Operating Systems

Dr. Fred Mtenzi
Teaching Approach

• Lectures and labs
  – Wed 11.00 – 12.00 noon (Lecture)
  – Wed 14.00 – 15.00 am (Lab)
  – Thur 12.00 – 13.00 pm (Lecture)
Assessment methods

- Written examination 70%
- Continuous assessment 30%
  - Written test end of first semester.
  - Linux lab test.
  - Shell programming.
References

References

• Operating Systems Modern Perspective
• Operating Systems A Systematic View
Operating Systems Theory

• To understand the OS is to understand the workings of the entire computer system, because it is the OS that manages each and every piece of hardware and software.

• An OS is the ‘executive manager’, the part of the computing system that manages all of the hardware and all of the software. To be specific, it controls every file, every device, every section of main memory, and every nanosecond of processing time.
Operating Systems Theory

• The OS has four subsystem managers: memory manager, processor manager, device manager and file manager.
• Each of the subsystem managers must perform these tasks:
  – Monitor its resources continuously.
  – Enforce the policies that determine who gets what, and how much.
  – Allocate the resources when its appropriate.
Operating Systems Theory

– Deallocate the resource – reclaim it when appropriate.
Understanding Operating Systems

Part II: Operating Systems in Practice

12. MS-DOS Operating System
13. Windows 2000
14. UNIX/Linux Operating System
15. OpenVMS Alpha Operating System
16. IBM OS/390 Operating System
Overview

• Introduction
• Operating System Components
• Machine Hardware
• Types of Operating Systems
• Brief History of Operating Systems Development
• Conclusion
Components of an Operating System

Operating system – part of the computing system that manages all of the hardware and all of the software
– Controls every file, device, section of main memory & every nanosecond of processing time

Operating system consists of

• Memory manager
• Processor manager
• Device manager
• File manager
Subsystems Must Work With Each Other
Tasks Performed by Each Subsystem

1. Monitor its resources continuously

2. Enforce the policies that determine who gets what, when and how much

3. Allocate the resource when appropriate

4. Deallocate the resource (reclaim it) when appropriate
Machine Hardware

- Memory chips
- Input/output devices (monitor, keyboard, printer)
- Storage devices (disks, magnetic tape, card readers, drums)
- Central Processing Unit (Arithmetic Logic Unit, registers, internal control, bus control)
Types of Operating Systems

- Batch (simple and multi-programmed)
- Interactive (time-sharing)
- Real-time systems
- Hybrid systems (combination of batch and interactive)
- Parallel (tightly coupled)
- Distributed (loosely coupled)
**Brief History of Operating Systems Development**

<table>
<thead>
<tr>
<th>First Generation</th>
<th>Second Generation</th>
<th>Third Generation</th>
<th>Recent Developments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum tube, single user, early operating systems</td>
<td>Job scheduling, JCL, faster I/O, spooling, batch, files</td>
<td>Shared processing, multiprogramming, virtual memory, DBMS</td>
<td>Distributed computing, personal computers, high-speed communication, multi-media</td>
</tr>
</tbody>
</table>

- **1940**
- **1955**
- **1965**
- **1980**
- **1990**
Key Terms

- batch system
- central processing unit
- device manager
- file manager
- firmware
- hardware
- hybrid system
- interactive system
- main memory
- mainframe

- memory manager
- microcomputer
- minicomputer
- multiprocessing
- networking
- operating system
- processor manager
- real-time system
- software
- supercomputer
- workstation