

95-702 Distributed Systems

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DS Concepts

DS Concept	DS Specifics	Labs/Projects	Text Chapters
Protocols	Naming, Networking, TCP/IP, RMI, RPC, HTTP	L2, L4, L10, L11 P1, P2, P4	3, 4, 5, 6, 9, 13
Security	Public key, private key, digital signatures, RSA, Cryptographic hashing, TLS, Blockchain	L5 P2, P3	8, 11
Consensus/Consistency	Time, NTP, Raft, Nakamoto, Lamport clocks, 2PC	L1	14, 15, 16, 17, 18
Deployment	Mobile, cloud, containers	L3, L8 P4	19
Architecture	System models, MVC, Separation of Concerns, Indirect messaging, service design styles, microservices, peer-to-peer	L2, L6, L7, L8, L10, L11 P1-P6	1, 2, 10
Data Persistence	Distributed file systems, JDBC, MongoDB, Map reduce, Spark, S3	L9, L12 P4, P5	12, 21

Course Administration

- Canvas
 - read the syllabus
 - read the course description
 - read the weekly modules for these postings:
 - project descriptions
 - lecture slides
- The Canvas web application is used for
 - grade postings
 - assignment submissions
 - lecture recordings
- The Piazza web application is used for:
 - discussion board
- Plenty of TA office hours

Assessment

- 12 Pre-class quizzes (drop two lowest) completed before section A (quizzes go out on Thursdays. See times on syllabus) Equally weighted 10% of final grade
- 11 Labs (low score dropped) .25% checkpoint, .75% completion) 10% of final grade
- Second class of the week is a lab that may include some lecture
- Five projects (programming) Equally weighted 30% of final grade
- Two midterms. Equally weighted 30% of final grade
- Final examination 20% of final grade
- We will be very fussy about deadlines. One second late is late. See late assignment policy on syllabus.
- You have 7 grace days you can use to turn in projects late with no penalty

What technologies will we use?

- IDE (IntelliJ Ultimate)
- Application Server (TomEE Plus)
- Git and GitHub
- Web Services (RESTful design, Various API's)
- Distributed Objects (Java RMI, and EJB's)
- Mobile platform (Android)
- Hadoop and MapReduce and Spark (Heinz cluster)
- Docker containers deployed to Heroku

First Lab – Due Next Week

- The first lab will cover instructions on getting started with the course technologies. You will also work with a Raft simulator and cryptographic hashing.
- The installation includes JDK 16, IntelliJ and TomEE Plus.
- Selected answers to the lab questions are included in the first lab. Try to solve the exercise before looking at an answer.
- Get help from TA's or instructors if confused by an answer.
- Use Piazza or office hours for help.
- Two checkered flags on Lab 1. Show your answers to a TA.
 - 0.25% from your specific TA
 - 0.75% from any TA
- For lab 1 only, complete any time before the deadline

Readings

- See Canvas. Readings from the required text or elsewhere are assigned for each lecture -- read them in advance.
- For this week, read [Coulouris chapter 1](#).
- Read the Bitcoin Paper - parts specified on Canvas.
- Review Secret Lives of Data – Raft Understandable [Distributed Consensus](#)

Review of Syllabus

- Pre-class quizzes (released Thursdays, due before Monday at 1:25 PM)
- Late projects, you have seven days to spend. After that, -10% per day.
- Unlike labs, projects must be completed individually.
- Labs allow for teamwork and help from TA.
- Cheating results in a notification to the Dean's office. You earn a 0 for the assignment and a course letter grade reduction. It may result in an R grade for the course.
- Any copied code must be clearly cited. Provide the exact URL where the code may be dereferenced. Of course, if you have violated the spirit of the project, you will earn 0 points. If the copied code is not cited then that is an academic violation.
- PLEASE go easy on email. Use Piazza!
- If a serious personal problem occurs, contact us via email.
- TA's guide you but do not solve problems for you.
- Exams take precedence over job interviews and travel.
- For grading concerns, see the TA within one week.
- The rubric on Canvas is a good guide to how your projects are graded. But we use sampling and more specific rubrics for consistency.