MONASH University

FIT2049
Games programming using C++

Unit Guide

Semester 2, 2009

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

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FIT2049 Games programming using C++ - Semester 2, 2009

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Introduction

Welcome to FIT2049 Games programming using C++ for semester 2, 2009. This 6 point unit is core in the Games Development major of the BITS degree. The unit has been designed to introduce students to the key programming language used in games development, C++. The unit will transition students programming skills from Java (where you have previously completed two units) into C++ and also introduce the basic building blocks of game programming in Microsoft Windows DirectX.

Unit synopsis

This unit will further develop object-oriented programming skills, and introduce the C++ language to students. Streams, pointers and arrays, classes, inheritance & polymorphism, templates and the STL, along with the I/O class hierarchy will be discussed at length. Interactive programming techniques will be used to solve various programming exercises. This unit will build upon previous programming skills, and provide a strong grounding for further study in this area, especially related to games engine development. The unit will examine game creation using C++ and Microsoft Windows DirectX.

Learning outcomes

Knowledge and Understanding:

1. An understanding of the history and concepts of the C++ language;
2. An understanding of how C++ relates to other commercial languages, especially Java;
3. An understanding of the features and capabilities of C++, (comprising Streams, Pointers and arrays, Classes, inheritance and polymorphism, Templates and the STL, The I/O class hierarchy);
4. An understanding of the possible solutions/approaches when using C++ for interactive programming;
5. An understanding of Microsoft DirectX (2D and 3D) and the role of the Windows API in game development.

Attitudes, Values and Beliefs:

1. Enthusiasm for interactive programming;
2. Motivation to develop further programming skills;
3. The confidence to understand and explain existing C++ code.

Practical Skills:

1. Skills in adapting Java code to C++;
2. The ability to design, develop and debug software applications written in C++, with a focus on interaction;
3. Skills in manipulating music and sound effects within a game via C++;
4. Create a 3Dd interactive environment, using C++, that displays the techniques learnt during the unit.

Contact hours

4 x contact hrs/week (comprising one x 2 hr lecture/week and one x 2 hr laboratory/week).

Workload

For on campus students, the **weekly** workload commitments are:

- four hours of lectures / laboratory (requiring advance preparation), and
- eight hours of self directed study - this will include reading and computer based activities.

Unit relationships

Prerequisites

FIT1007 and FIT2048

Prohibitions

MMS2804

Relationships

FIT2049 is a core unit in the Games Development major of the BITS degree.

You may not study this unit and MMS2804 in your degree.

Teaching and learning method

The unit will be delivered via lectures and laboratories.

Lecture: During the lecture, your lecturer will introduce key theoretical concepts and demonstrate various approaches to games programming tasks.

Laboratory: The labs consist of a set of graded exercises which allow you to put the theory presented in the lecture to work in implementing a programming solution to a practical problem.

Before the lab you should carefully read through the lab activities. The teaching staff will presume that you have completed all the posted lab tasks each week and build subsequent activities on this assumption. For this reason it is very important that you complete all the posted tasks (please note you will not be able to complete them in the allocated time, these will be completed in your self study 8 hours). Given the cumulative nature of the learning, it is easy to fall behind if either you do not complete the required work or fail to understand key tasks/concepts. If you are having problems with lab exercises, please ensure you speak to your tutor and gain some assistance.

Timetable information

For information on timetabling for on-campus classes please refer to MUTTS, http://mutts.monash.edu.au/MUTTS/

Tutorial allocation

On-campus students should register for tutorials/laboratories using the Allocate+ system: http://allocate.cc.monash.edu.au/

Unit Schedule

Week	Topic	Key dates
1	Unit Introduction, Basic Syntax of C++ & Programming Constructs	
2	References, Pointers, Arrays, Functions and Classes	
3	Inheritance and Polymorphism, Operator Overloading, Vectors, Virtual Functions	Assignment 1 Released
4	Template classes and functions - Standard Template Library	
5	File Input and Output, Introduction to Windows Programming	
6	Initialization and Main Loop for Games, Design Patterns	Assignment 1 Due. Assignment 2 Released.
7	Introduction to DirectX	
8	DirectX Graphics - Rendering Pipeline, Lighting and Objects, Textures	
9	Game Mathematics	Assignment 2 Due. Assignment 3 Released.
10	DirectSound - XAudio2	
Mid semester break		
11	Input Detection - DirectInput	
12	Game Events, Collisions and Physics	Assignment 3 Due.

13	Revision	

Unit Resources

Prescribed text(s) and readings

Exploring C++ : the programmer's introduction to C++ / Ray Lischner. (Electronic Resource, Available through Monash Library).

