Objectives

- To revise Topic 12
- To revise objectives and expected outcomes from ICT106
- To provide an overview of past examination questions
- To discuss what’s in the future.

Topic 12 - Introduction to Operating Systems

- To understand the components and functions of an operating system
- To understand the resource allocation functions of an operating system
- To understand the mechanisms by which an operating system manages programs and processes
- To understand the mechanisms by which an operating system manages the CPU
- To understand the mechanisms by which an operating system manages memory

Services provided by an Operating System

- User interface and User Management
- I/O Management
- File System Management
- Process Management
- Memory Management
- CPU Management
ICT106 Overview

• To study the basics of
  – Computer Architecture
  – High Level Language
  – Low Level Language
  – Development of HLL and LLL program
  – Input/Output
  – Interrupt
  – Introduction to Operating System

• Practical/lab Sessions
  – C Program development
  – Introduction to Assembly Language Programs
  – Introduction to Linux/Unix Environment

The Big Picture

• Nearly ALL digital computers rely on principles taught in ICT106 – nuts and bolts of computers
• Introduction to computer architecture
• Prepare for subsequent units on:
  – Databases, graphics, operating systems, data communications, data structure…etc
  – Programming and software development

Trends and Developments

• Ubiquitous computing
• Networks and Internet
• Large volume of data – Databases
• Intelligence – Data mining
• Virtualisation and Real-time
• Visualisation and Graphics
• System Integration and Middleware
• Business Value and Optimisation

ICT106 Main topics

• Basic Computer Architecture
• Information Representation and Processing
• High and Assembly Level languages and Program Development
• Introduction to I/O and interrupt mechanism
• Basics of Operating System
Changes from 2005

• Additional lecture components on lab
  – About 1/3 of lecture has been devoted to discuss lab and practical work
• Introduction to Unix/Linux
  – Lab and lecture materials will include and made reference to Unix/Linux. Cygwin will be used as a simulated environment to introduce the Unix/Linux OS and C programming.
• Assessment
  – Reduction of one C Exercise. However, the students are still expected to work on the lab EVERY WEEK
• Weighting for continuous assessment
  – The weighting between the practical components was adjusted slightly: C - 34% and Assembly Language – 16%

Changes from 2005

• Passing the Unit
  – A student must meet satisfactory performance in BOTH Continuous Assessment and Final Examination. Minimum 45% is required in each component and the total score must be at least 50%.
  – In other words, if one fails any component badly (less than 45%) and even the total is above 50%, he/she can still fail the whole unit.
• Memory Aid
  – you will not be permitted to take in any calculators. However, you are permitted to bring in ONE PAGE (DOUBLE-SIDED) HAND-WRITTEN NOTES to the Final Examination.

Topics covered

• Topic 1 Introduction to Computer System architecture and C programming language revision
  – Practical 1: Introduction to Cygwin Operating Environment
• Topic 2 Information Representation and Storage.
  – Practical 2: Problem Solving with C
• Topic 3 Arrays, Functions and Structures in C and inside the computer
  – Practical 3: Debugging C programs in Unix and Windows Environments - Part One

Topics covered

• Topic 4 Organisation of a Computer System
  – Practical 4: Debugging C programs in Unix and Windows Environments - Part Two
• Topic 5 Introduction to the Intel Microprocessors and its Architecture
  – Practical 5: Arrays, Pointers and Struct
• Topic 6 Addressing Mode, Assembly Language Fundamentals Generating, Loading and Executing Programs
  – Practical 6: Bit Manipulation in C
Topics covered

• Topic 7 Data Transfers, Addressing, and Arithmetic Operations
  – Practical 7: Developing assembly programs under DOS
• Topic 8 Procedures, Calling and Exit conventions, Run-time Stack
  – Practical 8: Algorithm with Assembly Language
• Topic 9 High Level Language Interface - Inline Assembly within C
  – Practical 9: MASM 6.11 Reference

Topics covered

• Topic 10 Basic Data Processing: Conditional Processing and Integer Arithmetic
  – Practical 10: Practical Inline Assembly Examples
• Topic 11 I/O and Interrupts - Basis of computer interface with the world
  – Practical 11: Input-Output-Interrupts
• Topic 12 Introduction to Operating Systems
  – Practical 12: C Program Reviews 2-12

Assessment

• C Exercises (x2) 7 % each 14%
• C Project (Abstract, Report and Program) 20%
• Assembly language Exercise 6%
• Assembly Language Program 10%
• Final Examination (Closed-book) 50%

Final Grade

• Your final grade for the unit will be reported as a letter grade and % mark.
• Note that marks, for example, may be scaled to ensure equity of marking by different staff, and across assignments of different difficulty.
**Grade**

<table>
<thead>
<tr>
<th>Letter</th>
<th>Grade</th>
<th>Notional Minimum Percentage Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD</td>
<td>High Distinction</td>
<td>80 - 100</td>
</tr>
<tr>
<td>D</td>
<td>Distinction</td>
<td>70 - 79</td>
</tr>
<tr>
<td>C</td>
<td>Credit</td>
<td>60 - 69</td>
</tr>
<tr>
<td>P</td>
<td>Pass</td>
<td>50 - 59</td>
</tr>
<tr>
<td>DNS</td>
<td>Fail</td>
<td>Fail and did not submit any assignments after the HECS census date</td>
</tr>
<tr>
<td>S</td>
<td>Supplementary</td>
<td>45 - 49*</td>
</tr>
<tr>
<td>N</td>
<td>Fail</td>
<td>Below 50</td>
</tr>
</tbody>
</table>

*The award of CP and S shall be at the discretion of the Unit Coordinator and approval by the Board of Examiners.

