6620 Lec 4 - Oct. 2nd, 2021

Lecture 4 Topics(summary after the lecture)

Part 1

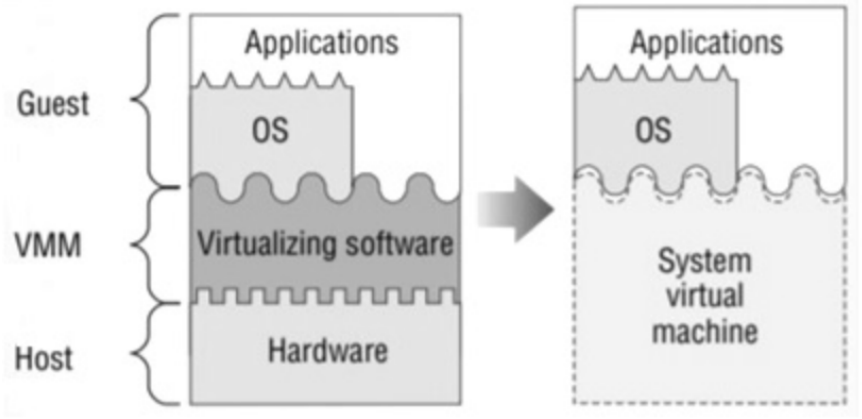
- `textbook CCSA: chap 4` (skip 4.3 Serverless Design Patterns)
- difference of deployment(about SaaS) and provisioning(about IaaS)
- Lec structure from `Lecture_4_Topics.doc`:
  - compare the difference of vm and container
  - compare the difference of web services and micro services
  - how to deploy a website, java app with AWS
- overview inituition of Lec 4
  - background: shipping container in modern supply chain -> serverless lambda in tech
  - advantages of container:

    package things, easy and efficienct to land in or move to the factory -> user data, reduce human work
  - serverless:

    FaaS (functions as service)
- java web service
  - concepts: decopling, SOAP, REST
  - implementation example (might need 10 min reading for each related files):
    - create: `How to create services in Java.doc`
    - deploy: `deploying a web service.pdf`
      - require a physical machine but not a vm/container: GPU, more cpu and memory, security
      - Serverless and Lambda: just package all your app as a function, no need to worry about the provision etc.
- how docker container works
  - from `Lecture_4_Topics.doc`:

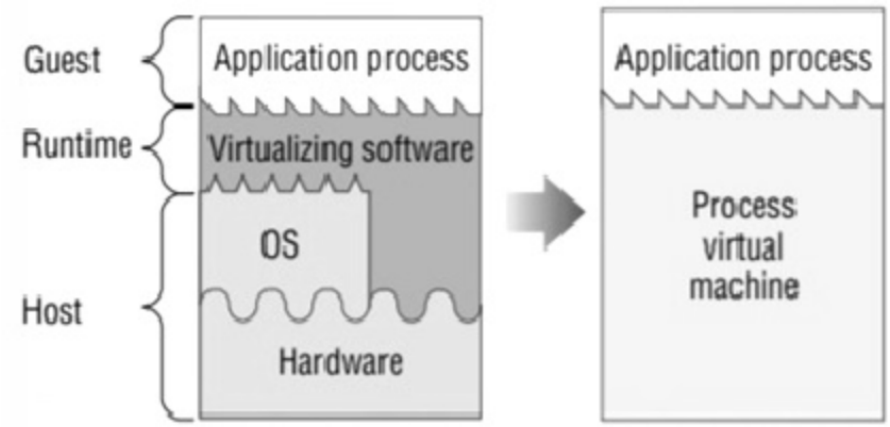
    https://codeahoy.com/2019/04/12/what-are-containers-a-simple-guide-to-containerization-and-how-docker-works/
  - two type of virtual machines:
    1. System Virtual Machines

       the virtualization software is called Virtual Machine Monitor(VMM)



2. Process Virtual Machines(VM)

   Runtime software is the virtualization software that implements the Process VM



   Runtime software is the virtualization software that implements the Process VM. It is implemented at the API level of the computer architecture above the combined layer of OS and Hardware. This emulates the user-level instructions as well as OS or library calls. For the system virtual machine, the virtualization software is called Virtual Machine Monitor(VMM). This software is present between the host hardware machine and the guest software. VMM emulates the hardware ISA allowing the guest software to execute a different ISA.

