School of Software and Electrical Engineering

Unit Outline

COS30041

Creating Secure and Scalable Software

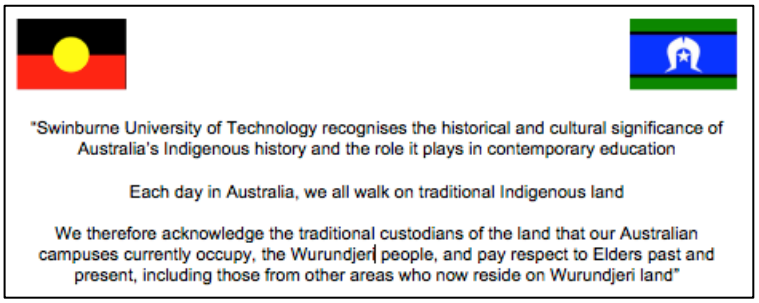
Semester 1 2022

Please read this Unit Outline carefully. It includes:

PART A Unit summary

PART B Your Unit in more detail

PART C Further information



PART A: Unit Summary

Unit Code(s)		COS30041
Unit Title		Creating Secure and Scalable Software
Duration		One semester or equivalent
Total Contact Hours		48 hours
Requisites:		
	Pre-requisites	COS20007 Object Oriented Programming OR SWE20004 Technical Software Development AND COS20001 User-Centred Design OR COS10011 Creating Web Applications OR COS10005 Web Development
	Co-requisites	Nil
	Concurrent pre-requisites	Nil
	Anti-requisites	Nil
	Assumed knowledge	Nil
Credit Points		12.5 credit points
Campus/Location		Hawthorn
Mode of Delivery		Face to Face
Assessment Summary		Portfolio (Individual) 100% Test (Individual) 0%

Aims

Creating Secure and Scalable Software aims to introduce students to contemporary frameworks for developing software, and strategies, patterns, and frameworks to help address security and scalability issues.

Unit Learning Outcomes

Students who successfully complete this Unit should be able to:

1 Build and deploy secure and scalable application using contemporary frameworks

2 Explain and apply strategies, patterns and frameworks to address a range of scalability issues

3 Explain and apply strategies, patterns and frameworks to address a range of security issues

4 Use contemporary tools to evaluate the scalability of applications

5 Use contemporary approaches to evaluate the security considerations of applications

Graduate Attributes

This unit may contribute to the development of the following Swinburne Graduate Attributes:

- Communication skills
- Teamwork skills
- Digital literacies

Content

- Architecture for scaling up and out
- Patterns and structures for scalability
- Security with authentication and authorisation
- Encryption and signing
- Contemporary technology frameworks

PART B: Your Unit in more detail

Unit Improvements

Feedback provided by previous students through the Student Survey has resulted in improvements that have been made to this unit. Recent improvements include:

- Tutorial lab instructions have been revised.
- Portofino tasks have been revised.

Unit Teaching Staff

Name	Role	Room	Phone	Email	Consultation Times
Dr. Wei Lai	Unit Convenor / Lecturer / Tutor	EN510b	9214 4391	wlai@swin.edu.au	By appointment
Dr Shibli Saleheen	Tutor			ssaleheen@swin.edu.au	By appointment
Dr Naurin Afrin	Tutor			nafrin@swin.edu.au	By appointment

Learning and Teaching Structure

Activity	Total Hours	Hours per Week	Teaching Period Weeks
Lectures	24 hours	2 hours	Weeks 1 to 12
Tute (Lab) Work	24 hours	2 hour	Weeks 1 to 12

This unit of study requires you to investigate and research into the technologies involved in enterprise development.

In a Semester, you should normally expect to spend, on average, twelve and a half hours of total time (formal contact time plus independent study time) a week on a 12.5 credit point unit of study.

