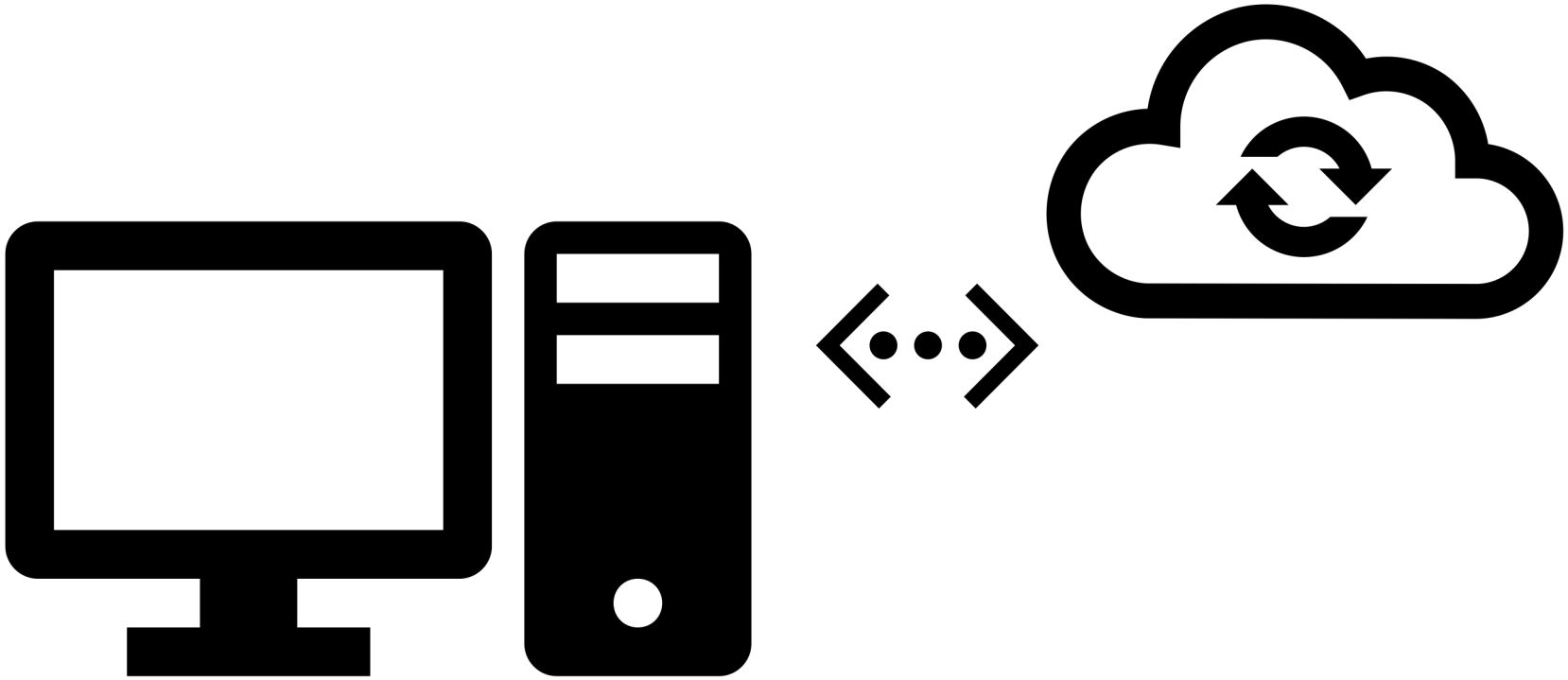
Solid containers-Cluster

Dankook University

Seehwan Yoo

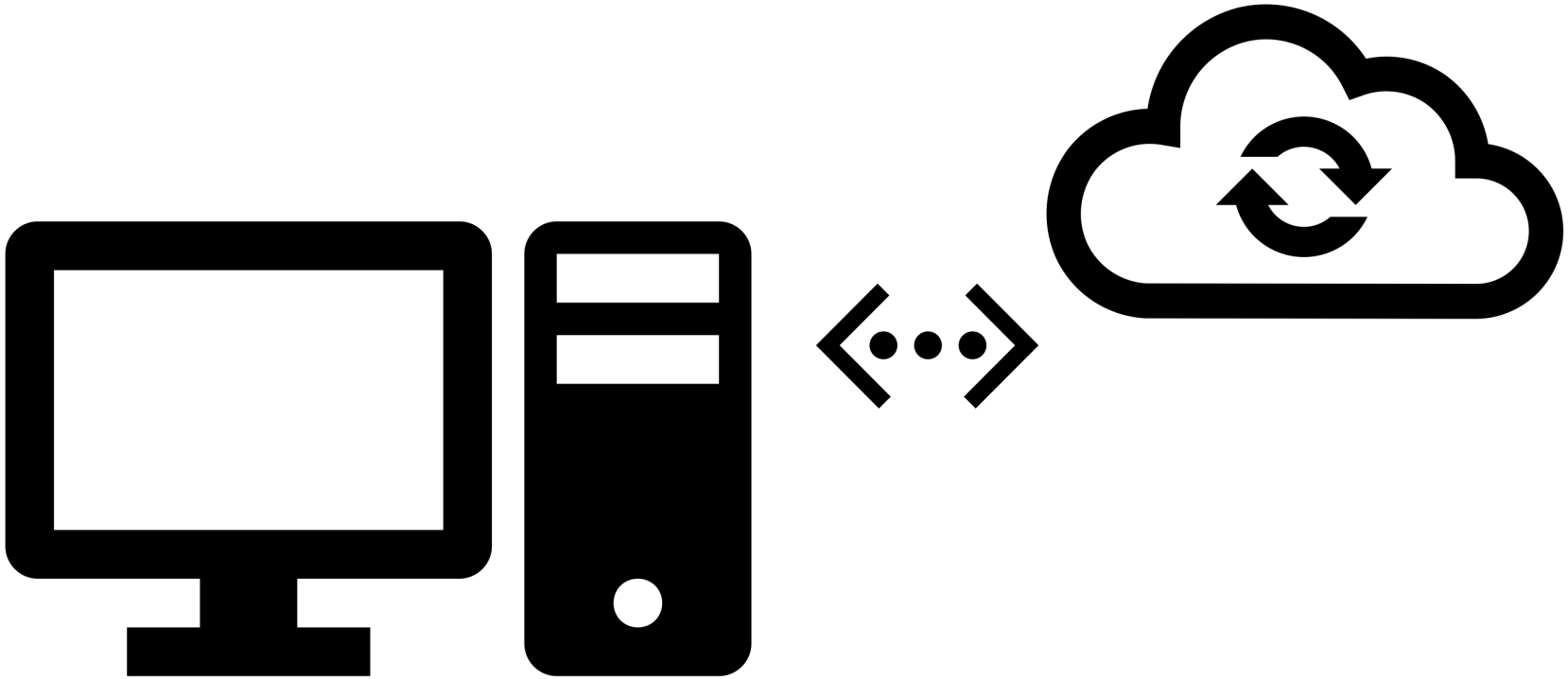
