

Cloud Computing: CNIT-581000-CLD



Overview

This course provides an introduction in the technologies used in cloud computing. It consists of independent and intensive hands on labs. Topics covered in this course focus on the characteristics of cloud computing, cloud delivery models, and deployment models, anatomy, security and case studies. The course will emphasize on architecture and the development of web services that can scale on cloud infrastructure. We cover practical deployments ranging from OpenStack, Containers, Ceph etc. to virtualization layers KVM, VMware products, and the use of AWS. The students learn how to develop application against common PaaS. Finally, we also cover some theoretical parts such as the CAP theorem, Paxos, BASE vs ACID etc.

Topics Covered (offered as modules)

- Introduction to Cloud Computing (standardization and automation, rapid elasticity, flexibility)
- Architecture (Service and Delivery Models, Virtualization, Hypervisors)
- Anatomy of the Cloud (Cloud tiers, Sharding, CAP Theorem, ACID/Base, Web Services)
- Replication, Consistency, 2 and 3 Phase Commits (Logical and Vector Clocks, Chandy/Lamport)
- Paxos (Byzantine Failure, Quorums)
- IaaS Cloud Storage (Ephemeral, Block and Object storage)
- PaaS Cloud Storage (BLOB, NoSQL, Queueing Services)
- Micro Services and Containers (Linux Containers, Control Groups, Namespaces, Docker)
- Network Virtualization (OpenStack Neutron, Software Defined Networks, OpenFlow)
- Security (security integration model, threads, Economic Denial of Sustainability, threat mitigation, Google Case Study)

Hands on Projects

- OpenStack Deployment
- Docker and Linux Containers
- Map Reduce on AWS
- Development and use application for the Cloud (NodeJS, Google Go, Scala etc.)

Course Instructor

Ioannis Papapanagiotou received an MSc and dual Ph.D. degree in Computer Engineering/Operations Research from NC State University. He was working for IBM in the Cloud Computing area since 2009. In the Fall 2013, he joined the department of Computer and Information Technology at Purdue University. Phone: 765-494-4677 Office: Knoy 213 Email: ipapanan@purdue.edu