Week by Week Schedule

Week	Week Beginning	Teaching and Learning Activity	Student Tasks and Assessment	
1	Feb 28	Introduction; Java – a crush course	Complete weekly tasks Submit task progress for feedback and signoff	
2	Mar 7	Database Connectivity		
3	Mar 14	ORM and Java Persistence		
4	Mar 21	Business Logics 1 (Stateless behaviour) Creating app client		
5	Mar 28	Creating web client		[D/HD] Discuss software ideas
6	Apr 4	Business Logics 2 (Stateful behaviour)		[HD] Discuss research ideas
7	Apr 11 Apr 18	Security; Building secured apps Apr 14 (Thu) – Apr 20 (Wed) Easter & Mid Break		
8	Apr 25	Design Patterns		[D/HD] Finalize software ideas
9	May 2	Traditional (“Big”) Web Services		[HD] Finalize research ideas
10	May 9	RESTful and Non-RESTful		

Week	Week Beginning	Teaching and Learning Activity	Student Tasks and Assessment	
11	May 16	Portfolio Work Discussion		[D / HD] Book Portfolio Interview
12	May 23	Portfolio and Submission issues		
13	May 30	Non-teaching week; Exam period	Prepare for portfolio submission	
14	Jun 6	Exam period	Portfolio Submission (Jun 6) [D / HD] Interview (Jun 7-10)	

Assessment

a) Assessment Overview

Tasks and Details	Individual or Group	Weighting	Unit Learning Outcomes that this assessment task relates to	Assessment Due Date
[P / C] Portfolio	Individual	100%	ALL	Jun 6
[D / HD] Portfolio and Portfolio interview	Individual	100%	ALL	Jun 6 Jun 7 - 10

b) Minimum requirements to pass this Unit

This unit uses portfolio assessment (see below) to determine your final grade. As the minimum requirements of assessment to pass this unit and meet all ULOs (or ILOs) to a minimum standard, a postgraduate student must submit and present a passable Portfolio which includes all Pass Tasks completed to the minimum standard.

If you do not submit a passable Portfolio, you will receive a maximum of 44% (N) as your total mark for the unit.

If your submitted Portfolio does not meet the minimum Pass standard, you will receive a maximum of 44% (N) as your total mark for the unit.

c) Examinations

This unit uses portfolio assessment (see below) to determine your final grade. Hence, it does not have an examination. However, for students aiming D / HD, they will be expected to be available for the Portfolio interview period.

d) Portfolio Assessment

This unit of study uses **portfolio assessment** to determine your final grade. You are required to submit a portfolio that contains the following items:

1. **Learning Summary Report** that reflects on what you have learnt, and shows how your portfolio addresses the assessment criteria for each intended learning outcome.
2. A **number of pieces** of work that demonstrate how you have met **all** of the unit's intended learning outcomes. This must include
    a. All required weekly task work, completed and marked by staff for your intended grade
    b. A program of your own design, and related documents such as design doc with justifications (for Distinction and above)
    c. A research report (for High Distinction)

The following sections and tables outline the criteria by which your portfolio will be assessed.

Learning Summary Report

The Learning Summary Report consists of the following two parts:

- **reflection**: a personal comment on what you have learnt in this unit, and how your knowledge and skills have developed; and
- **self-assessment**: it indicates objectively how your portfolio aligns with the assessment criteria, and the depth (Adequate, Good, Outstanding, and Exemplary as defined in the learning assessment tables below) to which these criteria have been met for each of the intended learning outcomes.

This report should be **3 - 5 pages** in length: one page for an overview, half a page to address the assessment criteria for each intended learning outcome as indicated in the tables below, and the rest should be used to present your reflection.

The reflection should aim to cover your learning experience and can,

- Elaborate on aspects that your found challenging / inspiring / interesting or different (to expectations) and why?
- Include the approach that you used to solve a problem and how the learning in the unit helped.
- Compare and contrast new learning / information within the context of prior learning (as well as any previous assumptions or expectations – with a discussion on how these have either been reinforced or changed).
- Present areas that you have personally explored beyond the expectations of the unit, as well as indication of the areas where you plan to learn further on your own and why?
- Provide a map of the key concepts, techniques and/or principles related to the unit (you may use mind-maps, or visual diagrams to communicate this map).
- Highlight ideas/techniques/principles that can be generalised and used in other areas or for further learning (with a brief discussion to support the claim).

Note: The reflective section should not just be a direct summary of the content covered in the unit.

Possible Pieces

Your portfolio should also include a **number of pieces of work**. These pieces will include things such as weekly assignment work, presentation slides, spike outcome reports, source code, experience reports, research reports, and others. The details of what is expected from each of these can be found below.