Linux system for normal user

- 일반인



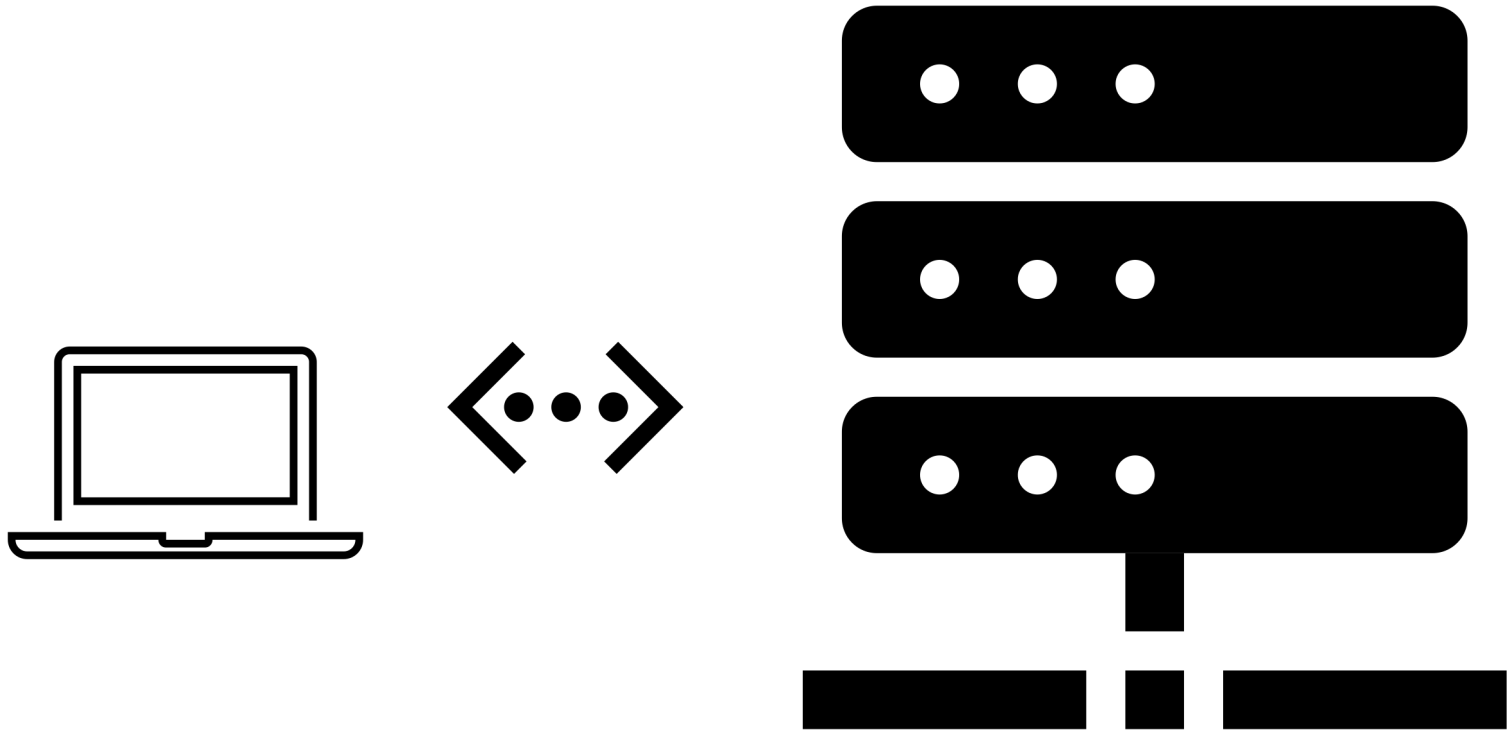
Linux system for normal user

- 리눅스 사용자



