ITEC801

Distributed Systems

S2 Evening 2018

Dept of Computing

Contents

General Information

Unit convenor and teaching staff
Ian Joyner
ian.joyner@mq.edu.au

Mark Dras
mark.dras@mq.edu.au

Credit points
4

Prerequisites
ITEC647 or admission to MCyberSec with a specialisation in Internetworking

Corequisites

Co-badged status

Unit description
This unit covers both fundamental issues and recent trends in distributed computing. We examine the complexities of distributed communications systems such as partial failures, shared memory, scheduling problems and multiple clocks. Networking protocols and other industry standards are discussed. Lectures will mostly be expository and conceptual and aim to provide a solid understanding of distributed systems and related enduring issues.

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:

Describe the complexities of distributed system development and approaches to solve those complexities

Distinguish the goals and architectures of distributed systems

Explain important issues in distributed systems, including time, inter-process communication, state management, distributed computing paradigms, data fragmentation and replication, middleware, and naming

Identify applicability of technologies that support distributed applications such as RPC, RMI and object-based technology, message passing, and REST.

Analyze and design distributed systems

Assessment Tasks

Name	Weighting	Hurdle	Due
Weekly problems	10%	No	Weekly
Assignment 1	20%	No	Week 7
Assignment 2	20%	No	Week 12
Examination	50%	No	After final lecture

Weekly problems

Due: **Weekly**
Weighting: **10%**

After each lecture a set of tutorial questions will be posted on iLearn. Students need to research and answer these questions which will be marked on a weekly basis.

On successful completion you will be able to:

- Distinguish the goals and architectures of distributed systems
- Explain important issues in distributed systems, including time, inter-process communication, state management, distributed computing paradigms, data fragmentation and replication, middleware, and naming

Assignment 1

Due: **Week 7**
Weighting: **20%**

Assignment 1 assesses progress and understanding of lecture material. It will set a moderate design task to be completed.

On successful completion you will be able to:

- Describe the complexities of distributed system development and approaches to solve those complexities
- Identify applicability of technologies that support distributed applications such as RPC, RMI and object-based technology, message passing, and REST.
- Analyze and design distributed systems

Assignment 2

Due: **Week 12**
Weighting: **20%**

Assignment 2 will be researching a couple of topics we have covered and writing a report on those topics.

On successful completion you will be able to:

- Describe the complexities of distributed system development and approaches to solve those complexities
- Identify applicability of technologies that support distributed applications such as RPC, RMI and object-based technology, message passing, and REST.
- Analyze and design distributed systems

Examination

Due: **After final lecture**
Weighting: **50%**

The final examination will consist of questions based on the lecture material, tutorial problems and assignments. The examination will be closed book, three hours long and held in the end of session examination period.

All learning outcomes will be assessed in the final examination, which will cover the entirety of the lecture material.

On successful completion you will be able to:

- Distinguish the goals and architectures of distributed systems
- Explain important issues in distributed systems, including time, inter-process communication, state management, distributed computing paradigms, data fragmentation and replication, middleware, and naming
- Identify applicability of technologies that support distributed applications such as RPC, RMI and object-based technology, message passing, and REST.
- Analyze and design distributed systems

Delivery and Resources

Classes

Each week you should attend the class which is three to four hours. For details of days, times and rooms consult the timetables webpage.

This course has no extra classes for tutorials or practicals.

Please note it is to your benefit to attend most of the classes, prepared to participate in discussions, ask and answer questions, and provide perspectives from your own background and workplaces.

Resources to assist your learning

Digital recordings of lectures are available as Echo360 through iLearn login. These are provided for review material and in case of missing lectures.

Online discussion. We will have an active online discussion forum in the ED system. It is expected that you contribute to these discussions.

iLearn is used for out-of-class communication as well as forums where active discussion of issues is encouraged. iLearn can be found at can be found at http://learn.mq.edu.au. You are encouraged to review iLearn weekly and to do background reading before each class.

Textbook

The textbook for ITEC801 is:

Maarten van Steen and Andrew s Tanenbaum Distributed Systems 3rd Edition (2017) (TVS)

Available for free at:

https://www.distributed-systems.net/index.php/books/distributed-systems-3rd-edition-2017/

References

Coulouris, Dollimore, Kindberg, and Blair - Distributed Systems: Concepts and Design 5th Edition, 2012 (Previously used text book).

Unit Schedule

Week	Topic
Week 1	Introduction, Challenges, and Goals (TVS Chapter 1)
Week 2	Distributed Systems Architectures, Paradigms, and Patterns, Networks (TVS Chapter 1)
Week 3 Client-Server, Peer-to-peer, Communication in Distributed Systems (TVS Chapter 2)	
Week 4	Naming - location transparency (TVS Chapter 5)

Week	Topic
Week 5	Open Distributed Processing (Online reading)
Week 6	Synchronization (TVS Chapter 6)
Week 7	RPC, RMI, message passing and failure in distributed systems communication (TVS Chapter 4)
Week 8	REST - Concepts (Fielding's Thesis) and Application (TVS Chapter 2, Online reading)
Week 9	Middleware and Distributed Data - Fragmentation and Replication (TVS Chapter 2, 7)
Week 10	Consistency, transactions and replication (TVS Chapter 7)
Week 11	Cloud Computing (TVS Chapter 3)
Week 12	Mobile and ubiquitous computing

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

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

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results shown in *iLearn*, 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.

Student Support

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

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

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.

Graduate Capabilities

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Describe the complexities of distributed system development and approaches to solve those complexities
- Distinguish the goals and architectures of distributed systems
- Identify applicability of technologies that support distributed applications such as RPC, RMI and object-based technology, message passing, and REST.

Assessment tasks

- Weekly problems
- Examination

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Distinguish the goals and architectures of distributed systems
- Identify applicability of technologies that support distributed applications such as RPC, RMI and object-based technology, message passing, and REST.
- Analyze and design distributed systems

Assessment tasks

- Assignment 1
- Assignment 2
- Examination

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Describe the complexities of distributed system development and approaches to solve those complexities
- Explain important issues in distributed systems, including time, inter-process communication, state management, distributed computing paradigms, data fragmentation and replication, middleware, and naming
- Identify applicability of technologies that support distributed applications such as RPC, RMI and object-based technology, message passing, and REST.
- Analyze and design distributed systems

Assessment tasks

- Weekly problems
- Assignment 1
- Assignment 2
- Examination

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- Describe the complexities of distributed system development and approaches to solve those complexities
- Explain important issues in distributed systems, including time, inter-process communication, state management, distributed computing paradigms, data fragmentation and replication, middleware, and naming
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- Assignment 1
- Assignment 2
- Examination

Standards and Grading

In this unit, the final mark will be calculated by combining the marks for all assessment tasks according to the percentage weightings shown in the assessment summary.

Students obtaining a higher grade than a pass in this unit will (in addition to the above)

- have a total mark of 85% or higher to obtain High Distinction;
- have a total mark of 75% or higher to obtain Distinction;
- have a total mark of 65% or higher to obtain Credit.

You are encouraged to:

- set your personal deadline earlier than the actual one;
- keep backups of all important assessed tasks;.
- make sure no one else picks up your printouts.

All work submitted should be readable and well presented.

PRESENTING YOUR OWN WORK IS ESSENTIAL. You should **never commit plagiarism or copying** in any of your submitted work. In particular, you must put any web sources in your own words. **DO NOT COPY BLOCKS OF TEXT FROM THE WEB** – you will be penalised for this, depending on the extent of copying.