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**Requirements to pass this unit**

(Information from Unit Outline)

In order to pass this unit, you must satisfy the following conditions:

- achieve an overall aggregate score of 50% or higher for all of the combined assessments (Continuous Assessment and Final Examination);

- achieve a satisfactory performance in the final examination. A satisfactory performance is normally considered to be 45% or higher;

- achieve a satisfactory performance in the continuous assessment (C Exercises, C Project, Assembly Language Exercises and Assembly Language Program). A satisfactory performance is normally considered to be 45% or higher.

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**Student consultation**

- Contact Tutor first via email and/or phone for consultation.
- If you are unable to work out an arrangement with your tutor, you could contact me.
- I shall speak at the 6th Cyber Defense Initiative Conference at Bangkok and attend the Gartner IT Expo at Sydney from 8th to 18th November. Eric Li will provide student consultation during my absence.
- Please make an appointment with him before seeing him.

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**Examination Instruction**

FAMILY NAME:______________ GIVEN NAME:______________

STUDENT NO:______________ SIGNATURE:______________

There are 16 pages in this question paper including 2 blank pages at the end for additional space. The exam consists of 13 questions totaling 100 marks. The marks for each question are indicated at the beginning of the question. Answer ALL questions.

Write all answers on this question paper in the space provided under each question. If more space is required, use the blank page adjacent to the question (i.e. to the LEFT and NOT ON THE REVERSE SIDE). Number the answers clearly and indicate on the original page that the answer is continued on the back of a particular page. There are two blank pages for rough notes and additional space if required. Return ALL pages.

EXAMINATION AIDS:

To be provided by the Candidate: CLOSED BOOK EXAMINATION – No calculators permitted

ONE Page of Notes - A4-sized, Double-Sided and HANDWRITTEN is permitted.
Past Exam Paper (Sem 2, 2003)

- Question 1 – Basic Components of a computer System
- Question 2 – Understanding of the principle of computer Languages
- Question 3 – Numbering system and conversion
- Question 4 – Range and numeric values of Data
- Question 5 – Definitions and terminologies in Application Program Development

(Questions 1-5 on basic computer system and information representation.)

Past Exam Paper (Sem 2, 2003)

- Question 6 – C program, I/O and arithmetic processing
- Question 7 – C program, I/O and arithmetic processing
- Question 8 - C program and use of function
- Question 9 – C statements: Structure
- Question 10 – C Array Operations
- Question 11 – General issues in C and Assembly Programming

(Note: Question 6-11 on C and related programming)

Past Exam Paper (Sem 2, 2003)

- Question 12 – Assembly language and use of DEBUG
- Question 13 – Writing and executing Assembly language instructions
- Question 14 – Implementing algorithm in Assembly Language statements
- Question 15 – Execution of Assembly instructions

(Note: Question 12-15 are on assembly language programming)

Past Exam Paper (Sem 2, 2003)

- Question 16 – Stack and parameter passing
- Question 17 – Interrupts
- Question 18 – Operating Systems

(Note: Question 16-18 are on OS and Processor Operations)
Exam Advice

- **Time management** – spent time proportional to marks allocated.
- Provide **concise and clear** answers.
- Answers should be **neat and tidy**.
- Answer **on allocated space only**.
- If you are stuck, put the question off and do the next question. Return to the question later.
- **Stay calm and don’t panic!**

Remember this slide? (Week 1)

This is 3 months later

- **IT & T jobs**: 19,037 (Week 1, Semester 2)
- **Now** – 21,837 (Week 13, Semester 2)
- Increase of **2,800 jobs**!
- That’s equivalent to **+14.7% in 3 months**!
- **What does it means?**
Demand for ICT professionals is here to stay! (Can you imagine a society without ICT?)
ICT is contributing $6.6 Billion to the WA Economy. (Government report from 2006)
The WA government is expecting ICT to be one of the 4 pillars of growth beyond the mining boom.
WA has many “niche” products and leading world first!
WA is in the final round of competing against South Africa to host the SKA project.

What is the SKA?

- The SKA is a new generation radio telescope that will be 100 times as sensitive as the best present-day instruments.
- Will unlock information from the very early Universe and, using novel capabilities, be able to undertake entirely new classes of observation.
- Building such a telescope will require vigorous technological developments in computing, communications and radio frequency devices.

In March 2006 the Western Australian Government announced the creation of a Radio Astronomy Park on Mileura station in order to develop Western Australia as the world’s pre-eminent location for radio astronomy research.

- Four countries, Australia, China, South Africa and Argentina submitted proposals to the International SKA Steering Committee to host the SKA.
- On September 28, 2006 the International SKA Steering Committee announced that Australia and South Africa had been short-listed as acceptable sites to host the SKA.
- The final decision will be made in 2009, and will depend on outcomes from demonstrator facilities being constructed at the two sites.