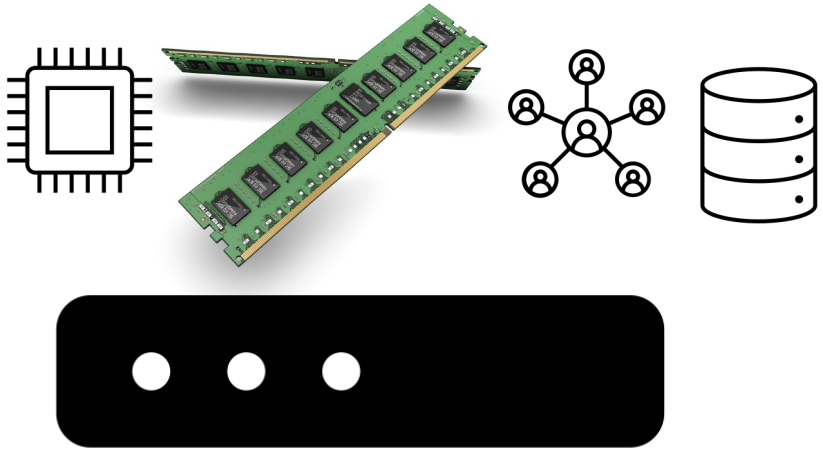
Linux system for normal user

- 서버 사용자



Linux in a Rack

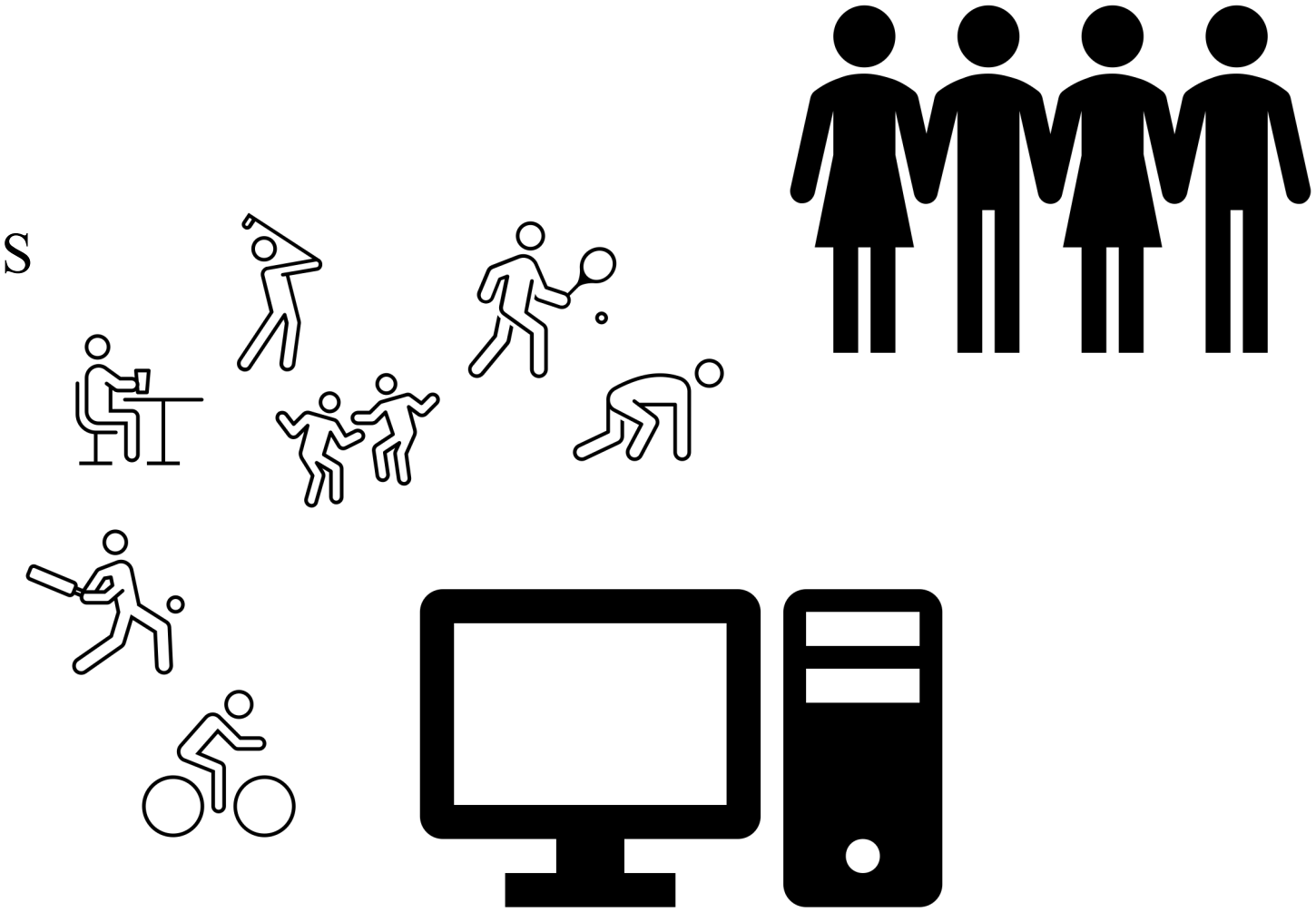
- Server?
  - CPU + Memory + Storage + Network + (GPU?) …



https://www.reviewplan.com/server-vs-network-rack/

OS for Multiple users (multi-user OS)

