



COIT13229 *Applied Distributed Systems*

Term 1 - 2021

Profile information current as at 25/04/2024 01:52 pm

All details in this unit profile for COIT13229 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

Corrections

Unit Profile Correction added on 25-02-21

The prescribed textbook shown on page 5 of the unit profile has been updated and should be deleted.
Microservices Patterns: With examples in Java 1st edition (2018) Authors: Chris Richardson Manning ISBN 978-1617294549 Binding: Website Link Additional Textbook Information Can be accessed freely online at:
<https://learning.oreilly.com/library/view/microservices-patterns/9781617294549/>

The prescribed textbook information on page 5 in the unit profile should be replaced with:
Distributed Systems Concepts and Design 5th (2012) Authors: George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair Addison-Wesley Boston, MA, USA ISBN: 9780132143011 Binding: Other

General Information

Overview

In this unit you will learn basic principles of distributed systems including architectural design, inter-process communication, remote invocation, web services, coordination and concurrency, and how to use these principles in the development of distributed applications. You will learn about distributed file systems, naming, and data-related aspects of distributed transactions, and data replication. You will be exposed to the significant distributed system characteristics of scalability, heterogeneity, security and failure handling. You will explore the areas of mobile and ubiquitous computing and the social impact arising from the ubiquity of distributed systems. You will practice the theory through laboratory activities developing of secure, reliable, distributed computing applications that can perform concurrent operations across multiple computers in the Internet.

Details

Career Level: *Undergraduate*

Unit Level: *Level 3*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

Prerequisite: COIT11134 and COIT11237.

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

Offerings For Term 1 - 2021

- Brisbane
- Cairns
- Melbourne
- Online
- Rockhampton
- Sydney
- Townsville

Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

Class and Assessment Overview

Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

Class Timetable

[Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

[Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Practical Assessment**

Weighting: 30%

2. **Practical Assessment**

Weighting: 35%

3. **Written Assessment**

Weighting: 35%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the [CQUniversity Policy site](#).

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from Self Evaluation

Feedback

Assignment return and feedback.

Recommendation

Unit Coordinator should ensure correct and detailed feedback is provided by the cohort of markers along with the timely return of the assignments within the allocated timelines.

Unit Learning Outcomes

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

1. Develop software applications that can run in parallel and on multiple networked computers to using approaches such as remote objects, and client-server solutions
2. Design and develop secure distributed applications using approaches such as webservices, and peer-to-peer solutions
3. Discuss the use of algorithms and other mechanisms for executing coordinated concurrent processes in distributed systems
4. Discuss the technology needs and social impact arising from ubiquitous distributed systems
5. Evaluate techniques for creating secure, reliable and efficient distributed systems.

Australian Computer Society (ACS) recognises the Skills Framework for the Information Age (SFIA). SFIA is a widely used and consistent definition of ICT skills. SFIA is increasingly being used when developing job descriptions and role profiles. ACS members can use the tool MySFIA to build a skills profile at <https://www.acs.org.au/professionalrecognition/mysfia-b2c.html>

This unit contributes to the following workplace skills as defined by SFIA 7. The SFIA code is included:

- Software Design (SWDN)
- Systems integration and build (SINT)
- Programming/Software Development (PROG),
- Database Design (DBDS)
- Testing (TEST)
- Release and Deployment (RELM)
- Application Support (ASUP)

Alignment of Learning Outcomes, Assessment and Graduate Attributes



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Practical Assessment - 30%	•	•			
2 - Practical Assessment - 35%	•	•			•

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
3 - Written Assessment - 35%			•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
1 - Communication	•	•	•	•	•
2 - Problem Solving	•	•			
3 - Critical Thinking	•	•	•	•	•
4 - Information Literacy		•	•	•	•
5 - Team Work					
6 - Information Technology Competence	•	•	•		•
7 - Cross Cultural Competence				•	
8 - Ethical practice				•	
9 - Social Innovation					
10 - Aboriginal and Torres Strait Islander Cultures					

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Practical Assessment - 30%	•	•	•	•		•				
2 - Practical Assessment - 35%	•	•	•	•		•				
3 - Written Assessment - 35%	•		•	•		•	•	•		

Textbooks and Resources

Textbooks

COIT13229

Prescribed

Microservices Patterns: With examples in Java

1st edition (2018)

Authors: Chris Richardson

Manning

ISBN: 978-1617294549

Binding: Website Link

Additional Textbook Information

Can be accessed freely online at: <https://learning.oreilly.com/library/view/microservices-patterns/9781617294549/>

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- MySQL
- Java SE 11
- Java Derby
- NetBeans 11

Referencing Style

All submissions for this unit must use the referencing styles below:

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

For further information, see the Assessment Tasks.

