ITEC801
Introduction to Distributed Systems
S2 Evening 2014
Computing

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General Information

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

Credit points
4

Prerequisites
COMP347

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://students.mq.edu.au/important-dates

Learning Outcomes

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

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<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
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<tr>
<td>Weekly problems</td>
<td>10%</td>
<td>Weekly</td>
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<tr>
<td>Assignment 1</td>
<td>20%</td>
<td>Week 7</td>
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<tr>
<td>Assignment 2</td>
<td>20%</td>
<td>Week 12</td>
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<tr>
<td>Examination</td>
<td>50%</td>
<td>After final lecture</td>
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## 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.

This Assessment Task relates to the following Learning Outcomes:

- 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.

This Assessment Task relates to the following Learning Outcomes:

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

This Assessment Task relates to the following Learning Outcomes:

- 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

This Assessment Task relates to the following 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

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](https://unitguides.mq.edu.au/unit_offerings/29879/unit_guide/print).

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.
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:


**References**


**Unit Schedule**

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<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Introduction, Challenges, and Goals (Coulouris Chapter 1)</td>
</tr>
<tr>
<td>Week 2</td>
<td>Distributed Systems Architectures, Paradigms, and Patterns, Networks (Coulouris Chapter 2 and 3)</td>
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<tr>
<td>Week 3</td>
<td>Client-Server, Peer-to-peer, Communication in Distributed Systems (Coulouris Chapter 4, 5, 6)</td>
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<td>Week 4</td>
<td>Naming - location transparency (Coulouris Chapter 13)</td>
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<td>Week 5</td>
<td>Open Distributed Processing (Online reading)</td>
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<td>Week 6</td>
<td>Synchronization (Coulouris Chapter 14 and 15)</td>
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<td>Week 7</td>
<td>RPC, RMI, message passing and failure in distributed systems communication (Coulouris Chapter 4, 5, 5)</td>
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<tr>
<td>Week 8</td>
<td>REST - Concepts (Fielding's Thesis) and Application (Coulouris Chapter 9, Online reading)</td>
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<tr>
<td>Week 9</td>
<td>Middleware and Distributed Data - Fragmentation and Replication (Coulouris Chapter 8)</td>
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<tr>
<td>Week</td>
<td>Topic</td>
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<tr>
<td>Week 10</td>
<td>Consistency, transactions and replication (Coulouris Chapter 18)</td>
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<td>Week 11</td>
<td>Cloud Computing (Coulouris Chapter 8)</td>
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<td>Week 12</td>
<td>Mobile and ubiquitous computing (Coulouris Chapter 19)</td>
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**Policies and Procedures**

Macquarie University policies and procedures are accessible from [Policy Central](http://mq.edu.au/policy/docs/academic_honesty/policy.html).

Students should be aware of the following policies in particular with regard to Learning and Teaching:


In addition, a number of other policies can be found in the Learning and Teaching Category of 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/support/student_conduct/](https://students.mq.edu.au/support/student_conduct/)

**Student Support**

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

**Learning Skills**

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.
Student Enquiry Service
For all student enquiries, visit Student Connect at ask.mq.edu.au

Equity 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.

IT Help
For help with University computer systems and technology, visit http://informatics.mq.edu.au/help.
When using the University's IT, you must adhere to the Acceptable Use 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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