Syllabus of NY ECE 6363 Data Center and Cloud Computing (2020 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 five labs, several quizzes, 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: 25% + 30%; Eight Quizzes: 20%; Five Labs: 25% (5% each)

Instructor

Prof. H. Jonathan Chao
Office: TBD, TEL: TBD
E-mail: chao@nyu.edu URL: http://engineering.nyu.edu/people/jonathan-chao

Class Schedule: Wed 1:00 - 3:30PM or Thur 8:30 - 11:00AM

Office Hours: Wed 4:00 – 5:00PM

Course Assistants:

Michael Wang: icw238@nyu.edu
Zack Luo: zl3115@nyu.edu

Class schedule: (All are on Wed or Thur except those two highlighted in red on Saturday)

Week	Lecture
1 (9/16 Wed, 17 Thur)	Lecture 1: Overview (cloud computing and data centers)
2 (9/23, 24)	Lecture 2: Data Center Networks I
3 (9/26, Sat, 8:30AM)	Lecture 3: Data Center Networks II
4 (10/7, 8)	Lecture 4: Software-Defined Networking (SDN)
5 (10/14, 15)	Lecture 5: Virtualization and Parallel Programming
6 (10/21, 22)	Lecture 6: Traffic Engineering in Data Centers
7 (10/29, Thur)	**Exam 1 covers Lectures 1-6 (8:30-10:30 AM)**
8 (11/4, 5)	Lecture 7: Flow Table Management
9 (11/11, 12)	Lecture 8: Cloud Security
10 (11/14, Sat, 8:30AM)	Lecture 9: Network Virtualization
11 (11/18, 19)	Lecture 10: Task Scheduling in Data Centers
12 (11/25, 26)	Lecture 11: Congestion Control in Data Centers I
13 (12/2, 3)	Lecture 12: Congestion Control in Data Centers II
14 (12/9, 10)	Lecture 13: Mobile Edge Computing
15 (12/17, Thur)	**Exam 2 covers Lectures 7-13 (8:30-10:30 AM)**

Dates highlighted in yellow have a quiz at the beginning of the class for 10 minutes.

Lab guidelines:

1. All labs are conducted online in real time.
2. There are 4 lab sessions as shown below. You'll be asked to provide your preference for the lab session and then assigned to one of them based on the number of requests in each session.
3. Some labs require the knowledge of Python. Please practice it before the semester starts.
4. There are in total 5 labs. Each lab has two videos, the 1st one on lab material and the 2nd one on lab procedure. Students are supposed to view the 1st video before attending the lab session and download necessary tools or packages before it. Without viewing the video before the lab session could cause you not being able to finish your partial assignment at the end of the lab session.
5. Students will view the 2nd video during the lab session and proceed with their lab work.
6. After viewing the 2nd video, students will be sent to breakout rooms, one for each room, to conduct their lab in their own room. Students are encouraged to share their screen and have their camera and microphone turned on so that the course assistant can better help you when you have questions. The course assistant will stay in the main room and go to the breakout room to help students if they have any questions.
7. Students are supposed to complete their partial assignment, a part of the entire lab assignment, during the lab session and submit it before the end of the session.
8. Students that don't stay in the lab session to work on their partial assignment will not receive a grade for the partial assignment.

Lab sessions: Mon 8:30-10:30AM (Zack); Wed 8:30-10:30AM (Michael); Thur 8:30-10:30PM (Michael); Fri 8:30-10:30AM (Zack)

Lab schedule:

5 Labs and 4 lab sessions	Mon 8:30-10:30AM	Wed 8:30-10:30AM	Thur 8:30-10:30PM	Fri 8:30-10:30AM	1st Lab Video Released	Lab Report Due (11:59PM)
Lab1: Linux, Wireshark and Network Debugging Tools	9/21	9/23	9/24	9/25	9/17 Lab1 video released	
Lab1	9/28	9/30	10/1	10/2		10/6 Lab1 due
Lab2: OVS, Mininet and SDN Data Plane	10/5	10/7	10/8	10/9	10/1 Lab2 video released	
Lab2	10/12	10/14	10/15	10/16		10/20 Lab2 due
Lab3: RYU and SDN Control Plane	10/19	10/21	10/22	10/22	10/15 Lab3 video released	
Lab3	11/2	11/4	11/5	11/6		11/10 Lab3 due
Lab4: Hadoop and AWS	11/9	11/11	11/12	11/13	11/5 Lab4 video released	
Lab4	11/16	11/18	11/19	11/20		11/24 Lab4 due
Lab5: Google Cloud and Kubernetes	11/30	12/2	12/3	12/4	11/26 Lab5 video released	
Lab5	12/7	12/9	12/10	12/11		12/15 Lab5 due

LATE SUBMISSION OF LAB REPORT: 1-day late: 30% off; 2-day late: 70%off; 3 or more days: no grade

POLICIES AND PROCEDURES ON ACADEMIC MISCONDUCT: Students are encouraged to discuss the labs, reports and homework with each other. However, except for team projects, your written submission, lab reports and exam papers, must be your own work. The first violation of this policy will result in zero point on that assignment and a reduction in your final grade (for example, from B+ to B). A second violation will result in an F grade of your final grade. For additional information see school's Student Code of Conduct.