- 다중 사용자
  - Applications
- General-purpose OS
  - vs. application-specific OS
- 친구(?)와 쓰는 시스템

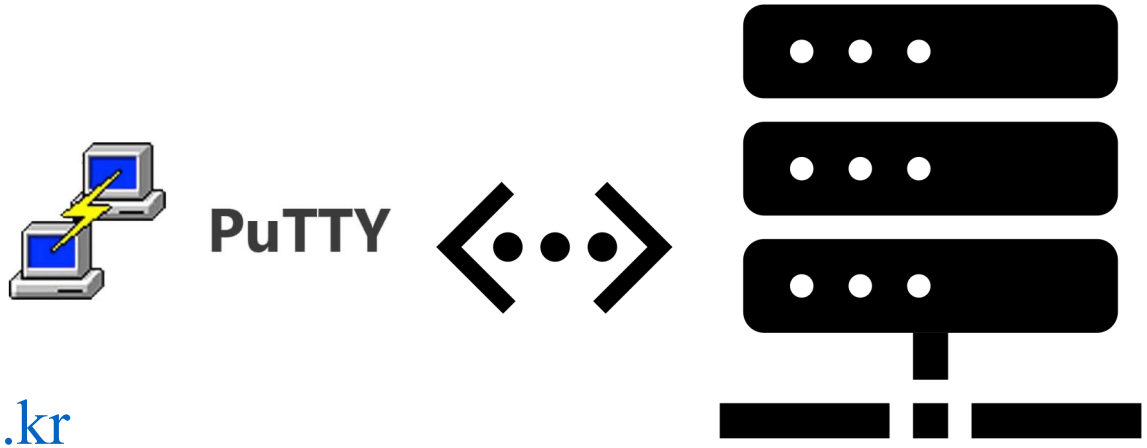


Linux Server has a name (Internet)

- Domain Name (human readable name)
  - naver.google.com
  - Internally, it is translated into some numbers (address, location identifier)
- assam.dankook.ac.kr is the server name
  - bellflower, camomile, darjeeling, earlgray.... all gone
  - name of a tea
- WAS quite good in 2015 (ㅠㅠ)
  - 12-core x 2 Xeon CPU, 52GB main memory, 2TB SSD

First check-in / log-in

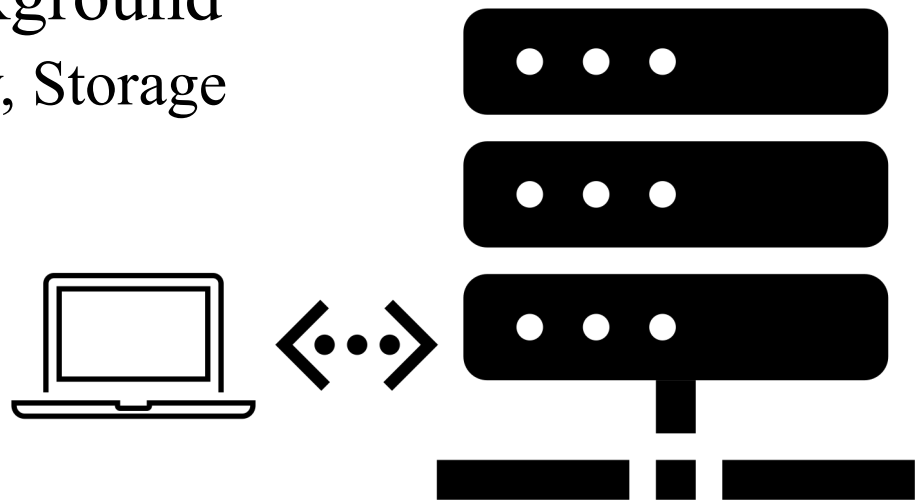
- Meet the assam.dankook.ac.kr!
- How?
- The entrance program: putty,
  - called a terminal
  - sends keyboard input to the server,
  - receives output from the server
- You need an account, user name
  - e.g.) seehwan14
  - If you're using Mac, Linux,
  - use ssh on 'Terminal' program
  - e.g.) ssh seehwan14@assam.dankook.ac.kr
  - You will be asked for password



Yes, it is a computer, and No.

