HY-559
Infrastructure Technologies for Large-Scale Service-Oriented Systems

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Course requirements

- **Project (50%)**
  - Study and experimental evaluation of a real system
  - Individual assignment
  - Periodic progress reports

- **Two presentations of recent research papers (20%)**
  - Select from recent conferences (SOSP, OSDI, EuroSys, etc.)

- **Written quiz, November 2022 (5%)**
  - Questions selected from one of the papers we go over

- **Final exam (25%)**
  - Questions selected from three papers
Course administration

• Meeting Mon/Wed 6-8pm (A-121)

• Office hours: By appt., contact via email (H-311)

• Web site : http://www.csd.uoc.gr/~hy559

• Subscribe to hy559-list
  – Email majordomo@csd with body “subscribe hy559-list”
Course administration

• Projects are individual

• Project results to be presented in class
  – Status updates and final presentation
  – Report
  – Demo

• Platform options
  – AWS Academy (HY-559 students will be invited to join)
  – Oracle VirtualBox and other VM/container technologies
Course themes

- Coordination services: Chubby, ZooKeeper
  - Based on consensus algorithms such as Paxos, Raft

- Scalability, availability, consistency across tiers
  - Load balancing approaches
  - Scalable caching
  - Messaging systems
  - Data stores
  - Geo-distribution
  - Cloud execution platforms: Serverless/FaaS
  - Distributed stream processing

- Data center management: Autopilot, Borg
The example of Amazon

Rendering service may construct its response by sending requests to over 150 other services

Stateless but may use caching

Each service in the call chain must obey performance contract
Data centers
Network design

Scalability dimensions

• Expandability
  – Increase system size (capacity) as needed

• Performance
  – Increase linearly with system size

• Availability
  – Survive failures gracefully

• Manageability
  – React to changes automatically