Faculty of Information and Communication Technologies
Higher Education

Unit of Study Outline

HIT3329 / HIT8329

Creating Data Driven Mobile Applications

Semester 2/2011

SWINBURNE UNIVERSITY
OF TECHNOLOGY

Unit of Study Outline

Unit of study code	HIT3329 / HIT8329
Unit of study name	Creating Data Driven Mobile Applications
Teaching Term/Semester & Year	2011/Semester 2
Contact Hours (hrs/wk) or total contact hours	36 Hours in total
Prerequisites	HIT2302 Object-Oriented Programming or HIT3172 Object-Oriented Programming in C++ or HIT2037 Software Development in Java
Co-requisites	Nil
Credit Points	12.5

Aims

This unit covers the practical and theoretical knowledge required to develop data driven software for mobile devices (iOS). This involves learning Objective C, the Cocoa Touch Framework, debugging for devices, the nature of developing for mobile distribution platforms as well as network access and on-device sensor input such as the accelerometer and GPS.

Learning Objectives

After successfully completing this unit, you should be able to:

1. Build, test, and debug mobile applications that consume and process external data, as well as collect and publish data
2. Explain the importance of and design testable, reusable code components
3. Design mobile applications that work within device and environmental limitations
4. Use caching and concurrency to create fast applications with a better user experiences

These learning objectives will be assessed via the following **intended learning outcomes**.

After successfully completing this unit, you will be able to:

1. Build a data-driven mobile application that reads data from Web APIs, interprets the data on the device, and publishes user data back to an API
2. Design and build a mobile application that gracefully degrades functionality when resources are constrained
3. Create a responsive mobile application by using data caching and by handling long-running tasks asynchronously

Content

- Mobile telephony and tablet hardware
- iOS operating system
- Cocoa Touch Framework
- Designing, developing, debugging and deploying applications on mobile devices

Key Generic Skills for this Unit of Study

You will be provided with feedback on your progress in attaining the following generic skills:

- Problem solving skills, Communications skills
- Ability to tackle unfamiliar problems, and
- Ability to work independently

Learning and Teaching Structure

- 2 hour lecture each week
- 1 hour tutorial (laboratory) session each week

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.

Provisional Schedule

Week	Starting	Lecture / Laboratory Topic		Assessment
1		Welcome to iOS	***No Lab***	
2		The Objective C Way		Weekly Assignment Feedback
3		The Cocoa Touch Framework		Weekly Assignments
4		Introduction to UIKit		
5		Core Data & Notifications		
6		Basic Networking		
		Mid-Semester Break		
7		Concurrent Operations, Usability and User Feedback		Weekly Assignments
8		Modelling Application Design Around Availability		
9		Integrating External Data Sources		
10		Guest Lecture		Portfolio Draft Due for Feedback
11		Student Presentations 1		Technical Presentation
12		Student Presentations 2		Technical Presentation, Portfolio Signoff and Interview Booking

Teaching Staff

Name	Role	Campus & Room No.	Phone No.	Email Address	Consultation Times
Paul Chapman	Unit of Study Convenor	Hawthorn TD	92145011	paul@longweekendmobile.com	Check Blackboard
Dr. Rajesh Vasa	Moderator	HAW, EN514b	92145011	rvasa@swin.edu.au	

Resources and Reference Material

Check Blackboard (as this information is updated regularly)

Blackboard Site for this Unit of Study

Important information concerning this unit of study is placed on the Swinburne course management system (Blackboard), accessible via http://ilearn.swin.edu.au/

It is your responsibility to access on a regular basis
- the Blackboard site for your unit of study,
- the Announcements section on Blackboard, and
- any emails sent by the teaching staff to your student email address via Blackboard.

Swinburne student email and calendar services are provided by Live@edu:
To login navigate to http://outlook.com and use the following login details:
Login: <studentID>@student.swin.edu.au
Default Password: Date of birth (DDMMYY)
Email Address: <studentID>@student.swin.edu.au

If you access your email through a provider other than Swinburne, it is your responsibility to ensure that your Swinburne email is redirected to your private email address.

Assessment

a. Assessment Task Details:

Assessment Task	Individual/ Group Task	Related Learning Objective(s)	Weighting	Due Date
Weekly Assignments#	Individual	*All*	P/F	Regularly starting Week 3
Presentation#	Individual	*1, 2 or 3*	P/F	Week 11 / 12
Portfolio of work	Individual	*All*	100%	Exam Period

Weekly assignments and presentation work is formative - feedback will be provided and it is expected that students will incorporate that in their final portfolio.

