

Operating Systems

Introduction

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Contact details

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Administration

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Plan for today

- **Administration**
 - Assignments
 - Goals
 - Win32 development environment setup
- **Windows Essentials**
 - Architecture
 - User vs. Kernel Mode
 - Windows console applications
- **Hello Word application**
 - Console System Calls

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Assignments

- All homework assignments must be done **individually!**
- Submitting and passing *all* homework assignments is **mandatory** (for passing the course):
- Resubmit in case:
 - 0 on one or more questions
 - Exercises without a final grade (a question was missing, project won't compile, etc.)
 - Resubmit within a week of grade publication
 - Resubmission: include the original hardcopy with the comments you received and the required corrections
- The **final grade is not affected** by the homework grades
- **Penalty of any late submission** (or resubmission) is one point off the **final** course grade
- At least one exercise from the homework assignments will be **extremely helpful** at the final exam
- Submission is both **online and hardcopy**

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Hardcopy Submission

- Hardcopies should be submitted to box 268 of Efrat Mashiach
- No later than **Tue / Thu 24:00** the following week

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Softcopy Submission

- Create a directory in your homepage `~/os08b/`
- For each assignment create a subdirectory `ex01`, `ex02`, etc.
- Each assignment directory should include two subdirectories `code` and `bin`
 - `bin` will contain all binary files (exe, dll, lib)
 - `code` will contain source code (.cpp, .h), and the project and solution files

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Softcopy Submission (cont.)

- All source code files will begin with the header

```

/*
 * Name:
 * Id:
 * login:
 * Group No: <6|7|8>
 * Assignment No:
 * IDE Version:
 */
    
```

- Parts of checking is automatic so follow these instructions to the letter!

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Windows IDE Setup

- You will need:
 - A reasonable PC with XP/Vista
 - Software from MS site:
 - **Visual C++ 2008 Express Edition**
 - Select MSDN(documentation) during install or use online at msdn.microsoft.com
 - **Windows SDK for Windows Server 2008**
 - Select Core SDK and Debugging tool
 - Don't wait for the first assignment to setup the environment

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Windows OS

- Operating System is a software
- Architecture of an operating system is a **partition** into modules by functionality
- Each OS has its own architecture (although some similarities)
- We'll look into Windows architecture

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Windows OS: Cont'd

- OS gives services for applications
 - **System calls/API/Libraries**
 - Example: Read/Write from/to file
- Applications serve users or other applications
 - Browse using Internet Explorer
 - Embed Internet Explorer
 - Command Shell Application

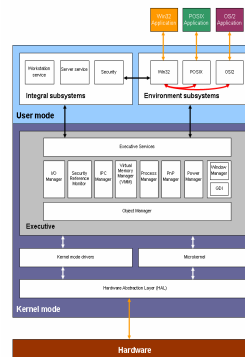
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Kernel vs. User Mode

- Application vs. System failure
- CPU Mode flag
 - In Kernel Mode: all resources are accessible
 - User Mode has limited access
- CPU constantly switch back and forth between kernel and user mode
- Application code runs in user mode, but some system calls it makes may run in Kernel or Protected mode
- Some OS services are user mode some are kernel mode and most are mixed

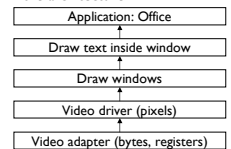
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Windows Architecture



- **Layered architecture:** Bottom modules provide services for upper modules

- The **level of abstraction** is increased as we move higher in the architecture



- Topmost modules provide services to applications

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Windows Executables

- EXE: Portable Executable File Format
- What Windows does when you click on executable file?
 - Read and parse PE file header
 - Allocate resources (e.g. memory)
 - Locate and load libraries (DLL)
 - Map EXE segments (data, code) to the memory
 - Setup an environment (e.g. security)
 - Locate address of start function (main)
 - **Call “main” function**

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Command Shell Processor

- CMD.exe
- Use special window: console window
 - Makes system calls to read input from console (e.g. “dir” string)
 - Makes system calls to fetch list of the files in current directory
 - Makes system calls to print out results
- In-class examples and assignments will be windows console applications

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Windows Objects & Handles

- Windows object
 - Window
 - Process
 - Device
- Handles
 - Code that uses an object has a **handle** to it
 - Multiple handles to the same objects
 - Permissions can be associated with handle
 - Reference counting: OS free object's resources if there are no more handles to it

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Windows Essentials: Summary

- Windows is bunch of software modules (mostly DLLs) that provide services for applications or other modules via system calls (Win32 API)
- Layered architecture with increased level of abstraction
- Bottom levels run in protected kernel CPU mode

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Let's do some programming

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