤ The good

    ➤ Small packages - move around easily

    ➤ More space for applications

➤ The bad

    ➤ Security?

    ➤ Network set-up

    ➤ Too many containers! 😖

CONTAINERS

➤ The good

  ➤ Small packages - move around easily

  ➤ More space for applications

➤ The bad

  ➤ Security?

  ➤ Network set-up

  ➤ Too many containers! 😖

CONTAINERS

- The good
    - Small packages - move around easily
    - More space for applications
- The bad
    - Security?
    - Network set-up
    - Too many containers! 😖

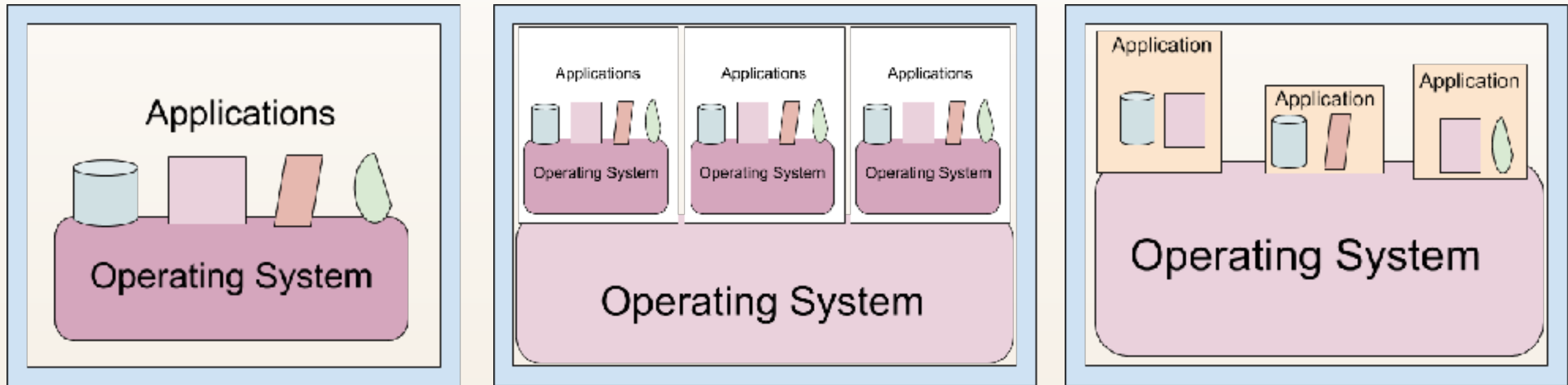Container orchestration

SUMMARY

Physical servers   Virtual Machines   Containers

time

SUMMARY – THE BAD BITS

SUMMARY – THE BAD BITS

➤ Physical servers

SUMMARY – THE BAD BITS

➤ Physical servers

  ➤ Different environments

SUMMARY – THE BAD BITS

➤ Physical servers

    ➤ Different environments

    ➤ Resource inefficiencies

SUMMARY – THE BAD BITS

- ➤ Physical servers

    - ➤ Different environments

    - ➤ Resource inefficiencies

- ➤ Virtual machines

SUMMARY – THE BAD BITS

➤ Physical servers

    ➤ Different environments

    ➤ Resource inefficiencies

➤ Virtual machines

    ➤ Large

SUMMARY – THE BAD BITS

➤ Physical servers

   ➤ Different environments

   ➤ Resource inefficiencies

➤ Virtual machines

   ➤ Large

➤ Containers

SUMMARY – THE BAD BITS

➤ Physical servers

  ➤ Different environments

  ➤ Resource inefficiencies

➤ Virtual machines

  ➤ Large

➤ Containers

  ➤ Set up the namespaces/cgroups

DOCKER

DOCKER

➤ Docker solved previous problems

DOCKER

- ➤ Docker solved previous problems

- ➤ Large file sizes - Containers

DOCKER

➤ Docker solved previous problems

➤ Large file sizes - Containers

    ➤ Less overhead in containers than VMs

DOCKER

➤ Docker solved previous problems

➤ Large file sizes - Containers

    ➤ Less overhead in containers than VMs

    ➤ Namespaces and cgroups set up for you

DOCKER

➤ Docker solved previous problems

➤ Large file sizes - Containers

  ➤ Less overhead in containers than VMs

  ➤ Namespaces and cgroups set up for you

➤ Environment set up - Images from Dockerfile/snapshots

DOCKER

- ➤ Docker solved previous problems

- ➤ Large file sizes - Containers

  - ➤ Less overhead in containers than VMs

  - ➤ Namespaces and cgroups set up for you

- ➤ Environment set up - Images from Dockerfile/snapshots

  - ➤ Like a template for spinning up containers

DOCKER

➤ Docker solved previous problems

➤ Large file sizes - Containers

  ➤ Less overhead in containers than VMs

  ➤ Namespaces and cgroups set up for you

➤ Environment set up - Images from Dockerfile/snapshots

  ➤ Like a template for spinning up containers

➤ Sharing the packaged applications - Registry

DOCKER

➤ Docker solved previous problems

➤ Large file sizes - Containers

  ➤ Less overhead in containers than VMs

  ➤ Namespaces and cgroups set up for you

➤ Environment set up - Images from Dockerfile/snapshots

  ➤ Like a template for spinning up containers

➤ Sharing the packaged applications - Registry

  ➤ Push to/ pull from the registry (public or private)

DOCKER

➤ Docker solved previous problems

➤ Large file sizes - Containers

  ➤ Less overhead in containers than VMs

  ➤ Namespaces and cgroups set up for you

➤ Environment set up - Images from Dockerfile/snapshots

  ➤ Like a template for spinning up containers

➤ Sharing the packaged applications - Registry

  ➤ Push to/ pull from the registry (public or private)

  ➤ Store images and cache effectively

THANK YOU!

....

questions?