2ba3

Systems Programming

Contact Information

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Systems Programming

- **3 Terms**
- **2 Lectures per week**
- **1 Lab session every week (2 groups, PCHut)**
- **Tools:- Visual C++,**
  - **Win32 API,**
  - **MFC,**
  - **Windows 2000**

Coursework and Assessment

Regular practical exams:	**10%**
Xmas Project:	**10%**
Final Exam:	**80%**

Labs, lectures and projects are Compulsory!

Aims Of Course

- **To build on first year Object Oriented programming skills;**
- **To give an understanding of how to use the facilities which are provided by the underlying operating system.**
- **To introduce the concepts of concurrent processes and threads**
- **To introduce some concepts of Graphics Programming**

Course Contents

- **The C++ programming language.**
  - Overview, Classes, Functions, Arrays, Pointers, References, Dynamic Allocation, Inheritance, Virtual Functions and Polymorphism,
- **Introduction to Graphics Programming**
- **Windows Programming**
  - Overview of the Windows family of operating systems,
  - Event-driven and Windows programming,
  - The Win32 API and System Services
  - Microsoft Foundation Classes
- **Processes, Threads, and Concurrency:**
  - Generation and control of processes and threads, Interprocess communication, Synchronisation mechanisms and bugs.

Textbooks

"C++ How to Program", H.M. Deitel &P.J. Deitel, Prentice-Hall

(or any other good C++ book).

"MFC Programming from the Ground Up", H.Schildt.

(or any other introductory MFC book)

Why C++?

- **A General-Purpose language:**
  - **for high-level programming**
  - **for low-level control**
- **Supports both:**
  - **Structured Programming**
  - **Object-Oriented Programming**
- **Commercial language, widely used for software development.**

Why Windows?

- **Standardized Graphical User Interface (GUI)**
- **Multi-tasking/Concurrency**
- **Device Independence**
- **32-bit programming with Windows 95 and Windows NT (Win32 API, and Microsoft Foundation Classes)**
  - Multiple Processes and Threads
  - Synchronization
  - Remote Procedure Calls (RPC)
  - Networking, etc...

What is Win32?

- **There are a family of Windows Operating Systems**
- **As with all OS, they have an associated Application Program Interface (API), WIN32**
  - A set of functions which access the Operating System.
  - specified in terms of 32-bit values, rather than the 16-bit values used in earlier versions of Windows)
- **MFC.. Microsoft Foundation Classes are a set of classes which encapsulate the Win32 API.**

Concurrency

- **Multi-tasking**
- **Distributed programming**
- **“Abstract parallelism”,**
  - **Programs are executed as a set of separate processes or threads but do not need to be executed on separate physical processors**
- **Concurrency arises naturally in the real-world, so sometimes easier to solve problems with concurrent techniques**