P/F indicates a Pass/Fail component that must be included in your final portfolio to pass the unit.

b. Participation Requirements

You are required to attend laboratory sessions to submit assessment items and have your portfolio work signed off. Participation in all teaching and learning activities is strongly encouraged.

c. Minimum Requirements to pass this Unit of Study:

In order to achieve a pass in this unit of study, you must:

- Submit all weekly assignments,
- Prepare and deliver a presentation, and
- Submit and present a passable Portfolio

If you do not meet the pass requirements you will be given a maximum mark of 44 or less for the unit.

d. Assessment Criteria:

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 portfolio pieces** of work that demonstrate how you have met the unit's learning objectives. This must include:
    a. Your answers, and code from the weekly assignments
    b. Bonus work reports (for Credit and above)
    c. A program of your own design, and accompanying report (for Distinction and above)
    d. A research report (for High Distinction)
    e. Any other work you feel demonstrates your depth of knowledge related to the intended learning outcomes.

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

Learning Summary Report

The Learning Summary Report consists of two parts: a **reflection** and a **self-assessment**. The reflection is a personal comment on what you have learnt in this unit, and how your knowledge and skills have developed. The **self-assessment** 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 no more than **7 pages** in length: one page for an overview, half a page to address the assessment criteria for each learning objective as indicated in the tables below, and the rest should be used to present the 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.

Portfolio Pieces

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

Weekly Assignment Work Include your revised solutions to the weekly assignment work. You may incorporate the feedback you get from the formative assessment during the semester.
Short Report A *Short Report* aims 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.
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 that emits a PDF.
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. One 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's Citation Guide available from http://www.swinburne.edu.au/lib/researchhelp.
- 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 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: Grade Assessment Criteria

Pass			**Credit**			**Distinction**			**High Distinction**		
P 50	P 53	P 56	C 65	C 68	C 70	D 75	D 78	D 80	HD 90	HD 95	HD 100
Portfolio includes: ▪ Learning Summary Report. ▪ Core assignment work. ▪ Presentation notes and handouts Weekly assignments have been completed satisfactorily. Technical presentation must have been delivered, and notes and handouts included. Feedback from presentation is addressed in the handout. Learning Summary Report includes a reflection on what you have learnt, and clearly shows how **all** intended learning outcomes are addressed to at least an **adequate level**.			In addition to meeting the Pass requirements the Portfolio includes: ▪ Extension work (as indicated in the assignment handouts). Extension work is sufficient so that **at least one** of the intended learning outcomes is addressed at a **good level**.			In addition to meeting the Credit requirements the Portfolio includes: ▪ Extension work (as indicated in the assignment handouts). ▪ A program of your own design and implementation. ▪ Experience Report on the above program. Additional extension work is sufficient so that in total **at least two** of the intended learning outcomes are addressed at a **good level**. The program and Experience Report are sufficient so that **at least one** of the intended learning outcomes is addressed at an **outstanding level**.			In addition to meeting the Distinction requirements the Portfolio includes: ▪ Extension work (as indicated in the assignment handouts). ▪ A research report. Additional bonus work is sufficient so that in total **at least three** of the intended learning outcomes are addressed at a **good level**. The program and Experience Report are sufficient so that in total **at least two** of the intended learning outcomes are addressed at an **outstanding level**. The research report is sufficient so that **at least one** of the intended learning outcomes is addressed at an **exemplary level**.		

Intended Learning Outcome (ILO 1): Build a data-driven mobile application that reads data from Web APIs, interprets the data on the device, and publishes user data back via an API.			
Adequate	**Good**	**Outstanding**	**Exemplary**
Evidence includes code that highlights uses of the SDK and features of the device. You must include **technology demonstrators** that showcase your understanding of the following: **(a)** At least 3 types of collection objects, both mutable and immutable, **(b)** At least 3 instances of the Model-View-Controller design pattern, (c) Delegation, (d) Event observers, (e) Ability to create an API class to consume data on the Web via HTTP, (f) At least one unit test class to test code with public & external interfaces.	Evidence also demonstrates that the application publishes data via HTTP to an external API. You must also include a ***short report*** that explains your understanding of how unit testing is useful for testing code that interacts with external interfaces (e.g. the Web).	Evidence also demonstrates that the application makes use of one or more device sensors, using the sensor data to create a "mashup" with Web-sourced data, and is non-trivial. Accompanying the program is an **Experience Report** that discusses topics related to this ILO. Specifically, discuss your experience learning how to read data from device hardware sensors, as well as any challenges you faced in implementation.	Evidence also includes a **research article** that demonstrates significant depth related to the area of external data sources and accessing those sources. Suggested topics: (a) The methodology you would use to engineer a data protocol over HTTP that (a) transfers a minimum amount of data, (b) reduces the number of client requests, yet still functions well in the eyes of a user. You may use an example protocol that is used in the course or choose your own. Specific focus should be given to API scalability, the user's experience, and performance. (b) Smartphones of the near future (and already in Japan!) will contain near-field communication (NFC) hardware. Propose a use case for a mobile application that integrates NFC, provide a block-level design, and rationalize your design choices. Note: Students can also propose and work on a topic of their choice after agreement with the unit convenor.