Glossary of Enterprise Development Concept	One of the key learning tools, and assessment items, of the unit is the development of a glossary. This glossary documents your understanding of the concepts covered in the unit, and will be built week by week. Please ensure that you work to complete your glossary each week. Your tutor will help you identify areas for improvement and will sign off your progress each week. A template for this glossary, including placeholders for the details you will need to supply, is available from Blackboard.
Programming Exercises	Include your revised solutions to the programming exercises. You may incorporate the feedback you get from the formative assessment during the semester.
Technical Presentation	Another key learning tools, and assessment items, of the unit is the technical presentation. In the technical presentation, you are required to form groups of 2 – 3 students to research and investigate the enterprise technologies of your chosen language. You are required to do an in-class presentation to share your knowledge of particular technical presentation topics with other students. You are also required to do a spike outcome report to share your learning journey / experiences to other students. These reports will also be used as lab instructions for other students to follow your learning journey.

Technical Presentation Slide	These will be your slides for the in-class technical presentations. You need to submit the slides early so that other students can download them before your presentation. See the presentation template on Canvas for details.
Spike Outcome Report	You need to submit the spike outcome report early so that other students can download them before your presentation and the lab class. See the SOR template on Canvas for details.
Source Code	*Sample code* should be printed directly from the code files. **Do not** copy the text into a word-processed document for printing. Use a pretty-printer to preserve formatting and readability.
Short Report	Aim to capture your understanding of a topic area. It should include at least 1 or 2 references to support the points you are making. The report is expected to be between 500 - 1000 words, and must contain at least the following sections: Introduction, Summary, and References
Experience Report	An *Experience Report* captures your reflections on applying principles and concepts related to the subject to a project of your own creation. It is expected to be between approximately 500 and 1000 words. The report should contain at least 1 or 2 references, and must have at least the following sections: Introduction, Summary, and References. An Experience Report may be used to address a number of Intended Learning Outcomes.
Research Report	A *Research Report* aims to document your findings related to a research topic relevant to the unit. You must examine related literature, perform experiments, and document your findings. It is expected to be between 1500 - 2500 words. The report must contain an *Abstract*, *Introduction*, *Method*, *Discussion*, *Conclusion* and *References*. It is expected that all research reports will contain at least 4 to 5 references and make use of images and/or tables to help convey their message.
Others	You may include any other work you feel demonstrates your knowledge in areas related to the intended learning outcomes. Feel free to be as creative as you like. Pieces such as audio clips, videos, poems, illustrations, interpretive dance, and others may all be included if they relate to the intended learning outcomes.

Notes:

- All reports should use the Harvard reference and citation notation as outlined in Swinburne Harvard complete guide available from http://www.swinburne.edu.au/library/referencing/harvard-complete-guide/.
- Images, Tables, Code snippets, Appendix Section contribute 200 words each to the overall word count.
- If you include code snippets in your reports, they must be generated using a pretty printer (that is, they must be set using a mono space font, formatted properly and easy to read)

Grades Awarded

Table 1 below shows the grades that will be awarded for successful completion of this unit of study. If the pass criteria are not met satisfactorily then the final result will be between 0 and 44, resulting in a fail for this unit of study.

Table 1 Assessment Criteria for each Grade

Grade	Assessment Item	Grade Assessment Criteria
Pass (possible	Learning Summary Report	Evidence demonstrates the Intended Learning Outcomes (ILOs) to a **minimally** acceptable standard.

Grade	Assessment Item	Grade Assessment Criteria
marks: 50, 53, 56)		ILOs have poor coverage, no originality, and / or weak justifications of portfolio pieces.
	Pieces of work	In order to pass the unit, you need to demonstrate that all Pass Tasks have been signed off (that is, marked as “Complete”) by staff.
Credit (possible marks: 60, 63, 66)	Learning Summary Report	Evidence shows a good understanding of all ILOs. This must include a high quality glossary that accurately describes all topics covered in this unit. ILOs have good coverage, with a suitable justification of portfolio pieces, and in-depth reflections on concepts learnt in this unit.
	Pieces of work	Must meet all Pass requirements (for all items for Pass) In addition to all Pass Tasks, you need to demonstrate that all Credit Tasks have been signed off by staff.
Distinction (possible marks: 70, 73, 76)	Learning Summary Report	Evidence demonstrates a clear view of how the various aspects of the unit integrate and apply to enterprise development. Evidence includes a software solution of the student's own design and implementation. All ILOs have good coverage, with clear and concise justification of portfolio pieces, and reflections on how the unit's concepts applied to the implementation of the software developed by the student.
	Pieces of work	Must meet all Credit requirements (for all items for Credit) In addition to all items for Credit, you need to include • A program of your own design and implementation demonstrating your ability to apply ILOs to the creation of a program of your own design • A design report showing the structure of your program
High Distinction (possible marks: 80, 85, 90, 95, 100)	Learning Summary Report	As in Distinction, with the addition of evidence showing the ability to research a question related to the concepts covered.
	Pieces of work	Must meet all Distinction requirements (for all items for Distinction) In addition to all items for Distinction, you need to include: • A research report of your own investigation

