

**NEW ZEALAND INSTITUTES OF TECHNOLOGY AND POLYTECHNIC
QUALIFICATIONS IN INFORMATION & COMMUNICATIONS TECHNOLOGY**

PRESCRIPTION: OS610 OPERATING SYSTEMS (INTERNALS)

| | |
|---------------------------|---|
| AIM OF MODULE: | To provide students with a thorough knowledge of the components of a typical multiuser operating system and the interaction between those components. |
| CREDITS: | 7 |
| STUDENT LEARNING HOURS: | 70 |
| CONTENT REVISED: | 2008 |
| PRESCRIPTION EXPIRY DATE: | Nov 2011 |

Level and Assessment Schedule

| TOPICS | Highest Skill Level | | | | Suggested Assessment Percentage |
|---------------------------------|---------------------|---|---|---|---------------------------------|
| | R | C | A | P | |
| 1. Process Management | | * | | | 20 |
| 2. Storage Management | | | * | | 25 |
| 3. Processor Management | | * | | | 20 |
| 4. Auxiliary Storage Management | | * | | | 10 |
| 5. Case Study | | | * | | 25 |
| | | | | | 100 |

LEARNING OUTCOMES

The student will:

- | | | |
|---|---|--|
| C | 1 | Explain the concept of a process, the interaction of these processes, and the concept of deadlock |
| A | 2 | Describe storage management in single and multi-programming environments, explain the management of real and virtual storage and monitor programme behaviour |
| C | 3 | Explain how processes are scheduled in a multitasking environment |
| C | 4 | Explain the main techniques used in disk scheduling and the management of auxiliary storage for file and database applications |
| A | 5 | Demonstrate, using a case study, how a current multitasking operating system performs its operations and manages its processes |

Content

1 Process Management

- Explaining the concept of a process, the interaction of these processes, and the concept of deadlock will include:
- Process;
 - States
 - Control blocks
 - Operations
 - Interrupt processing
 - Context switching
 - Interactions;
 - Parallel processing
 - Mutual exclusion
 - Deadlock;
 - Coffman conditions
 - Mutual exclusion
 - Hold and wait
 - No preemption
 - Circular wait
 - Avoidance (Banker's algorithm)
 - Prevention (Four conditions)
 - Detection and recovery
 - Anticipation

- Livelock
- Indefinite postponement examples

2 Storage Management

➤ Describing storage management in single and multi-programming environments, explaining the management of real and virtual storage and monitoring programme behaviour will involve:

- Storage Organisation;
 - Contiguous and non-contiguous
 - Fixed and variable partitions
- Storage management strategies;
 - Fetch
 - Placement and replacement
 - Single user contiguous allocation
 - Single stream batch manager
- Multi programming;
 - Fixed and variable partition
 - Fragmentation
 - Swapping
 - Caching
- Virtual Storage Organisation;
 - Paging and segmentation
 - Address translation
- Virtual Storage Management
 - Fetch
 - Placement and replacement
- Page replacement policies;
 - FIFO (first in first out)
 - LRU (least recently used)
 - LFU (least frequently used)
 - NUR (not used recently)
- Locality
- Thrashing
- Fetch policies (demand and anticipatory)
- Page size and page release
- Program behaviour under paging (including blocking and swapping)

- Using an available monitoring package to document program behaviour under a variety of machine conditions

3 Processor Management

➤ Explaining how processes are scheduled in a multitasking environment will include:

- Scheduling;
 - Strategies
 - Cooperative multitasking
 - Context switch
 - Multithreading
 - Algorithms;
 - Cooperative scheduling;
 - Round robin
 - Fixed priority pre-emptive
 - Pre-emptive scheduling;
 - Pre-emptive time slicing
 - Static time scheduling
- Real Time Operating Systems (RTOS)
- Interval timing
- Priorities;
 - None, static and dynamic
- Operator control
- Swapping and its functions

4 Auxiliary Storage Management

➤ Explaining the main techniques used in disk scheduling and the management of auxiliary storage for file and database applications will include:

- Filing systems;
 - Account/directory structures
 - Block allocation
- Disk scheduling
- Data base systems
- Security;
 - User logon and password protection
 - Account/directory/file access protection

- Encryption
- Memory protection

5 Case Study

- Demonstrating, using a case study, how a current multitasking operating system performs its operations and manages its processes will include:
 - Management of;
 - Process and processor
 - Storage and auxiliary storage

Resources

- **Operating System** http://en.wikipedia.org/wiki/Operating_system (Accessed August 2008)
- **Primary Storage** http://en.wikipedia.org/wiki/Physical_memory#Primary_storage (Accessed August 2008)