- In the last winter, we made some playground on some servers.
- assam works as the gateway to enter the system
  - some are still working on the assam; and we are leaving now

- multiple container servers running in the background
  - Each of which has much powerful CPU, Memory, Storage
  - backed by NAS storage
- Each student runs on their pod (ssh server)
  - In the pod, a user runs with mse account
  - a user can be a root user by ‘sudo’ command
    - install some software on it



Some of students are still working on it

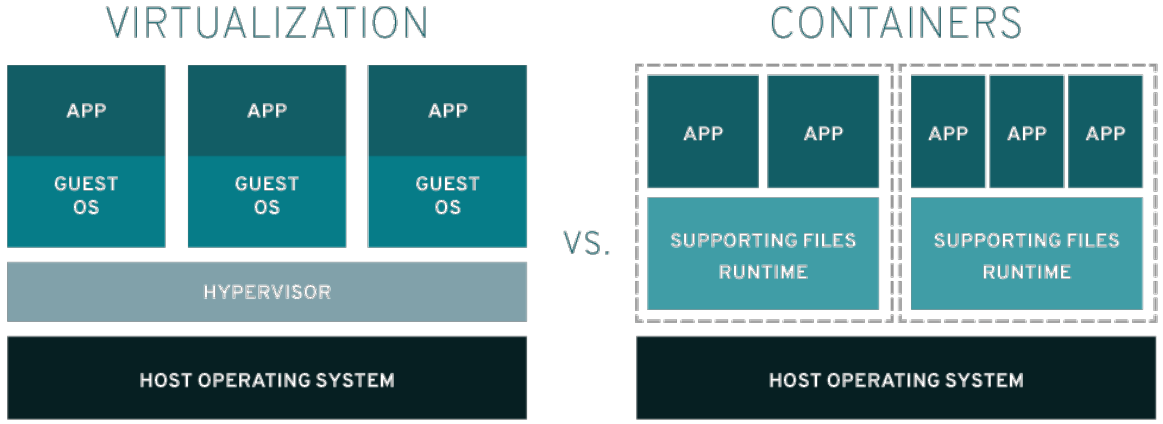
- Building the infrastructure!
- Kubernetes – pods maintenance platform (software), running on 10 servers
  - Pods, Deployment – kubernetes (k8s) mgmt.
  - Networking – ingress, calico, metallb (virtual network)
  - Storage – NAS connection, permanent volume mgmt.
  - Security – authentication, security auditing
  - and more!

So, how to use it?

- ssh into assam
  - redirected to solid container cluster
  - In the pod, you will use mse account
- Initial password
- Behold!
  - 3 consecutive passwd failures lead to blocking of your IP
  - Tell me, to unlock it