Intended Learning Outcome (ILO 2): Design and build a mobile application that degrades gracefully under limiting conditions and maintains a good user experience.			
Adequate	**Good**	**Outstanding**	**Exemplary**
Evidence includes a design model for each screen of an application that explains how the application will or will not function, and what will happen to the user interface, if each data source is unavailable (e.g. no network connectivity, GPS unavailable). The actual implementation *does not need to work* as described in the design model. Evidence must also include **technology demonstrators** that: (a) Use at least 1 UI component to inform the user of limited conditions, (b) Use at least 1 UI component to inform the user of how they can act to restore full functionality, (c) Use at least 1 UI component to inform the user of the progress of a long operation.	Evidence also includes an actual implementation of some functionality in limited conditions. You must also submit a **short report** explaining how you would UI components to communicate to the user about what they can and cannot do based on the conditions.	Evidence also includes an implementation that *automatically recovers* from periods of limited functionality. For example, when a network connection is lost in the middle of a transfer, the application should maintain state and initiate a resume transfer request, if appropriate, when connectivity returns. Accompanying the application is an **Experience Report** that discusses topics related to this ILO. Specifically, discuss the decisions that you have made about availability versus functionality, as well as any known limitations of your approach. Rationalize your design choices from the perspective of the end user.	Evidence also includes a **research article** that demonstrates depth in the topic. Suggested topics: (a) Each mobile device has different hardware, and each mobile OS has a different API. Create a report discussing your approach for creating portable designs, including any trade-offs between portability and functionality. (b) Pretend that you're asked to write the iOS app for a successful Web service/site. Discuss UI concerns and user experience, and your approach to handling limited network conditions. Note: Students can also propose and work on a topic of their choice after agreement with the unit convenor.

Intended Learning Outcome (ILO 3): Create a mobile application that provides speed and a good user experience by caching data and making asynchronous API calls.			
Adequate	**Good**	**Outstanding**	**Exemplary**
Evidence includes code that highlights understanding of a data abstraction layer, and also a basic understanding of concurrency. You must include the following **technology demonstrators**: (a) Use of at least 3 data models to model application objects (in the same application), (b) Use of at least 2 relationships between data model objects, (c) Use of each CRUD (create-retrieve-update-delete) operation at least once, (d) Use of at least three asynchronous (concurrent) HTTP requests that do not block the UI thread.	Evidence should also include a **short report** to convey your understanding of how to implement an offline data cache using iOS' Core Data and the model-view-controller (MVC) design pattern. Your report should also include a block-level diagram explaining the role of each object in the application.	Processing large amounts of data on the application's main UI thread will cause the user interface to become non-responsive. Evidence also includes an implementation of an operation queue to schedule concurrent tasks. This implementation should add blocks (closures) to the queue to schedule work. Accompanying the application is an **Experience Report** that discusses topics related to this ILO. Specifically, discuss both the advantages and disadvantages of concurrency programming, as well as any challenges that you faced in creating this implementation.	Evidence also includes a **research article** that demonstrates depth in the topic. Suggested topics: (a) Present the main issues that arise from processing multiple threads concurrently, and how you would design software to mitigate those issues. This report should be built around concrete examples, your experience in this course, and your code, rather than abstractions. (b) Core Data is the main database abstraction layer for iOS. Research other database abstraction layers available for different mobile platforms and provide a comparison. Specifically, discuss design portability: if you choose to use Core Data for an iOS implementation, what impact will that choice have when you code the Android version of your app? What is your approach to design an application that is easily portable between platforms? Note: Students can also propose and work on a topic of their choice after agreement with the unit convenor.

Note: Students are expected to check with the convenor to ensure that their application is non-trivial (for Outstanding / Exemplary work).

e. Submission of Assignments:

The assessment items due during the semester must be submitted directly to your tutor in your allocated laboratory session of the week the item is due. This will enable the tutor to give you immediate feedback on your progress.

