Course Syllabus
CSE 512: Distributed and Parallel Database Systems

Semester: Spring 2020
Number of Credits: 3
Day/Time: Friday 12:15 – 1:30 pm
Location: Tempe CAVC 351

Instructor Information:

Name: Mohamed Sarwat
Email: msarwat@asu.edu

TA Information:

Name: Kanchan Chowdhury

Instructor Office Hours:

Data/Time: Monday/Wednesday 2:00 – 3:00 pm
Location: Brickyard 404

Course Prerequisites:

For the course to be effective, course participants should already have acquired basic database systems knowledge (e.g., took CSE 412 and/or CSE 510) including: SQL query language, Query Processing and Optimization, Data Storage and Indexing, Transaction Management. Course participants should also have programming experience with a high level programming language (e.g., C++, Java) and/or scripting languages (e.g., Python).

Course Description:

This course touches upon the following main topics: distributed database architectures, distributed data storage and indexing, distributed and parallel query processing/optimization, Concurrency control in distributed Parallel Database Systems, Data Management in Cloud Computing Environments, Data Management in Map/Reduce-based Systems, and Distributed NoSQL Database Systems. Note that the teaching style in this course is not only lecture-based. Students need to do the necessary reading before class and come prepared to participate in in-class discussions. A group project represents the biggest chunk of this course – where students need to build a complete system prototype that extends the functionality of a distributed data management system in order to support a new application. In the project, students will also write a technical report that describes and experimentally evaluates the built system.

Course Reading:

- During the course, we will cover several chapters in the following textbook: "Principles of Distributed Database Systems" by Ozsu, Valduriez.
- When needed, recommended books and/or research articles are cited at the beginning of each course section.

Course Schedule:

Week	Topic	Due	Feedback	Reading
Week 1	Database systems Review / Distributed Systems Principles			TBA
Week 2	Overview of Distributed Data Management Systems	Project: Phase 0		TBA
Week 3	Distributed Data Fragmentation & Replication	Assignment 1		TBA
Week 4	Distributed Query Processing & Optimization		Assignment 1	TBA
Week 5	Distributed Query Processing & Optimization	Project: Phase I		TBA
Week 6	Distributed Transaction & Concurrency Control	Assignment 2	Project: Phase I	TBA
Week 7	Distributed Database Reliability & Fault Tolerance		Assignment 2	TBA
Week 8	Parallel Database Systems	Assignment 3		TBA
Week 9	Data Management in Cloud Computing Environments	Project - Phase II:	Assignment 3	TBA
Week 9 - Midterm (04/07)				
Week 10	Data Management in Cloud Computing Environments	Assignment 4		TBA
Week 11	Data Management in Map-Reduce Systems		Mid-Term Project: Phase II	TBA
Week 12	Data Management in Map-Reduce Systems	Assignment 5	Assignment 4	TBA
Week 13	Distributed No-SQL Database Systems			TBA
Week 14	Project – Final Presentation	Project: Phase III	Assignment 5	TBA

Assignments:

There will be five assignments that constitute 40% of the total grade. All assignments should be submitted to the class website at 11:59 pm. The exact date for turning in (and receiving feedback on) each assignment is specified in the course schedule.

Group Project:

There will be a group project that constitutes 40% of the total grade. In this project, students will extend an existing distributed/Parallel Data Processing software (Apache Spark) to support GeoSpatial Data Processing operations. The project consists of four main phases:

- Phase I (15%): System Implementation 1
- Phase II (15%): System Implementation 2
- Phase III (10%): Demonstration and Reporting.

More details about each phase will be given in class during the course of the semester.

Grading Criteria:

The final grade will be based solely on the absolute percentage. There are three necessary (minimum) conditions for passing this class: (1) Submission of ALL assignments, (2) scoring >= 50% on the midterm exam, and (3) Score >= 50% on each phase of the group project. A grade of Incomplete may be given under special circumstances and requires both the instructor and the student to complete a contract with a plan for completing the course work. Grade distribution is as follows:

- A+: Grade >= 98%
- A: 98% > Grade >= 95%
- A-: 95% > Grade >= 90%
- B+: 90% > Grade >= 86%
- B: 86% > Grade >= 80%
- B-: 80% > Grade >= 77%
- C+: 77% > Grade >= 73%
- C: 73% > Grade >= 70%
- D: 70% > Grade >=60%
- E: < 60%

Assignments	30%
Group Project	40%
Mid-term Exam	30%

Student Role (Minimum requirements to pass this class):

1) Actively participate in class and engage in class activities.
2) Turn in all assignments on time (no late assignments will be accepted).
3) Score >= 50 % on the midterm and the final examination.
4) Score >= 50 % on each phase of the group project.

