



COMP6210

Big Data

Session 2, Online-scheduled-weekday 2022

School of Computing

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General Information

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By Appointment

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Credit points

10

Prerequisites

COMP6200 and Admission to MDataSc or MScInnovationIT or GradCertInfoTech or MBusAnalytics

Corequisites

Co-badged status

Unit description

Even simple tasks like counting elements can seem impossible when the amount of data to process is huge. This unit explores some of the key aspects related to processing and mining information from large volumes of data. We present technology commonly used in industry such as map-reduce, and show how a range of data processing methods can be realised using map-reduce. Especial emphasis will be placed in the adaptation of data mining techniques for large volumes of data and for data streaming.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Explain the key Big Data concepts and techniques.

ULO2: Apply techniques for storing large volumes of data.

ULO3: Apply Map-reduce techniques to a number of problems that involve Big Data.

ULO4: Apply techniques for handling high-dimensional big data.

General Assessment Information

Late Assessment Submission Penalty

From 1 July 2022, Students enrolled in Session based units with written assessments will have the following university standard late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 11:55 pm. A 1-hour grace period is provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for Special Consideration.

Assessments where Late Submissions will be accepted In this unit, late submissions will accepted as follows:

- Assignment 1 - YES, Standard Late Penalty applies
- Assignment 2 - YES, Standard Late Penalty applies

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment 1	20%	No	Week 7-8
Assignment 2	20%	No	Week 12-13

Name	Weighting	Hurdle	Due
<u>Final examination</u>	60%	No	TBA

Assignment 1

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 30 hours

Due: **Week 7-8**

Weighting: **20%**

In this assignment you will implement MapReduce techniques for the processing of Big Data. You will build your assignment on top of Hadoop.

On successful completion you will be able to:

- Explain the key Big Data concepts and techniques.
- Apply techniques for storing large volumes of data.
- Apply techniques for handling high-dimensional big data.

Assignment 2

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 30 hours

Due: **Weel 12-13**

Weighting: **20%**

In this assignment you will implement a non-trivial problem that processes Big Data.

On successful completion you will be able to:

- Apply techniques for storing large volumes of data.
- Apply Map-reduce techniques to a number of problems that involve Big Data.

Final examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 15 hours

Due: **TBA**

Weighting: **60%**

The final exam will focus on the theoretical aspects of the unit, including algorithms and implementation issues.

On successful completion you will be able to:

- Explain the key Big Data concepts and techniques.
- Apply techniques for storing large volumes of data.
- Apply Map-reduce techniques to a number of problems that involve Big Data.
- Apply techniques for handling high-dimensional big data.

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

For details of days, times and rooms consult the [timetables webpage](#).

Required and Recommended Texts

Some of the contents of the unit will be based on the following books:

- J. Leskovec, A. Rajaraman, J. Ullman, Mining of Massive Datasets. The book is free and available from <http://www.mmds.org/>, where you can also find links to a MOOC, slides, and videos.
- C. Coronel, S. Morris. Database Systems: Design, Implementation and Management. 13th edition. Chapter 14 is the most relevant chapter. This chapter will be made available to students attending the classes.

Additional material including lecture notes will be made available during the semester. See the unit schedule for a listing of the most relevant reading for each week.

Technology Used and Required

The following software is used in COMP6210:

- Java 8

- Download: <https://www.oracle.com/technetwork/java/javase/downloads/jre10-downloads-4417026.html>
- Installation instructions to set JAVA_HOME:
 - https://www.java.com/en/download/help/download_options.xml
 - https://docs.oracle.com/cd/E19182-01/820-7851/inst_cli_jdk_javahome_t/
- Python 3.7 (Anaconda version)
 - Download: <https://www.anaconda.com/download>
 - Installation instructions: <https://docs.anaconda.com/anaconda/install/>
- MongoDB
 - Installation instructions: <https://docs.mongodb.com/v3.2/tutorial/install-mongodb-on-windows/>
- Studio 3T
 - Here is an online tool to access MongoDB and MapReduce. It has a 30 day Trial but if you need more time you can also apply for a student licence.
 - Download: <https://studio3t.com/download/>
- Hadoop
 - Download: <https://hadoop.apache.org/releases.html>
 - Installation instructions: <https://wiki.apache.org/hadoop/Hadoop2OnWindows>

This software is installed in the labs; you should also ensure that you have working copies of all the above on your own machine. Note that some of this software requires internet access.

Many packages come in various versions; to avoid potential incompatibilities, you should install versions as close as possible to those used in the labs.

Unit Web Page

The unit web page will be hosted in iLearn, where you will need to login using your Student One ID and password. The unit will make extensive use of discussion boards also hosted in iLearn. Please post questions there, they will be monitored by the staff on the unit.

Unit Schedule

Note: Lectures will be online.

Week 1: Data and Big Data

Week 2: Organizing Big Data

Week 3: Curating Big Data

Week 4: Processing Big Data (Cloud Computing)

Week 5: Processing Big Data (MapReduce)

Week 6: Big Data Platforms (Guest Lecture)

Week 7: Big Data with High Dimensions

Week 8: Indexing Big Data

Week 9: Searching Big Data

Week 10: Multidimensional Divide and Conquer

Week 11: Grid Decomposition in Big Data

Week 12: Advanced Topic in Big Data (Guest Lecture)

Week 13: Unit Review

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA

student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Changes from Previous Offering

No change.