COIT13229 *Applied Distributed Systems*
Term 1 - 2024

Profile information current as at 05/09/2024 01:39 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.

General Information

Overview
Modern computer systems commonly rely on distributed and cloud computing systems, which enable seamless access to networked resources such as processors, data stores, sensor networks, cyber-physical systems, and multimedia services. In this unit, you will gain foundation knowledge, and an understanding of the system models and their enabling technologies. You will learn the core concepts of distributed computing, such as interprocess communication, concurrency and synchronisation, transactions and concurrency control as well as distributed databases and files. This unit also exposes you to distributed system characteristics of scalability, heterogeneity, security, and failure handling. The areas of mobile and ubiquitous computing and the social impact arising from the ubiquity of distributed systems will also be explored. You will learn to develop secure and reliable distributed computing applications and web services that can perform concurrent operations across multiple computers.

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
Prerequisites: COIT12200 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 - 2024
- 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. **Written Assessment**
Weighting: 20%
2. **Practical Assessment**
Weighting: 35%
3. **Reflective Practice Assignment**
Weighting: 45%

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 Unit Coordinator reflection and teaching team feedback

Feedback
The technology-related contents of this unit including the textbook are outdated and don't follow the current industry technology trends.

Recommendation
Replace the current textbook and introduce the implementation of theoretical concepts such as "consensus systems", "secure interprocess communications", and "load-balancing" techniques.

Feedback from Student feedback

Feedback
Some contents are difficult to understand and there aren't enough resources to explain the content.

Recommendation
Revise unit materials and provide more real-life examples to help students understand the applicability of contents in real-life situations.

Unit Learning Outcomes

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

1. Evaluate techniques for creating secure, reliable, and efficient distributed systems by examining the technology needs and social impact arising from ubiquitous distributed systems
2. Design and develop secure distributed applications in a distributed service-oriented architecture
3. Analyse the use of algorithms and mechanisms to execute coordinated concurrent processes in distributed systems
4. Implement software applications that enable concurrent access to distributed databases and transactions.

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 8. The SFIA code is included:

- Solution architecture (ARCH)
- Software Design (SWDN)
- Systems integration and build (SINT)
- Programming/Software Development (PROG),
- Database Design (DBDS)
- User Experience Evaluation (USEV)
- Testing (TEST)
- System Installation and Removal (HSIN)

Alignment of Learning Outcomes, Assessment and Graduate Attributes

— N/A Level　　○ Introductory Level　　● Intermediate Level　　● Graduate Level　　○ Professional Level　　○ Advanced Level

Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes			
	1	2	3	4
1 - Written Assessment - 20%	●			
2 - Practical Assessment - 35%		●		●
3 - Reflective Practice Assignment - 45%	●	●	●	●

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes			
	1	2	3	4
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				

Textbooks and Resources

Textbooks

There are no required textbooks.

Additional Textbook Information
The following two books are good resources to get more in-depth information about distributed systems:
1- Designing distributed systems: patterns and paradigms for scalable, reliable services.
   ISBN: 9781491983645. O'Reilly Media, Inc.
   Burns, B. (2018)
2- Understanding Distributed Systems, Second Edition: What every developer should know about large distributed applications.
   ISBN 978-1838430214
   Vitillo, R. (2022)

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- MySQL Community Server 8.0.26 (available from https://dev.mysql.com/downloads/mysql/)
- NetBeans 20 (available from: https://netbeans.apache.org/front/main/download/nb20/)
- Open JDK 21 (available from: https://jdk.java.net/21/)
- Jakarta EE 10 (available from https://jakarta.ee/release/10/)
- Apache TomEE 10 TomEE Plus (available from https://tomee.apache.org/download.html)

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Farzad Sanati Unit Coordinator
f.sanati@cqu.edu.au

Schedule

Week 1 - 04 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
An Introduction to Distributed System - System Characterization and Models		

Week 2 - 11 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Inter-process Communication		

Week 3 - 18 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Process and Thread Management – Operating System Support		

Week 4 - 25 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Distributed Objects and Introduction to Web Services		**Assessment 1** Due: Week 4 Friday (29 Mar 2024) 11:45 pm AEST

Week 5 - 01 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Web Services		

Vacation Week - 08 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 15 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Security in Distributed Systems		

Week 7 - 22 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Coordination and Agreement		**Practical Assignment 2** Due: Week 7 Friday (26 Apr 2024) 11:45 pm AEST

Week 8 - 29 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Transactions and Concurrent Control		

Week 9 - 06 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Distributed Transactions		

Week 10 - 13 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Distributed File Systems and Name Services		

Week 11 - 20 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Replication and Fault Tolerance		

Week 12 - 27 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Mobile and Ubiquitous Computing		

Review/Exam Week - 03 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Practical Assessment 3 Due: Review/Exam Week Friday (7 June 2024) 11:45 pm AEST

Exam Week - 10 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Contact information for Dr Farzad Sanati: Email: f.sanati@cqu.edu.au; Office: Level 6, 120 Spencer Street, Melbourne Vic 3000; P +61 3 9616 0640 | X 50640.
If you have any queries, please email me and I will get back to you within one business day or so. For an individual discussion, please ring me during business hours (or leave a message if I am not in) and I will return your call as soon as possible.

