

CSCI 6968 – Edge Computing

General Information

Meeting time and place: TF 12:00pm- 1:50pm, Sage 2701

Instructor: Stacy Patterson sep@cs.rpi.edu

Office hours: T 2pm – 3pm or by appointment, Lally 301

Web site: <http://www.cs.rpi.edu/~pattes3/edge>

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 and applications that comprise today's cloud computing platform, with a special focus on using the cloud for big data applications. The course content will come directly from research papers, articles, and documentation of cloud and data center 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 Edge Computing

Lectures 2-8: The Cloud Computing analytics pipeline

Lectures 9: Cloud databases

Lectures 10: Coordination of Cloud Services

Lecture 11: Apache Edgent

Lectures 12-13: Geo-Distributed Computing

Lectures 14-15: Edge Architectures

Lectures 16-19: Algorithms for Sensor Networks

Lectures 20-28: Edge Computing Applications

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. There is also the possibility of taking this course for independent study credit.

Learning Outcomes

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

- Describe the key architectures and applications in edge computing
- Critically evaluate research publications on cloud services and edge computing.
- Develop and deliver oral presentations for research publications on cloud and edge computing.
- Implement software using standard open-source cloud and edge computing software for data analytics.
- Develop and execute a research project related to data analytics and edge computing.

Grading

Grading will be based on the following:

- Paper presentations and tutorials: 30%
- Participation in class discussions: 15%
- Homework: 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 or two research papers from the paper list posted on the web site. We will experiment with different presentation formations, e.g., solo vs. team presentations, slides vs. "chalk talks", etc.

Tutorials

Several lectures will be devoted to tutorials, where everyone installs software (e.g. Hadoop) and implements analytics programs related to edge computing. Every student will help to develop at least one tutorial.

Homework

There may be several short homework assignments throughout the course. The assignments will involve simulating algorithms studying in class (using the language of your choice) and answering brief questions about these algorithms.

Projects

A large part of the course grade is based on a research project. Projects will be done independently. Anyone who wants to do a project in a group of two must get permission from the instructor prior to the first project deliverable. Projects may be research projects, in which you pose an answer a research question. Projects may also be surveys of a specific edge computing application area.

Project deliverables and deadlines are:

1. Meeting with the professor to discuss and approve your project idea.
Due by March 9, 2018, end of day.
2. List of references
Due by March 23, 2018 11:59pm, via email
3. Class presentation
Last 3 weeks of class
4. Project report, in 2-column IEEE conference style, 4 to 6 pages
Due by May 2, 2018 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."