CISC 432/CMPE 432/CISC 832

Advanced Database Management Systems

Fall 2016

Course Syllabus

The course examines advanced topics in database management systems. The course will examine the implementation of relational DBMSs including query processing, query optimization, concurrency control and recovery. The course will also cover topics related to big data such as data warehouses, parallel and distributed architectures, column-oriented data stores, cloud data stores, streaming data and NoSQL systems.

Students should have taken CISC 332 or have equivalent knowledge of relational database management systems and SQL. Course material will be taken from the course text and recent research papers.

Intended Student Learning Outcomes

To successfully complete the course students will demonstrate their ability to

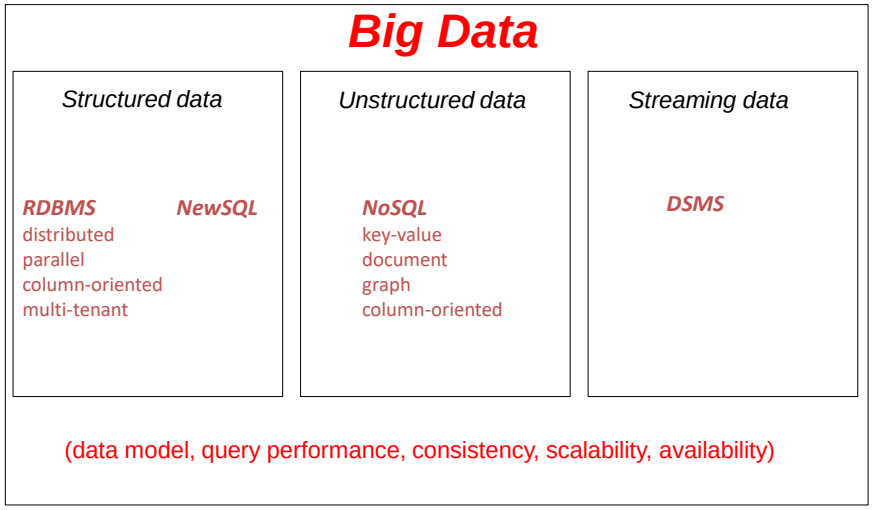
1. Apply optimization algorithms to SQL queries to produce efficient query plans.
2. Apply concurrency control and recovery algorithms to sample transaction workloads to ensure ACID properties are maintained.
3. Assess the use of relational DBMSs and NoSQL systems for different types of data and applications.
4. Apply a NoSQL system to the creation of a sample database.
5. Apply the MapReduce framework to a sample big data problem.
6. Evaluate the use of a big data approach to a sample application area or problem.

Textbook/Readings

Text book: *Database System Concepts (6th Edition)*, A. Silbershatz, H. Korth and S. Sudarshan, McGraw-Hill.

Readings: See OnQ pages.

Course Content



The course examines the topic of ***big data*** by looking at the properties of database systems that store and manage different types of big data, namely structured data, unstructured data and streaming data. The system properties considered are the data model, query performance, data consistency, scalability and availability.

A tentative course outline is the following:

- **Week 1:** Course information; introductions to big data, cloud computing
- **Week 2 - 3:** RDBMS review
- **Week 4 - 5:** Bluemix tutorial; RDBMS architectures
- **Week 6:** Distributed storage systems
- **Week 7:** NoSQL systems
- **Week 8:** Hadoop ecosystem & Map-Reduce
- **Week 9:** BigSQL / BigInsights
- **Week 10 - 12:** Big data topics

Grading Scheme

Undergraduate Students

- 3 assignments (60 %).
- 2 term tests (40%).

Graduate Students

- 3 assignments (45%).

- 2 term tests (30%).
- Term paper (25%).

Schedule of Class Requirements

Requirement	Due Date
Assignment 1	October 4
Grad Paper Proposal (832 students only)	October 14
Term test 1	Oct 18
Assignment 2	Nov 1
Term test 2	Nov 25
Assignment 3	Dec 2
Grad Research Paper (832 students only)	Dec 9

Grading Method

In this course, some components will be graded using numerical percentage marks. Other components will receive letter grades, which for purposes of calculating your course average will be translated into numerical equivalents using the Faculty of Arts and Science approved scale (see below). Your course average will then be converted to a final letter grade according to Queen's Official Grade Conversion Scale (see below).

Arts & Science Letter Grade Input Scheme

Assignment mark	Numerical value for calculation of final mark
A+	93
A	87
A-	82
B+	78
B	75
B-	72
C+	68
C	65
C-	62
D+	58
D	55

Queen's Official Grade Conversion Scale

Grade	Numerical Course Average (Range)
A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56

D-	52
F48 (F+)	48
F24 (F)	24
F0 (0)	0

D-	50-52
F	49 and below

Late Policy

Assignments should be handed in by 4:00 pm on the day they are due. Late assignments are subject to a 10% per day late penalty, with weekends counted as one day. Late assignments will not be accepted beyond 5 days past the date due.

Academic Integrity

Academic Integrity is constituted by the five core fundamental values of honesty, trust, fairness, respect and responsibility (see www.academicintegrity.org). These values are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University (see the Senate Report on Principles and Priorities http://www.queensu.ca/secretariat/policies/senateandtrustees/principlespriorities.html).

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar (see Academic Regulation 1 http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations/regulation-1), on the Arts and Science website (see http://www.queensu.ca/artsci/academics/undergraduate/academic-integrity), and from the instructor of this course.

Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

Copyright of Course Materials

Disability Accommodation Statement

Queen's University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities.

If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact the Disability Services Office (DSO) and register as early as possible. For more information, including important deadlines, please visit the DSO website at: http://www.queensu.ca/hcds/ds/