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University of New Orleans Syllabi

Fall 2015

CSCI 6450

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University of New Orleans

This is an older syllabus and should not be used as a substitute for the syllabus for a current semester course.

UNIVERSITY *of* **NEW ORLEANS**

DEPARTMENT OF COMPUTER SCIENCE

CSCI 6450 Distributed Systems

Fall 2015

Tue/Thu 9^{30}-10^{45} [MATH 320]

Syllabus

Instructor *Dr. Vassil Roussev*

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Office Hours:	T/Th 11^{00}-12^{00}, 3^{00}-4^{00}; Wed 10^{00}-12^{00}, by appointment
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Textbook(s)

- There is no required textbook; topics in the course are covered in the books below, as well as other online reference materials.
- *Distributed Systems: Concepts & Design*, 5th ed. by Coulouris et al. ISBN: 978-0132143011
- *Distributed and Cloud Computing: From Parallel Processing to the Internet of Things*, Kai Hwang, Jack Dongarra, Geoffrey C. Fox. ISBN: 978-0123858801
- *Distributed Systems: Principles and Paradigms*, 2nd ed. by Tanenbaum & van Steen. ISBN: 0-132-39227-5
- *ZeroMQ*, 1st ed. by Hintjens. ISBN: 978-1-449-33406-2
- Reference: Any good book on socket programming.

Learning outcomes

The main goal of this course is to provide a conceptual and practical introduction to the world of parallel and distributed computing, and its emerging dominant form of practice—cloud computing. At the end of the course, students will have a foundation of upon they can build more specialized skills in the real world. They will also have basic experience with some standard technologies for distributed such as sockets and various forms of RPC as well as exposure to recent innovations in the field

The main course load will be focused on two hands-on experiences—a midterm performance evaluation study of third-party distributed software, and a term project to develop a robust, high-performance parallel file system.

All work will be performed in teams of three students each, and the majority of your grade will be determined by your team's score. Team membership will be assigned by the instructor.

Topics:

Distributed Systems

- Review: networking & IPC—sockets, RPC, RMI, SOAP, REST
- Identity & naming
- Classic distributed file systems—NFS, AFS, NFSv4
- Parallel file systems—Google FS, Panasas
- Data serialization—XDR, XML, JSON, YAML, protocol buffers
- Hadoop & MapReduce processing
- Time—clock synchronization, logical & vector clocks, causality and consistent cuts
- Transactions and concurrency control—two-phase commit, locking: pessimistic/optimistic, lock-free & wait-free data structures
- Coordination—Paxos, Google Chubby and ZooKeeper

Cloud Computing

- Virtualization—type I & II, lightweight virtualization (containers)
- Cloud computing classification & economics—IaaS/Paas/SaaS, public/private/hybrid
- Security concerns in cloud environments—multi-tenancy, side-channel attacks, data possession, single sign-on, transitive trust, (new) failure modes

Grading:

All work will be graded based on 100-point scale and will count towards your final grade with the following base weights:

Term project	➔	45%
Performance study (midterm)	➔	25%
Project presentation (final)	➔	15%
Class notes	➔	15%

The following bonuses and deductions will be applied to the respective component scores:

Best term project	➔	+10% bonus
Best performance study	➔	+5% bonus
Runner-up term project	➔	+5% bonus
Best presentation midterm/final	➔	+5% bonus
Worst presentation midterm/final	➔	-5% deduction

Grading scale: A = 90+, B = 80-89, C = 70-79, D = 60-69, F = 0-59.

Class notes:

You will be responsible for taking and editing notes on three separate class meetings. You will have one week to deliver the final version of your work.

Peer evaluation:

With the exception of the term project, your component grades will be formed, in part, by the scores of your peers. If you *consistently* underperform, your final grade will be negatively affected.

Attendance:

As per university policy, all students are expected to attend all class meetings. Experience and statistics show a strong correlation between good grades and regular attendance.

If you attend *fewer than 20* class meetings[1], your final grade will be dropped by *one* letter grade.
If you attend *fewer than 16* class meetings, your final grade will be dropped by *two* letter grades.

[1] Not counting excused absences.