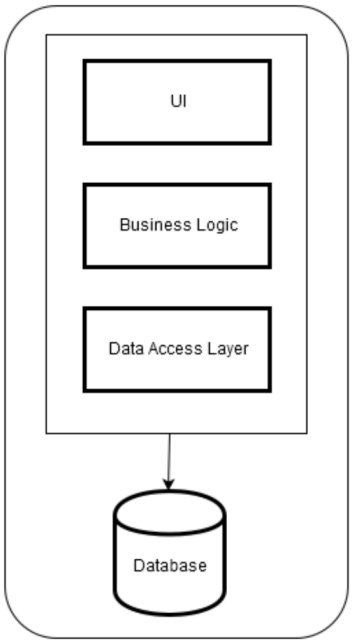
   (https://www.elprocus.com/virtual-machine/)

- concepts: namespaces, cgroups, images (layer by layer) (difference with a vm image? docker img lighter than a vm img)
- How to create Dockerfile

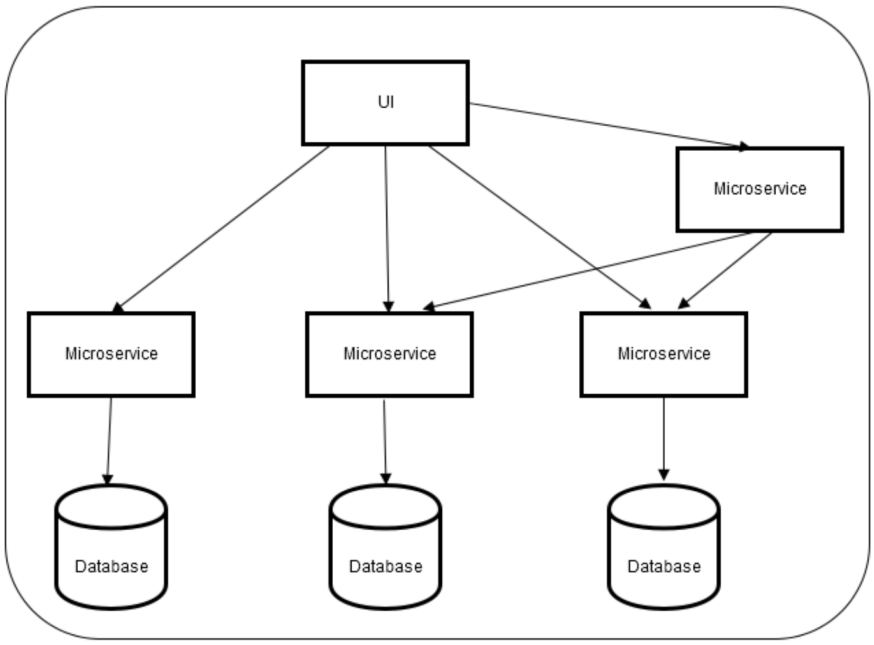
Part 2

what are microservice, how to package microservice into a docker container, how to be serverless?

- `Web Services vs Micro Services.pdf`



Monolithic Architecture



Microservices Architecture

advantage of microservices:

- high availiability
- avoid single point failure
- scailiability
- maintainability

- deploy a microservices: from `Lecture_4_Topics.doc`: https://dzone.com/articles/packaging-microservices
  - What is kubernetes
- how all these map to serverless?

  `textbook CCSA: chap 4`: page 184: Figure 4.1. Monolith to Microservices to Serverless applications

- what's an API gateway: a service decouples the client interface from your backend implementation.

  `API Gateway Basic.pdf`

  - two types of proxies:
    - forward proxies (or tunnel, or gateway)
    - reverse proxies (used to control and protect access to a server for load-balancing, authentication, decryption or caching) - api gateway
- Serverless:

  `Serverless Overview Why How.pdf`

  why AI so popular? automatic decision making - the following 4 things

  4 things human can do and computer can do: msg passing, execution, monitoring(observation), introspection

  local no-code platform

===> when do you use serverless:

`vm and container bottomley.pdf`

- SOAP and REST