

Syllabus

CS 553: Cloud Computing

<http://www.cs.iit.edu/~iraicu/teaching/CS553-S16/>

Semester: Spring 2016

Lecture Time: Monday/Wednesday, 11:25AM - 12:40PM

Location: Wishnick Hall 113

Professor:

- **Dr. Ioan Raicu** (iraicu@cs.iit.edu, 1-312-567-5704)
 - Office Hours Time: Monday/Wednesdays 12:50PM-1:50PM (SB237D)

Teaching Assistants (cs553-s16@datasys.cs.iit.edu):

- TBA



Course Description

Cloud Computing is “A large-scale distributed computing paradigm that is driven by economies of scale, in which a pool of abstracted, virtualized, dynamically-scalable, managed computing power, storage, platforms, and services are delivered on demand to external customers over the Internet.” It has become a driving force for information technology over the past several years, and it is hinting at a future in which we won’t compute on local computers, but on centralized facilities operated by third-party compute and storage utilities. Governments, research institutes, and industry leaders are rushing to adopt Cloud Computing to solve their ever-increasing computing and storage problems arising in the Internet Age. There are three main factors contributing to the surge and interests in Cloud Computing: 1) rapid decrease in hardware cost and increase in computing power and storage capacity, and the advent of multi-core architecture and modern supercomputers consisting of hundreds of thousands of cores; 2) the exponentially growing data size in scientific instrumentation/simulation and Internet publishing and archiving; and 3) the wide-spread adoption of Services Computing and Web 2.0 applications. This course is a tour through various topics and technologies related to Cloud Computing. Topics include distributed system models and enabling technologies, computer clusters for scalable Computing, virtual machines and virtualization of clusters and datacenters, design of cloud computing platforms, cloud programming and software environments (Workflow Systems, MapReduce, Google App Engine, Amazon AWS, Microsoft Azure, and emerging cloud software stacks), grid computing and resource management, P2P computing with overlay networks, ubiquitous computing with clouds and the Internet of things, and data-intensive distributed computing. The course involves lectures, projects, programming assignments, quizzes, and exams. Prerequisites: [CS450](#) or [CS455](#).

Required Texts

We will be using the textbook [Distributed and Cloud Computing: Clusters, Grids, Clouds, and the Future Internet](#) by [Kai Hwang](#), [Jack Dongarra](#) & [Geoffrey C. Fox](#). (Required)

Prerequisites

[CS450](#) (OS) or [CS455](#) (Data Communications). Other courses that might contribute to having a better in depth understanding of this course are [CS542](#), [CS546](#), [CS451](#), [CS550](#), [CS551](#), [CS570](#), and [CS554](#); these courses are not required. Many of these graduate courses are part of the [Master of Computer Science Specialization in Distributed and Cloud Computing](#).

Detailed Course Topics

- Distributed System Models
- Parallel Computing
- Virtualization
- Cloud Platform Architectures
- Service-Oriented Architectures
- Cloud Programming
- Grid Computing
- Peer-to-Peer Computing

Programming Assignments

There will be 3 programming assignments throughout the semester, each worth 10%~15% of the total grade, and each taking about 4 weeks to complete. These assignments will be completed individually. The projects will require knowledge of Java, C

and/or C++. It is expected that students know the basics of these languages, but students are free to generally choose the languages they want to implement their assignments in. These assignments must all work in a Linux environment (in which they will be graded in). These assignments must be submitted through BlackBoard.

Computer Usage

Computer systems that can be used for development of projects (more information about access to these will be passed in the first several lectures):

- **Jarvis:** 20-node (180-cores) Linux Cluster running SGE and NVIDIA GPUs
- **Amazon AWS:** \$100 credit per student

Project

There will be 1 project which will be worth 10% of the grade. This project will be completed individually, and will require about 4 weeks to be completed. It will involve students to read online material, compute and generate graphs, and write a report. This assignment must be submitted through BlackBoard.

Late Policy

Assignments will be due at 11:59PM on the day of the due date, through BlackBoard. There will be a 15 minute grace period. There will also be a 7-day late pass, where students can submit late assignments without penalty; the late pass can be used in 1-day increments spread out over multiple assignments. Any late submissions beyond the grace period and beyond the 7-day late pass, will be penalized 10% every day it is late. Assignments will not be accepted after the solutions have been posted.

Exams & Quizzes

There will be two exams and a cumulative final exam evenly spread out over the semester. Each exam will be worth 15% of the overall grade, with the final exam being 20% of the grade. If you are an in-class student, you must take the exams in class; for remote students, you can either come take it in class, or you can take the exam at an official testing center in a proctored environment. The exams will be individual, but students will be allowed to use their textbooks and any notes they have (on paper). No electronic devices such as phones, eReaders, tablets, or laptops will be allowed. Simple calculators can be used. The exams will have the following schedule:

- **Exam #1: Monday, February 15th, 2016 from 11:25AM – 12:40PM in Wishnick Hall 113**
- **Exam #2: Wednesday, March 23rd, 2016 from 11:25AM – 12:40PM in Wishnick Hall 113**
- **Final Exam: Monday, April 25th, 2016 from 11:25AM – 12:40PM in Wishnick Hall 113**

THERE WILL BE NO MAKEUP EXAMS.

Grades

Grading Policies:

- **Programming Assignments (3):** 40% -- can use late day passes (PA1=10%, PA2=15%, PA3=15%)
- **Project (1):** 10% -- can use late day passes
- **Exam (2):** 30% -- NO MAKEUPS
- **Final Exam (1):** 20% -- NO MAKEUPS

The following grading scale will be used. The scale will be adjusted downwards based on the overall performance of the entire class. Traditionally, in my classes, the class average score typically falls around 80% (a solid B-grade).

- **A: 87% ~ 100%**
- **B: 75% ~ 86%**
- **C: 60% ~ 74%**
- **E: 0% ~ 59%**

Mailing lists

This course will use Piazza to facilitate discussions for assignments, at <http://piazza.com/iit/spring2016/cs553/home> (it has not been setup yet, more instructions will follow). Piazza should be the primary mechanism of communication between the students and the professor and the TAs. If you have a question and want to reach only the TAs and professor, send email to cs553-s16@datasys.cs.iit.edu. As a last resort, send individual emails directly (iraicu@cs.iit.edu) when you believe the message is not appropriate to be sent to the entire class, or to all the TAs and professor.