Recommended text(s) and readings

Introduction to 3D Game Programming with DirectX, Frank D Luna.

'Game Coding Complete', Second Edition (2005) Mike McShaffry, Paraglyph Press, ISBN: 1-932111-91-3.

Introduction to Programming Using Visual C++ .Net (2005), ISBN: 0471-48724-4

Visual C++ .Net - How to Program (2004), ISBN: 0-13-437377-4

DirectX 9 Graphics – The definitive guide to Direct3D, ISBN: 1-55622-229-7

Required software and/or hardware

You will need access to Microsoft Visual Studio.Net 2008 and the DirectX SDK 2008 (June or later) - if you wish to use this software at home the CDs can be borrowed from the technical services desk.

On-campus students may use this software which is installed in the computing labs. Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook.

Equipment and consumables required or provided

On-campus students may use the facilities available in the computing labs.Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook.You will need to allocate up to **8** hours per week for use of a computer, including time for newsgroups/discussion groups.

Study resources

Study resources we will provide for your study are:

- Weekly detailed lecture notes outlining the learning objectives, discussion of the content, required readings and exercises;
- Weekly tutorial or laboratory tasks and exercises with sample solutions provided one to two weeks later;
- Assignment specifications and sample solutions;
- A sample examination and suggested solution
- Discussion groups;
- This Unit Guide outlining the administrative information for the unit;
- The unit web site on MUSO, where resources outlined above will be made available.

Assessment

Overview

Two assignments (40%), Examination (60%)

Faculty assessment policy

To pass a unit which includes an examination as part of the assessment a student must obtain:

- 40% or more in the unit's examination, and
- 40% or more in the unit's total non-examination assessment, and
- an overall unit mark of 50% or more.

If a student does not achieve 40% or more in the unit examination or the unit non-examination total assessment, and the total mark for the unit is greater than 44% then a mark of no greater than 44-N will be recorded for the unit.

Assignment tasks

Assignment coversheets

Assignment coversheets are available via "Student Forms" on the Faculty website:
http://www.infotech.monash.edu.au/resources/student/forms/
You MUST submit a completed coversheet with all assignments, ensuring that the plagiarism declaration section is signed.

Assignment submission and return procedures, and assessment criteria will be specified with each assignment.

- **Assignment task 1**

  Title:
  C++ Fundamentals
  Description:
  This task will require students to demonstrate their understanding of the fundamentals of C++
  Weighting:
  10%
  Due date:
  28th August 2009

- **Assignment task 2**

  Title:
  DirectX Fundamentals
  Description:
  This task will require students to demonstrate their understanding of the fundamentals of DirectX
  Weighting:
  10%
  Due date:
  18th September 2009

- **Assignment task 3**

  Title:
  Game Development
  Description:
  Using C++ and DirectX, students, working as a member of a team, will develop a graphical game
  Weighting:
  30%
  Due date:
  16th October 2009

Examination

- **Weighting:** 50%
  Length: 2 hours
  Type (open/closed book): Closed book
  Remarks:

  Written Theory Examination

See Appendix for End of semester special consideration / deferred exams process.

Due dates and extensions

Please make every effort to submit work by the due dates. It is your responsibility to structure your study program around assignment deadlines, family, work and other commitments. Factors such as normal work pressures, vacations, etc. are not regarded as appropriate reasons for granting extensions. Students are advised to NOT assume that granting of an extension is a matter of course.

Students requesting an extension for any assessment during semester (eg. Assignments, tests or presentations) are required to submit a Special Consideration application form (in-semester exam/assessment task), along with original copies of supporting documentation, directly to their lecturer within two working days before the assessment submission deadline. Lecturers will provide specific outcomes directly to students via email within 2 working days. The lecturer reserves the right to refuse late applications.

A copy of the email or other written communication of an extension must be attached to the assignment submission.

Refer to the Faculty Special consideration webpage or further details and to access application forms: http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html

Late assignment

Assignments received after the due date will be subject to a penalty of 5% per day, including weekends. Assignments received later than one week (seven days) after the due date will not normally be accepted. In some cases, this period may be shorter if there is a need to release sample solutions.

This policy is strict because comments or guidance will be given on assignments as they are returned, and sample solutions may also be published and distributed, after assignment marking or with the returned assignment.

Return dates

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Appendix

Please visit the following URL: http://www.infotech.monash.edu.au/units/appendix.html for further information about:

- Continuous improvement
- Unit evaluations
- Communication, participation and feedback
- Library access
- Monash University Studies Online (MUSO)
- Plagiarism, cheating and collusion
- Register of counselling about plagiarism
- Non-discriminatory language
- Students with disability
- End of semester special consideration / deferred exams