Assessment Tasks

1 Assessment 1

Assessment Type
Written Assessment

Task Description
Your task in this assignment is to demonstrate your understanding of the role distributed systems play in facilitating pervasive computing and critically evaluate the technology needs in terms of reliability and security and the related issues impacting society. This assessment task is to assess your ability to research to gain an understanding of the current developments in distributed systems. Further details are available in the Assignment 1 Specification document available on the Unit website.

Assessment Due Date
Week 4 Friday (29 Mar 2024) 11:45 pm AEST

Return Date to Students
Week 6 Friday (19 Apr 2024)

Weighting
20%

Assessment Criteria

1. Clear demonstration of your understanding of the importance of distributed system principles of security, reliability, etc. as per the requirement
2. Demonstration of a good understanding of the topics related to current developments in Distributed Systems as given in the specification
3. Demonstration of a deep understanding of the theoretical concepts learnt about fault tolerance
4. A critical review of relevant information and logical construction of arguments
5. Relevant discussion of the impact of specific aspects of distributed systems on society
6. Appropriate formatting, clarity of expressions, and relevant and correct use of references

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit the report (.doc or .docx) file using the Assignment submission link available on the Unit website.

Learning Outcomes Assessed

- Evaluate techniques for creating secure, reliable, and efficient distributed systems by examining the technology needs and social impact arising from ubiquitous distributed systems

2 Practical Assignment 2

Assessment Type
Practical Assessment

Task Description
Your task for this assignment is to design, implement, test, and document a client/server system that allows concurrent access to multiple clients. The purpose of this assignment is to assess your competency in Java TCP networking, multi-threading, and object serialization. This assignment task is to assess your skills in practicing the theoretical concepts learnt in Weeks 1 - 6. Further details are in the Assignment 2 Specification document available on the Unit website.

Assessment Due Date
Week 7 Friday (26 Apr 2024) 11:45 pm AEST

Return Date to Students
Week 9 Friday (10 May 2024)

Weighting
35%

Assessment Criteria

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

Referencing Style

- [Harvard (author-date)](#)

Submission
Online

Submission Instructions
Submit one zip file containing all source code (.java) files and the report (.doc/x) file using the Assignment submission link available on unit website. Do not submit the zipped project folder or compiled binaries(.class, .jar).

Learning Outcomes Assessed

- Design and develop secure distributed applications in a distributed service-oriented architecture
- Implement software applications that enable concurrent access to distributed databases and transactions.

3 Practical Assessment 3

Assessment Type
Reflective Practice Assignment

Task Description
This is a **group** assessment, and your task for this assignment is to design, implement, test, and document a secure three-tier client/server system that allows concurrent access to multiple clients. Your system will have a graphical user interface, a business logic layer, and a back-end database. This assignment task is to assess your skills in practicing the theoretical concepts learnt in Weeks 1- 12 and in the pre-requisite units. You will be completing the software design and development work in a team consisting of 3-4 members. You will develop a test plan and test the software application individually. You will individually write and submit a report documenting the testing details and any other theoretical aspects required. Further details are in the Assignment 3 Specification document available on the Unit website.

Assessment Due Date
Review/Exam Week Friday (7 June 2024) 11:45 pm AEST

Return Date to Students

Marking sheet with comments will be returned to you after publication of grades.

Weighting
45%

Assessment Criteria

1. Analyse the given problem and design a 3-tier client-server software application using distributed system concepts.
2. Correct design and implementation of a software solution to provide secure multi-user client access using one of the approaches of distributed objects, web services, or peer-to-peer communication
3. Use of good programming techniques/practices
4. User interface design following user interface design guidelines
5. Rigorous testing of software application
6. Correct and concise documentation as required
7. Good collaboration working in a small team.

Referencing Style

- [Harvard (author-date)](#)

Submission
Online Group

Submission Instructions
Submit one zip file containing all source code (.java) and the report (.doc) file using the Assignment submission link

available on unit website. Do not submit the zipped project folder or compiled binaries (.class, .jar). Each team member should submit his/her individually prepared report.

Learning Outcomes Assessed

- Evaluate techniques for creating secure, reliable, and efficient distributed systems by examining the technology needs and social impact arising from ubiquitous distributed systems
- Design and develop secure distributed applications in a distributed service-oriented architecture
- Analyse the use of algorithms and mechanisms to execute coordinated concurrent processes in distributed systems
- Implement software applications that enable concurrent access to distributed databases and transactions.

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