Instructor Role:

1) Facilitate discussions among all course participants during the class session.
2) Provide detailed feedback on exam, all submitted assignments, and project.
3) Respond to students' inquiries about the course material, assignments, and project.

Course Policies – Assignments and Grading:

Attendance and Participation: It is highly recommended that you attend each class session. 10% of the grade will be based on participation in class activities. When you attend, please arrive on time, attend the full class period, and participate in the class activities. It is totally fine that participants (students) may

need to occasionally miss a class session for personal reasons (e.g., religious holiday, family matter). In these situations, the student shall contact the instructor to discuss alternative ways to grasp the information presented in the missed class session.

Late Submission Policy: The due dates/times for all assignments and project phases are presented above on the class schedule. Please note the dates/times carefully because there will be no provision for late submissions, except for extraordinary circumstances. Late submissions will receive no credit since I post the model answer online right after the submission date.

Makeup Exam Policy: There will be no provision for make-up exams or assignments, except in extraordinary and documented circumstances.

Course Policies – Ethics and Conduct:

Accommodations for Students with Disabilities: Participants requiring disability or other accommodations are strongly encouraged to talk to the instructor as soon as possible to gain maximum access to course information. All discussions will remain confidential. Students with disabilities are encouraged to contact Disability Services and the instructor to discuss their individual needs for accommodations. Disability Services Staff can be reached at https://eoss.asu.edu/drc/ or by calling (480) 965-1234.

Student Diversity: This class embraces Arizona State University's position that promoting and supporting diversity among students is central to the academic mission of the University. At the core of our mission is to foster an environment in which students may think, learn and excel without prejudice, and where all recognizes personal dignity and respect for the individual.

Student Conduct: In the unfortunate event that participant behavior disrupts class or endangers participants, the instructor has the responsibility to ask that participant to moderate behaviors, and also has the right to ask uncooperative students to leave a class session. Students whose behavior suggests the need for counseling or other assistance may be referred to their college office or University Counseling and Consulting Services. Students whose behavior may violate the University Student Conduct Code may be referred to the Office of Student Conduct and Academic Integrity (https://eoss.asu.edu/dos/srr/codeofconduct). Every attempt will be made to deal with any conflicts in the most timely, direct, educative, and respectful manner.

Academic Dishonesty: Students are expected to do their own assigned work. If it is determined that a student has engaged in any form of academic dishonesty, he or she may be given an "F" for the course, and may face additional sanctions from the University. See https://provost.asu.edu/files/AcademicIntegrityPolicyPDF.pdf.

Contacting the Instructor: The best form of contact for me is by e-mail. I will make every effort to reply to your e-mail within 24 hours during the week and within 48 hours on the weekend. In your e-mail correspondence, please include [CSE 512] and the topic of the e-mail in the subject line.

Course Feedback: My goal is to create an environment that maximizes your learning. Your feedback is critical to meeting this goal. To that end, I will elicit and welcome feedback from you about this course throughout the semester.

Personal Technology: I encourage students to bring laptops, tablets, or any sort of technology to class, especially if such devices would help in the learning process (e.g., taking notes). Having said that please be respectful to your classmates while using such technology. In other words, please do not distract other students by watching YouTube, checking Email, or poking your Facebook friends.

Classroom Conduct/Civility: The Arizona State University Student Conduct Code governs all activities in the University, including this course. Students who engage in behavior that disrupts the learning environment for others may be subject to disciplinary action under the Code. In addition, students responsible for such behavior may be asked to cancel their registration (or have their registration cancelled).

Title IX: Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at http://sexualviolenceprevention.asu.edu/faqs/students.