Teaching Contacts

Partha Gangavalli Unit Coordinator

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Jamie Shield Unit Coordinator

j.shield@cqu.edu.au

Schedule

Week 1 - 08 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Distributed Systems	1 & 2	

Week 2 - 15 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Interprocess Communication	4	

Week 3 - 22 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
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Distributed Objects and Remote Invocation **5**

Week 4 - 29 Mar 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Process and Thread Management - Operating System Support **7**

Week 5 - 05 Apr 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Security in Distributed Systems **11** **Practical Assessment 1** Due: Week 5 Friday (9 Apr 2021) 11:45 pm AEST

Vacation Week - 12 Apr 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Week 6 - 19 Apr 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Web Services **9**

Week 7 - 26 Apr 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Name Services **13**

Week 8 - 03 May 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Coordination and Agreement 15

Week 9 - 10 May 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Transactions and Concurrent Control 16 **Practical Assessment 2** Due: Week 9 Friday (14 May 2021) 11:45 pm AEST

Week 10 - 17 May 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Distributed Transactions 17

Week 11 - 24 May 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Replication and Fault Tolerance 18

Week 12 - 31 May 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Mobile and Ubiquitous Computing 19 **Written Assessment 3** Due: Week 12 Friday (4 June 2021) 11:45 pm AEST

Review/Exam Week - 07 Jun 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Exam Week - 14 Jun 2021

Module/Topic **Chapter** **Events and Submissions/Topic**

Term Specific Information

Unit Coordinator

Mr. Partha Gangavalli
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School of Engineering and Technology
Central Queensland University
Sydney
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Prescribed textbook for this course: Distributed Systems Concepts and Design 5th (2012) Authors: George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair Addison-Wesley Boston, MA, USA ISBN: 9780132143011 Binding: Other

Assessment Tasks

1 Practical Assessment 1

Assessment Type

Practical Assessment

Task Description

Your task for this assignment is to design, implement, test and document a client/server system which allows concurrent access to multiple clients. The purpose of this assignment is to assess your competency in Java TCP/UDP networking, multi-threading, and object serialization/de-serialization. This assignment task is to assess your skills in practicing the theoretical concepts learnt in Weeks 2 - 4. Further details are available on the unit website in the Assignment 1 Specification document.

Assessment Due Date

Week 5 Friday (9 Apr 2021) 11:45 pm AEST
Assignment-1 Due

Return Date to Students

Week 7 Friday (30 Apr 2021)
Assignment-1 Results Release

Weighting

30%

Assessment Criteria

1. Appropriate analysis and design of a software application using networking and client-server communication for the given problem
2. Implementation of the application using networking, multi-threading, and object serialization
3. Incorporation of concurrent multi-user access to the software application
4. Use of good programming techniques/practices
5. Rigorous testing of software application.

Referencing Style

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Submission Instructions

Create a single zip file containing all code, data and configuration files required to run the project and submit via Moodle

Learning Outcomes Assessed

- Develop software applications that can run in parallel and on multiple networked computers to using approaches such as remote objects, and client-server solutions
- Design and develop secure distributed applications using approaches such as webservices, and peer-to-peer solutions

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

2 Practical Assessment 2

Assessment Type

Practical Assessment

Task Description

Your task for this assignment is to design, implement, test and document a secure 3 tier client-server system connecting to a database and using java remote method invocation. The system should allow concurrent access requiring synchronisation when dealing with multiple clients. This assignment task is to assess your skills in practicing the theoretical concepts learnt in Weeks 3 - 8. The assignment also includes a report on some theoretical concepts learnt in Weeks 7- 8. Further details are available on the unit website in the Assignment 2 Specification document.

Assessment Due Date

Week 9 Friday (14 May 2021) 11:45 pm AEST

Assignment-2 Due

Return Date to Students

Week 11 Friday (28 May 2021)

Assignment-2 Results Release

Weighting

35%

Assessment Criteria

1. Appropriate analysis and design of a software application using networking and client-server communication for the given problem
2. Implementation of the application using networking, multi-threading, connecting to a database and security
3. Use of good programming techniques/practices
4. Rigorous testing of software application.

Referencing Style

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Submission Instructions

Create a single zip file containing all code, data and configuration files required to run the project and submit via Moodle

Learning Outcomes Assessed

- Develop software applications that can run in parallel and on multiple networked computers to using approaches such as remote objects, and client-server solutions
- Design and develop secure distributed applications using approaches such as webservices, and peer-to-peer solutions
- Evaluate techniques for creating secure, reliable and efficient distributed systems.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

3 Written Assessment 3

Assessment Type

Written Assessment

Task Description

For this assessment you are required to write a technical report on aspects supporting seamless service provision using distributed systems and associated architectures. You will discuss the principles of replication and fault tolerance, the

architecture and components, scalability, and challenges. You will also discuss the relevance of this topic in cloud based IoT and cyber physical systems and the social impact of these systems. This assignment task is to assess your skills in emerging technologies and the theoretical concepts learnt in Weeks 1 - 12.

Assessment Due Date

Week 12 Friday (4 June 2021) 11:45 pm AEST
Assignment-3 Due

Return Date to Students

Exam Week Friday (18 June 2021)
Assignment-3 Results Release

Weighting

35%

Assessment Criteria

1. Clear demonstration of your understanding of replication and fault tolerance
2. Demonstration of your understanding of the theoretical concepts learnt in relation this topic
3. Critical review of the challenges in replication and fault tolerance
4. Relevant discussion of the relevance to IOT and cyber systems
5. Understand social impact of ubiquitous computing
6. Appropriate formatting, clarity of expressions, and relevant and correct use of references

Referencing Style

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Submission Instructions

Submit a Microsoft Word document via Moodle

Learning Outcomes Assessed

- Discuss the use of algorithms and other mechanisms for executing coordinated concurrent processes in distributed systems
- Discuss the technology needs and social impact arising from ubiquitous distributed systems
- Evaluate techniques for creating secure, reliable and efficient distributed systems.

Graduate Attributes

- Communication
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?



Be Honest

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own



Seek Help

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)



Produce Original Work

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem