Syllabus of ECE 6363 Data Center and Cloud Computing (2019 fall)

Course Description

Data center and cloud computing are key technologies in building large-scale Internet services. Almost all major service providers, e.g., Amazon, Microsoft, Google, Facebook, NASDAQ, NYSE, Netflix, rely on data center and cloud platforms for storage, computation, exchange, etc. Most traditional computing and networking equipment vendors, e.g., Cisco, Juniper, Arista, HP, Dell, have been focusing on data center and cloud computing as a strategic area of development and marketing.

This course covers the fundamental knowledge of data centers and cloud computing and offers hands-on opportunities. Topics to be discussed include data center and cloud platform architecture, data center network designs, software-defined networks (SDN), virtualization technologies, data center security, traffic engineering, resource management, and green data centers. Throughout the course we will motivate thinking and interactions using various approaches, such as giving examples, showing animations, discussing research papers, etc. The course includes six labs, and two exams. Students are expected to learn various tools used in software-defined networks, data centers, and cloud computing.

Prerequisite

- ECE 5373, or other computer networking course, and knowledge of Python

Materials

- No textbook.
- Research papers, technical articles, and slides will be provided.

Grading policy

- Two Exams: 60%
- Homework: 5%, Quizzes: 10%
- Six Labs: 25% (Labs1-4: 3%, Lab5: 6%, Lab6: 7%)

Instructor

Prof. H. Jonathan Chao
Office: 370 Jay Street, Room 955
TEL: 646-997-3302
E-mail: chao@nyu.edu
URL: http://engineering.nyu.edu/people/jonathan-chao

Class Hours: 12:25-2:55pm every Monday

Office Hours: 3-4pm every Monday

TA

Soheil Abbasloo ab.soheil@nyu.edu
Chen-yu Yen cyy310@nyu.edu
Michael Wang icw238@nyu.edu

Class schedule:

Week	Lecture	Labs
1 (9/9)	Lecture 1: Overview （cloud computing and data centers）	
2 (9/16)	Lecture 2: Data Center Networks I + Lab 1 Lecture	Lab 1: Cloud Service Measurement (starts on 9/16)
3 (9/23)	Lecture 3: Data Center Networks I + Lab 2 Lecture	Lab 2: Mininet Simulations OpenStack & MapReduce
4 (9/30)	Lecture 4: : Software-Defined Networking (SDN)	Lab 2: Mininet Simulations
5 (10/7)	Lecture 5: Virtualization and Parallel Programming + Lab 3 Lecture	Lab 3: OpenStack & MapReduce
6 (10/15)	Lecture 6: Data Center Networks II	Lab 3: OpenStack & MapReduce
7 (10/21)	Lecture 7: Traffic Engineering in Data Centers + Lab 4 Lecture	Lab 4: Open Virtual Switches and SDN controller programming
8 (10/28)	**Exam 1 covers Lectures 1-6 (2.5 hours)**	
9 (11/4)	Lecture 8: Flow Table Management	Lab 4: Open Virtual Switches and SDN controller programming
10 (11/11)	Lecture 9: Cloud Security + Labs 5 Lecture	Lab 5: OpenFlow Switches: Flow Management
11 (11/18)	Lecture 10: Network Virtualization	Lab 5: OpenFlow Switches: Flow Management
12 (11/25)	Lecture 11: Incast in Cloud Computing + Lab 6 Lecture	Lab 6: Virtual Networks with FlowVisor
13 (12/2)	Lecture 12: Task Scheduling in Data Centers	Lab 6: Virtual Networks with FlowVisor
14 (12/9)	Lecture 13: Multi-access Edge Computing (MEC)	Lab 6: Virtual Networks with FlowVisor
15 (12/16)	**Exam 2 covers Lectures 7-13 (2.5 hours)**	Lab makeup (ends on 12/20)