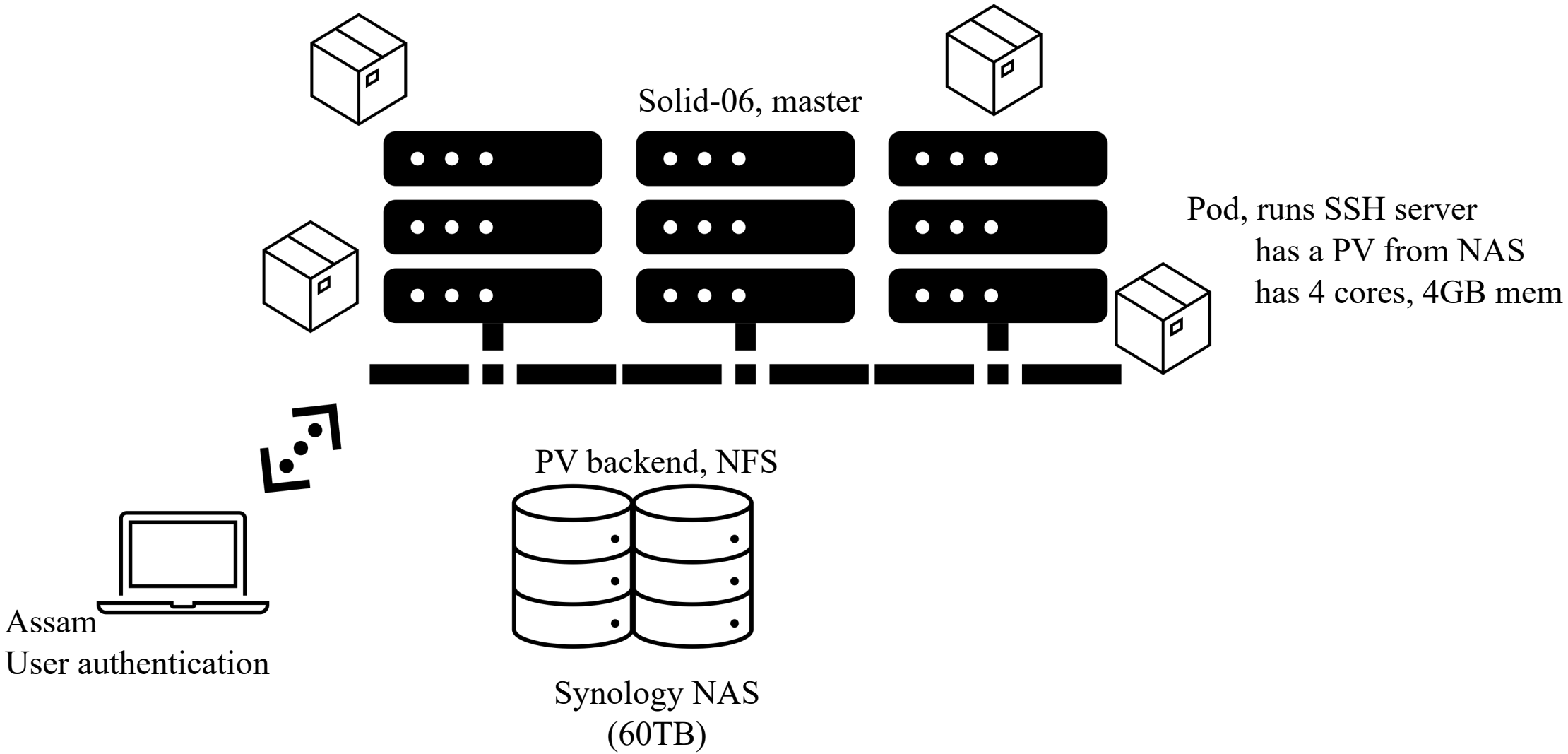
Appendix: container vs. VM

- Traditional system:
  OS + Lib + app + app + app
- What if…
  - system utilization is 15%
    for most of the time?
- Consolidate multiple systems!
  - Put logical machines (VM) into a physical machine!
- VM approach
  - Multiple OSs, multiple system library, multiple file systems, multiple storage, multiple memory…
- Container approach
  - Group process, threads, open files into a namespace!
  - Control QoS (Schedule through) cgroup! – lighter than VM



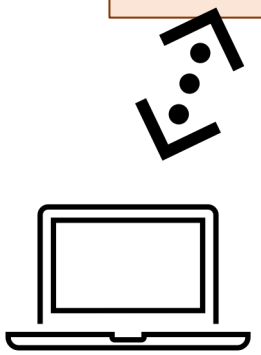
https://www.redhat.com/ko/topics/containers/containers-vs-vms

Appendix: some of the last slides



Appendix: some of the last slides

External IP
172.20.41.181
for ‘leveldb-ssh’
service



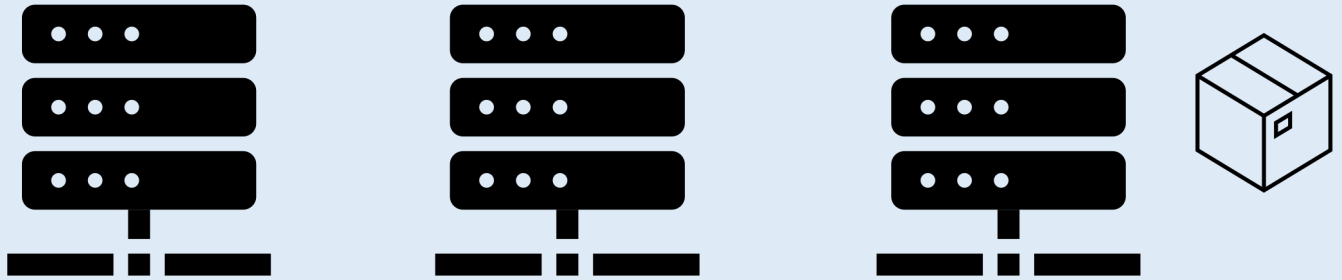
Assam (public IP, domain name)
User authentication
Distinguish users by port

Solid-06, master

MetalLB (loadbalancer)
populates Pods on physical nodes

Calico (network policy mgr)
setup internal networks (routing)

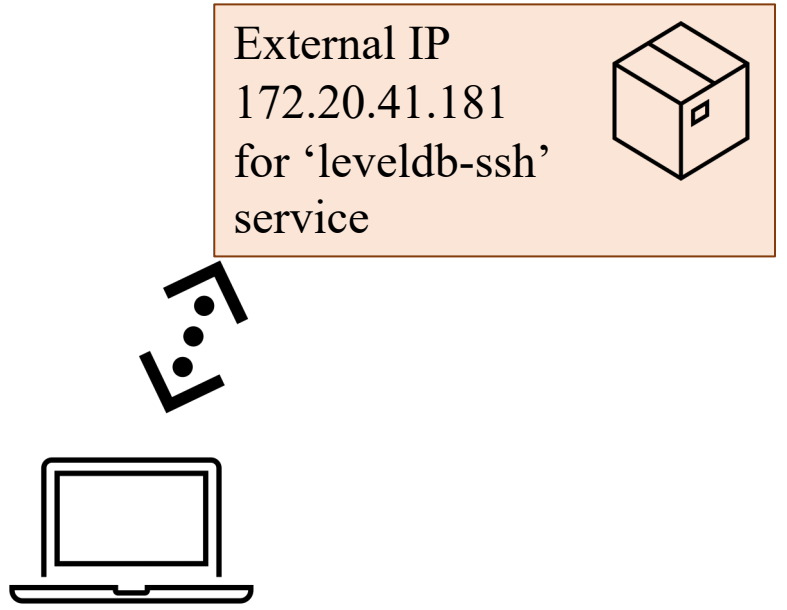
K8S network
172.20.41.XXX



Appendix: User Authentication

- Internal asymmetric RSA key authentication
  - Public key in Assam
  - Private key in the pod
    - generate RSA key in the pod
    - send Kpub to the assam
  - log-in to the pod using RSA key

- Assam users, k8s users
  use the same authentication method
  - ID/Password
- Not opening the k8s internal network
  - minimize attack surface



Appendix: Storage hierarchy

- Pod configuration – Can we be more intelligent for in-memory caching?
  - Reg/Cache -
  - Memory 8GB
  - fast Local Storage - ?
  - fast Remote Storage - ?
  - slow Remote Storage (NAS-HDD) 50GB
- Physical node configuration – Can we put some more hierarchy?
  - Reg/Cache 14MB
  - Memory 256GB
  - fast Local Storage (1TB SSD)
  - fast Remote Storage (1TB SSD per node)
  - slow Remote Storage NAS 10 TB HDD