Some assessment items will also need a second copy to be submitted electronically. This requirement will be noted explicitly in the specification for the assessment item. This second copy of your work will be used to verify that you have completed assessment tasks required to pass the subject.

Electronic submission of work (where indicated) will be done via the Faculty of ICT online Electronic Submission Processor software (ESP). https://esp.it.swin.edu.au/ See the unit website for more details.

It is strongly advised that you work consistently throughout the semester on the assessment items. Please ensure that you backup all work throughout the semester to avoid any issues should your storage media be lost, damaged or stolen.

f. Extensions and Late Submissions:

- Extensions will only be granted in exceptional circumstances on medical or compassionate grounds. Extensions must be applied for in advance of the assignment's due date and the convener of the appropriate unit must sign the extension certificate on the assignment cover sheet.
- Assignments or projects which are submitted after the due date and time will attract a penalty of 10% of the total marks available per working day late, up to a maximum of five working days. Assignments submitted after five working days past the published deadline will be graded with zero marks.
- Feedback or comments from the marker will generally not be available on assignments, which are submitted after five working days past the published deadline.

g. Assessment Results:

Feedback to student on weekly assignment reports and presentations will be given to students in laboratory classes by their tutor during or immediately after it is presented.

Students must retain all assessed material that contributes to the final result up until such time as the final results are published.

h. Groupwork Guidelines:

A group project 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 a project group, it is the responsibility of the other members to make the project supervisor aware of the situation straight away.

Group project reports must be submitted with the project 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 apply to all group members, not just the person who submitted."

i. Plagiarism:

Swinburne University of Technology defines Plagiarism as 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):

(i) The use of the whole or part of a computer program written by another person;

(ii) 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;

(iii) the paraphrasing of another's work;

(iv) the use of musical composition, audio, visual, graphic and photographic models,

(v) the use of realia, that is objects, artefacts, costumes, models and the like.

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.

j. Assessment and Appeals Policy and Procedure

The information outlined in the Assessment sections above is covered in more detail in Swinburne's Assessment and Appeals Policy and Procedure. Students must be familiar with the Policy and Procedure, found at:

The Policy and Procedure provides details about:

- Assessment issues such as the conduct of examinations, plagiarism policies and details explaining how to apply for a review of results and other appeals, and
- Student progress issues such as unsatisfactory academic progress and early intervention procedures, and
- Information for students with disabilities and special needs and procedures for applying for special consideration.

Students should make themselves familiar with all aspects of the Policy and Procedure, as failure to do so is not grounds for appeal. See - http://policies.swinburne.edu.au/ppdonline/

Students are advised to seek advice from the staff at the Swinburne Student Amenities Association SSAA (http://www.swinburne.edu.au/ssaa/) if they require assistance with advocacy for Sections 12 (At-Risk and Progress Review) and 13 (Appeals) of the Policy and Procedure.

Student Feedback:

Swinburne seeks student feedback in a number of ways, including through periodic "Student Feedback Survey", as part of the university's approach to quality assurance and improvement. Possible improvement based on both student and staff feedback is considered by Unit Convenors, Unit Panels made up of relevant teaching staff, Program Panels, Faculty Academic Committees, and the Academic Programs Quality Committee, as appropriate.

Safety Standards and Conduct Requirements:

The University executes safety drills without warning. Be prepared to follow instructions from staff and/or wardens to evacuate the building in a safe and orderly manner.

All students are expected to respect the rights and sensibilities of their fellow students and teaching staff. This also applies in respect of the content of video and audio work submitted for assessment. The University has rigorous anti-discrimination and harassment policies and procedures. Students should refer to Swinburne Anti Discrimination Policy & Procedure, at http://policies.swinburne.edu.au/ppdonline/.

Safety procedures in laboratories must be followed. Open-toed shoes are not permitted in certain laboratories. Drink or food is not permitted in teaching spaces. The supervisor is authorised to exclude students for dangerous or disruptive behaviour which would result in forfeiture of all marks for the laboratory activity. The playing of computer games is not allowed in the computer labs.

Special Needs

If you have special needs you should advise your Faculty and the Unit of Study Convenor by the end of the second week of the teaching period. In addition, you are recommended to notify the Equity Office if you have not already done so.

See also the “Students with Disabilities and Special Needs” Section of the Assessment and Appeals Policy & Procedure, at: http://policies.swinburne.edu.au/ppdonline/