Note: The actual mark associated with the grade is determined based on the quality of the final portfolio

e) Submission Requirements

Tasks: Submit all tasks to Doubtfire for tutor’s feedback within the suggested time frame according to the instructions in the Task Sheets

Portfolio: Collect all your pieces and submit it as a portfolio together with your Learning Summary Report

Please ensure you keep a copy of all assessments that are submitted.

f) Extensions and Late Submission

Late Submissions of **Tasks** - Unless an extension has been approved by your tutor, late submission for the tasks may not get appropriate feedback from your tutor. Hence, you risk about submitting sub-standard work which may lead to a Fail grade in the end.

Late Submissions of **Portfolio** - Unless an extension has been approved, late submissions of portfolio is not allowed.

g) Referencing

To avoid plagiarism, you are required to provide a reference whenever you include information from other sources in your work. Further details regarding plagiarism are available in Section C of this document.

Referencing conventions required for this unit are: Harvard reference and citation notation (http://www.swinburne.edu.au/library/referencing/harvard-complete-guide/)

h) Groupwork Guidelines

A group assignment is the collective responsibility of the entire group, and if one member is temporarily unable to contribute, the group should be able to reallocate responsibilities to keep to schedule. In the event of longer-term illness or other serious problems involving a member of group, it is the responsibility of the other members to immediately notify the Unit Convenor or relevant tutor.

Group submissions must be submitted with an Assignment Cover Sheet, signed by all members of the group.

All group members must be satisfied that the work has been correctly submitted. Any penalties for late submission will generally apply to all group members, not just the person who submitted.

Required Textbook(s)

No required textbook

Recommended Reading Materials

The Library has a large collection of resource materials, both texts and current journals. Listed below are some references that will provide valuable supplementary information to this unit. It is also recommended that you explore other sources to broaden your understanding.

Martin Fowler (2003) *Patterns of Enterprise Application Architecture*, Addison-Wesley

Jakarta EE 8 Tutorial https://eclipse-ee4j.github.io/jakartaee-tutorial/toc.html

Java EE 7 http://www.oracle.com/technetwork/java/javaee/overview/index.html

Ruby, Thomas, Hansson (2013) *Agile Web Development with Rails 4,* 4th edition, Pragmatic Bookshelf

Bass, Len (2013) Software Architecture in practice, 3rd edition, Upper Saddle River, Addison-Wesley

National Research Council (US) Steering Committee on the Usability, Security, and Privacy of Computer Systems (2010) Towards better usability, security, and privacy of information technology: report of a workshop, Washington, D.C., National Academies Press

Suggested IDEs

Java EE – Apache NetBeans 12.2 (http://netbeans.apache.org)

Others (e.g. Eclipse, IntelliJ) – At your own risk

PART C: FURTHER INFORMATION

For further information on any of the below topics, refer to Swinburne's Current Students web page http://www.swinburne.edu.au/student/.

Student Charter

Please familiarise yourself with Swinburne's Student Charter. The charter describes what students can reasonably expect from Swinburne in order to enjoy a quality learning experience. As students contribute to their own learning experience to that of their fellow students, the charter also defines the University's expectations of students.

Student behaviour and wellbeing

Swinburne has a range of policies and procedures that govern how students are expected to conduct themselves throughout the course of their relationship with the University. These include policies on expected standards of behaviour and conduct which cover interaction with fellow students, staff and the wider University community, in addition to following the health and safety requirements in the course of their studies and whilst using University facilities.

All students are expected to familiarise themselves with University regulations, policies and procedures and have an obligation to abide by the expected guidelines. Any student found to be in breach may be subject to relevant disciplinary processes. Some examples of relevant expected behaviours are:

- Not engaging in student misconduct
- Ensuring compliance with the University's Anti-Discrimination, Bullying and Violence and Sexual Harassment requirements
- Complying with all Swinburne occupational health and safety requirements, including following emergency and evacuation procedures and following instructions given by staff/wardens or emergency response.

