CSCI2952-F

Microservices..
Class Staff

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HTA: Saim Salman
What is a Microservice?

• “A particular way of designing software applications as suites of independently deployable services”

--MartinFowler
Function as a Service (lambda)

Microservice

Service Oriented Architecture

Distributed systems (CSCI1380)

Monolithic Program
Function as a Service (lambda)

Monolithic Program

Distributed systems (CSCI1380)

Service Oriented Architecture

Microservice

MONOLITHIC ARCHITECTURE

User Interface
Business Logic
Data Access Layer

DB

MICROSERVICES ARCHITECTURE

User Interface

Microservice

Microservice

Microservice

Microservice

DB

DB

DB

DB
Course Objectives

• Microservices: next generation of cloud deployments
  • Application decoupled and deployed in containers

• Multiple benefits of decoupling
  • Independent code evolution
    • Teams can deploy and push independently
  • Polyglot: each service in a different language
  • Better resource management
    • Independent allocation of resources
    • Independent scaling of resources
  • Better Fault tolerance and security
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• Microservices: next generation of cloud deployments
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Service Discover?
- Name to IP
- Which instance

Security
- Rolebased Access control

Debugging Issues
Configuration issues
- Manage security conf
- Manage loadbalancing conf

Function to function ➔ Function call
Function to function ➔ RPCs
- Service Discover?
  - Name to IP
  - Which instance

- Security
  - Rolebased Access control

- Debugging Issues

- Configuration issues
  - Manage security conf
  - Manage loadbalancing conf
- Service Discover?
  - Name to IP
  - Which instance

- Security
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- Configuration issues
  - Manage security conf
  - Manage loadbalancing conf
Service Mesh

For Blue container:
- Restrict access to green
- Make 5 copies
- This is the location of the orange container
- Collect logs files

- Two parts
  - Control plane
  - Data plane

- Data plane
  - One for each container
  - Intercepts all packets from container and does magic

- Control plane
  - Tell the data plane which magic to do for which container
Service Mesh: Data plane in a little detail

- Two parts
  - Control plane
  - Data plane

- Data plane (called a proxy)
  - One for each container
  - Intercepts all packets from container and does magic

- Control plane
  - Tell the data plane which magic to do for which container

For Blue container:
- Restrict access to green
- Make 5 copies
- This is the location of the orange container
- Collect logs files
Course Objectives

• Identify and cover topics at the forefront of microservices infrastructure development
  • What are microservices infrastructure components?
  • How are they different/similar to traditional components?
  • What interfaces/abstractions do these components expose to App Developers?

• Investigate cutting edges issues and emerging solutions
  • Managing microservices deployments
  • Providing SLA/SLO guarantees
  • Observability of microservice
  • Debugging and Diagnosis
  • Storage
Course Outline

• Identify and cover topics at the forefront of microservices infrastructure development

- Background (2 Weeks)
- SLA (2 Weeks)
- Observability (2 Weeks)
- Diagnosis (2 Weeks)
- Open issues (2 Weeks)
Course Syllabus

• Project: 50%
  • Groups of 2-3
  • Investigate and develop advances to microservices infrastructure

• Paper readings and Presentations (14-16 readings: allowed to skip 4)
  • Paper summary: 15%
  • Leading paper: 10%

• Assignments: 20%

• Class participation: 5%
Class Structure and Readings (begin Day 4)

• On the website each class has:
  • Required reading
  • A recommended video
  • 2-3 optional readings

• All students should read and write a summary for required reading

• The students leading the discussion should ...
  • Read both required and optional readings
  • Make a power point presentations (40-45 mins)
  • Not required to submit a reading

Tips on reading and writing paper reviews can be found here:
• How to Read a Paper
• How to read a research paper
Assignments

HW #1: Hello World!

HW #2: Virtual Kubecon

HW #3: Operator Problems

HW #4: Overload Prevention
Projects

• A chance to change the world!!!!

• A few options
  • Reimplement a closed source idea
  • Extend an open source idea
  • Investigate a new idea
  • Explore an existing idea within the microservices domain

• We will provide a list to choose from
Next Class

• We will cover more buzz words
  • API Gateway
  • YAML!
  • Istio/Envoy
  • eBPF/Cilium
  • Containers (Kubernetes)

• Later in the semester we will cover these buzz words
  • Distributed tracing (Jaeger/zipkin)
  • Observability
Questions??