CSCI 6961 – Advanced Distributed Systems

General Information

Meeting time and place: TF 2:00pm- 3:20pm, Sage 4203

Instructor: Stacy Patterson sep@cs.rpi.edu
Office hours: T 3:30pm – 4:30pm or by appointment, Lally 301
Web site: http://www.cs.rpi.edu/~pattes3/ads

There is no textbook for this course. Conference and journal papers related to the course material will be posted on the course web site.

An up-to-date course schedule will be maintained on the course web site.

Course Description

In this course, we will study significant tools, applications, and algorithms at the frontiers of cloud computing, edge computing, and the Internet of Things. The course content will come directly from research papers, articles, and documentation of cloud and edge architectures and technologies. We will work together to develop a deep understanding of this content through class presentations and discussions of this material. Students will also create a research project of their choosing.

Below is a brief outline of course topics and a preliminary schedule.

Lecture 1: Introduction to Cloud and Edge Computing

Lectures 2-6: Scalable Replication and Storage Systems

Lectures 7-8: Streaming Systems

Lectures 9-14: Federated Learning

Lecture 15-17: Serverless Computing

Lectures 18-19: Sensor Networks and the IoT

Lectures 20-21: Privacy and Security

Lectures 22-25: Advanced Distributed Algorithms

Lectures 26-28: Project Presentations

Pre-Requisites

CSCI-4510/6510: Distributed Systems and Algorithms

The pre-requisite may be replaced by suitable background and coursework in network programming and distributed systems. Undergraduates who are interested in taking this class should contact the instructor for permission.

Learning Outcomes

Upon successful completion of this course a student is able to:

- Describe the key architectures and applications in cloud and edge computing.
- Critically evaluate research publications on cloud and edge computing.
- Develop and deliver oral presentations on research publications.
- Design and implement software for cloud and edge platforms.
- Develop and execute a research project related to cloud and edge computing.

Grading

Grading will be based on the following:

- Paper presentations: 30%
- Participation in class discussions: 15%
- In-class exercises/short homeworks/paper reviews: 10%
- Project: 45%

Grades will be made available on LMS. There is no final exam for this course.

Paper Presentations

Each student must give several presentations. Each presentation will cover one research paper from the paper list posted on the web site. You will have a chance to do both team and individual presentations.

Assignments

There may be several short homework and in-class assignments throughout the course. These assignments may include: writing paper reviews; small coding exercisers on algorithms; and providing brief answers to questions on course material. Homework assignments will be due at the beginning of the lecture following their assignment.

Paper Reviews

You must submit three paper reviews, following the guidelines described in class.

Projects

A large part of the course grade is based on a research project. Projects will be done independently. Projects may be research projects, in which you pose and answer a research question. Projects may also be surveys of a specific edge or cloud computing topic.

Project deliverables and deadlines are:

1. Meeting with the professor to discuss and approve your project idea.
   By February 28, 2020, end of day.
2. Project proposal presentation (in class)
   March 3 and 3, 2020.
3. Initial list of references
   Due by March 17, 2020 11:59pm, via email.
4. Class presentation.
   Last 2 weeks of class.
5. Project report, in 2-column IEEE conference style, 4 to 6 pages.
   Due April 29, 2020 at 11:59pm, via email.

Students with Special Needs

Federal law requires all colleges and universities to provide specified types of assistance to students with disabilities. If you have such special assistance, please obtain an authorizing memo from Disability Services for Students. Information about a student's special needs will be treated as confidential. Please submit a copy of your authorizing memo to me well in advance of any affected assignment. Failure to do so may result in a lack of special accommodations.

Academic Integrity

If you use someone else's work (code, figures, research publications, etc.) to produce any work you do for this course, you must (1) indicate how this work was used, and (2) acknowledge this work in a bibliography section. For your course project, you are expected to produce your own code. For presentations, you must create your own slides.

Violation of these policies will be considered a breach of academic integrity, and the student will be subject to penalties outlined in The Rensselaer Handbook of Student Rights and Responsibilities, including "an academic (grade) penalty administered by the professor and/or disciplinary action through the Rensselaer judicial process described in this handbook."