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CS 643-851: Cloud Computing

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Syllabus

Faculty Contact Information

Instructor: Manoop Talasila

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(mailto:borcea@njit.edu)

Office Hours: WebEx Wednesdays 7-8 P.M. ET

Course Description

The course presents a top-down view of cloud computing, from applications and administration to programming and infrastructure. Its main focus is on parallel programming techniques for cloud computing and large scale distributed systems which form the cloud infrastructure. The topics include: overview of cloud computing, cloud systems, parallel processing in the cloud, distributed storage systems, virtualization, security in the cloud, and multicore operating systems. Students will study state-of-the-art solutions for cloud computing developed by Google, Amazon, Microsoft, Yahoo, VMWare, etc. Students will also apply what they learn in programming assignments executed over Amazon Web Services.

Textbook and Materials

There is no textbook required for this class. Each module is based on recent conference/journal papers as well as documentation from cloud providers. These papers and documentation are posted on the Schedule and Deadlines page.

Course Outcomes

1. Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.

2. Compare the advantages and disadvantages of various cloud computing platforms.

3. Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google AppEngine.

4. Program data intensive parallel applications in the cloud.

5. Analyze the performance, scalability, and availability of the underlying cloud technologies and software.

6. Identify security and privacy issues in cloud computing.

7. Explain recent research results in cloud computing and identify their pros and cons.

8. Solve a real-world problem using cloud computing through group collaboration.

Course Structure

Module
Introduction to Cloud Computing
Cloud Computing Platforms
Parallel Programming in the Cloud
Distributed Storage Systems
Virtualization
Cloud Security
Multicore Operating Systems

Grading Scale

Grade	Percentile
A	4.0
B+	3.5
B	3.0
C+	2.5
C	2.0
F	N/A

At the discretion of the instructors, the grading may be done on a curve.

Grading Categories

Categories	Percentage
Midterm Exam	25%
Final Exam	25%
Programming Assignment 1	10%
Programming Assignment 2	20%
Homework Problems	10%
Paper Presentations	10%

Course Policies

Course Correspondence

All correspondence with the instructor will take place through Moodle. Questions of general interest should be posted on Moodle's Ask the Instructor discussion board. Personal/ individual questions should be emailed if the instructor is not responsive to your discussion board posting.

Paper Presentations

Students will present, in groups of two, one research paper during the semester. These papers cover very recent developments in cloud computing. The presentations (using PowerPoint slides) will take place in class, and extra-credit will be assigned for active participation in discussions.

Programming Assignments

There will be two individual programming assignments. The first is to build an image recognition pipeline in Amazon AWS, using two EC2 instances, S3, SQS, and Rekognition. The assignment must be done in Java on Amazon Linux VMs. You will learn how to use the AWS cloud platform and how to develop an AWS application that uses existing cloud services. The second is to build a machine learning prediction model in Spark/MLlib over AWS. The model must be trained in parallel on multiple EC2 instances. The assignment must be implemented in Java, Scala, or Python on Ubuntu Linux. You will learn how to develop parallel machine learning applications in the AWS cloud platform.

Exams

There will be two exams: a midterm, and a final exam. Both are proctored closed book (i.e., papers, notes) exams. The final exam will cover only the material taught after the midterm.

Time Commitment

The students are expected to allocate ten hours per week to study and work on the assignments for this course.

Late Work and Make-Up Exams

In case of missing an exam, a make-up may be taken only after providing written documentation to the Dean of Students. It is left the instructor's discretion whether to accept all other late assignments.

Sharing Information

Students are free to discuss assignments with their colleagues. However, they should not take any written (electronic or otherwise) record away from the discussion. This applies when the assignment is supposed to be an individual effort or whenever two teams discuss common problems they are each encountering (inter-group collaboration). After the discussion, it is advisable to engage in at least half hour of non-course related activity before starting to work on the assignment. This will assure that students are able to reconstruct by themselves what they learned from the discussion.

Student Conduct

The NJIT University code on **academic integrity (https://www.njit.edu/middlestates/sites/middlestates/files/lcms/docs/2012/academic-integrity-code.pdf)** will be followed in all courses.

Student with Disabilities Codes

NJIT adheres to section 504 of the Rehabilitation Act (ADA) of 1990. Appropriate accommodations are provided at no cost to the student. If you have any questions or would like additional information, please contact Dr. Phyllis Bolling, Center for Counseling and Psychological Services (C-CAPS), Campbell Hall, (entry level), room 205, (973) 596-3420. For further information, visit the **Disability Support Services (http://www.njit.edu/studentsuccess/disability-support-services-0/)** website.

Technical Support

For assistance with the following items, please contact NJIT IST Service Desk at: 1-973-596-2900 or **http://ist.njit.edu/servicedesk/** **(http://ist.njit.edu/servicedesk/)**

*NJIT passwords may be changed using the **Global Password Change mechanism (http://ist.njit.edu/password-resets)** . You will need to know your current UCID and UCID password. Questions can be referred to 973-596-2900.

Periodic changing of passwords and strategies for managing them are best practice for anyone using a computer. All members of the university community are encouraged to review **tips for password management** **(https://ist.njit.edu/strong-password-management/)** and to change passwords regularly.

Software and Hardware Requirements

Sometimes, you will be required to use Word processing and presentation software, such as MS Word and PowerPoint found in Microsoft Office. You will also need to be comfortable with various aspects of using the Internet such as:

- Search engines

- Newsgroups

- E-mail

- Ability to download files

To view certain media elements in this course, you will need to have several browser plug-ins such as Shockwave, Flash, and Adobe Acrobat on your computer. Use the links in the course to download and install the appropriate software application.
Important: With regards to plug-ins, ensure you are using the most recent version of each plug-in you require. View the **hardware and software requirements** **(https://ist.njit.edu/fall2017-recommended)** for this course.

Student Services and Support

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