In teaching areas, it is expected that students conduct themselves in a manner that is professional and not disruptive to others. In all Swinburne laboratories, there are specific safety procedures which must be followed, such as wearing appropriate footwear and safety equipment, not acting in a manner which is dangerous or disruptive (e.g. playing computer games), and not bringing in food or drink.

Blackboard

You should regularly access the Swinburne Course Management System (Blackboard) available via http://ilearn.swin.edu.au. Blackboard is regularly updated with important Unit information and communications.

Communication

All communication will be via your Swinburne email address. If you access your email through a provider other than Swinburne, then it is your responsibility to ensure that your Swinburne email is redirected to your private email address.

Plagiarism

Plagiarism is the action or practice of taking and submitting or presenting the thoughts, writings or other work of someone else as though it is your own work. Plagiarism includes any of the following, without full and appropriate acknowledgment to the original source(s):

- The use of the whole or part of a computer program written by another person;

- the use, in essays or other assessable work, of the whole or part of a written work from any source including but not limited to a book, journal, newspaper article, set of lecture notes, current or past student's work, any other person's work, a website or database;
- The paraphrasing of another's work;
- The use of musical composition, audio, visual, graphic and photographic models,
- The use of realia that is objects, artefacts, costumes, models and the like.

Plagiarism includes the submission of assessments that have been developed by another person or service through contract, tender or online writing services.

Plagiarism also includes the preparation or production and submission or presentation of assignments or other work in conjunction with another person or other people when that work should be your own independent work. This remains plagiarism whether or not it is with the knowledge or consent of the other person or people. It should be noted that Swinburne encourages its students to talk to staff, fellow students and other people who may be able to contribute to a student's academic work but that where independent assignment is required, submitted or presented work must be the student's own.

Enabling plagiarism contributes to plagiarism and therefore will be treated as a form of plagiarism by the University. Enabling plagiarism means allowing or otherwise assisting another student to copy or otherwise plagiarise work by, for example, allowing access to a draft or completed assignment or other work.

Swinburne University uses plagiarism detection software (such as Turnitin) for assignments submitted electronically via Blackboard. Your Convenor will provide further details.

The penalties for plagiarism can be severe ranging from a zero grade for an assessment task through to expulsion from the unit and in the extreme, exclusion from Swinburne. Consequently you need to avoid plagiarism by providing a reference whenever you include information from other sources in your work.

Student support

You should talk to your Unit Convenor or Student Services, for information on academic support services available for Swinburne students.

Special consideration

If your studies have been adversely affected due to serious and unavoidable circumstances outside of your control (e.g. severe illness or unavoidable obligation) you may be able to apply for special consideration (SPC).

Applications for Special Consideration will be submitted via the SPC online tool normally no later than 5.00pm on the third working day after the submission/sitting date for the relevant assessment component.

Special needs

Sometimes students with a disability, a mental health or medical condition or significant carer responsibilities require reasonable adjustments to enable full access to and participation in education. Your special needs can be addressed by Swinburne's Disability Services, who can negotiate and distribute an 'Education Access Plan' that outlines recommendations for university teaching and examination staff. You must notify the University Disability Liaison Officer of your disability or condition within one week after the commencement of a unit of study to allow the University to make reasonable adjustments.

Review of marks

An independent marker reviews all fail grades for major assessment tasks. In addition, a review of assessment is undertaken if your final result is a marginal fail (45-49) or within 2 marks of a grade threshold.

If you are not satisfied with the result of an assessment you can ask the Unit Convenor to review the result. Your request must be made in writing within 10 working days of receiving the result. The Unit Convenor will review your result to determine if your result is appropriate.

If you are dissatisfied with the outcomes of the review you can lodge a formal complaint.

Feedback, complaints and suggestions

In the first instance you may discuss any issues with your Unit Convenor. If you are dissatisfied with the outcome of the discussions with the Unit Convenor or would prefer not to deal with your Unit Convenor, then you can complete a feedback form.

Advocacy

You are advised to seek advice from the staff at the Swinburne Student Amenities Association (SSAA) if you require assistance with any academic issues.