

Syllabus of CS4593.001: Cloud-Oriented Big Data Analytics and Software Engineering

Fall 2015

Time and Location:

MWF 3pm -- 3:50pm, NPB 4.140

Instructors:

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Course Description and Learning Objectives:

This **course** consists of two major blocks. The first block introduces the basic concepts and knowledge of cloud-oriented software engineering, including service-oriented computing, run-time software architecture, dynamic code loading, software evolution at run-time, etc. We will also introduce the underlying programming language features and techniques such as reflection and just-in-time compilation. At the end of this block, we will discuss some recent research progress on major problems of cloud-oriented software engineering. The second block of the **course** encompasses a comprehensive study of the system architecture, enabling technologies, software environment, and innovative applications of Cloud Computing and Big Data Analytics. It will give students an overview of the open source Cloud Operating System (OpenStack), the de facto Big Data processing framework (Apache Hadoop), the MapReduce programming model, Spark framework and programming, and their application for bioinformatics, genome sequence analysis, and machine learning.

Tentative Course topics:

- Cloud Computing – current & future trends, impact on scientific research
- OpenStack – cloud operating system, object storage (SWIFT)
- Hadoop – architecture, Hadoop Distributed File System (HDFS)
- MapReduce – programming model, task scheduling algorithms
- Apache Spark
- Web Services (2 week - 6 courses)
- Run-time Software Architecture (1 week - 3 courses)
- Run-time Software Evolution
- Reflection (1 week - 3 courses)
- Just-In-Time Compilation (1 week - 3 courses)
- Cloud-Oriented Software Security (Cloud security 1 week - 2 courses)

Prerequisites

CS 3423 and CS 3443 with at least C- or instructor permission

Grading

The final grade will be composed of

- Class participation and attendance 5%
- Projects/Assignments/Quizzes 25%
- Two Midterms (in class, closed book) 35%
- Final (in class, closed book) 35% (Thursday, Dec 10, 3:15 pm – 5:45 pm)

Grades will be assigned as follows:

- $90 \leq \{A\}$; $87 \leq \{A-\} < 90$
- $84 \leq \{B+\} < 87$; $80 \leq \{B\} < 84$; $75 \leq \{C+\} < 80$
- $70 \leq \{C\} < 75$; $65 \leq \{D+\} < 70$; $60 \leq \{D\} < 65$
- E/F: below 60

Requirements and Course Expectations

- Class attendance is required to receive credit for participation. Students who are observing a religious holy day or are participating in a University-sanctioned event may be excused, when prior notice is given to the instructor.
- Students are strongly encouraged to provide course evaluation at the end of the semester. Feedback provided by students in the course evaluations will be used by professors to improve their teaching and it is used by the University as one factor in evaluating the instructor's effectiveness.
- Late homework/project submissions in general will only be accepted one additional week and, will be penalized 10%, except under non-academic circumstances, such as illness and University-sanctioned events. In such cases, you have to provide sufficient proof, i.e., documents from the doctors.
- For FAIRNESS, no make-up examinations, except under extreme non-academic circumstances, such as illness. In such cases, you have to provide sufficient and convincing proof.

University Policies and General Information

<http://utsa.edu/syllabus>

Note: The syllabus is subject to minor changes.