CSE3241: Operating System and System Programming

Sangeeta Biswas (Ph.D.)

Assistant Professor
Dept. of Computer Science and Engineering
Faculty of Engineering
University of Rajshahi
Rajshahi-6205, Bangladesh
E-mail: sangeeta.cse@ru.ac.bd / sangeeta.cse.ru@gmail.com

October 28, 2017

Summary of Syllabus

- Overview
  - Introduction
  - OS Structure
- Process Management
  - Process Concept
  - Threads
  - CPU Scheduling
- Process Coordination
  - Synchronization
  - Deadlocks
- Memory Management
  - Memory-Management Strategy
  - Virtual Memory
- Storage Management
  - File System
  - Disk Management
  - I/O Systems
- Protection and Security
  - System Protection
  - System Security

Syllabus I

- Overview
  - Introduction
    - What is OS?
    - Tasks of OS
    - Types of OS
    - Kernel
    - User Space Vs. Kernel Space
  - OS Structure
    - User-OS Interface
    - System Software Vs. Application Software
    - OS Vs. System Software
    - System Call
    - Different Types of System Calls
    - Virtual Machine
- Process Management
  - Process Concept
    - What is Process?
    - Operations on Process
    - Interprocess Communication
  - Threads

Syllabus II

- Overview
- Benefits of Threads
- User and Kernel Threads

⊛ CPU Scheduling

- Process Scheduling
- Scheduling Criteria
- Scheduling Algorithms
- Algorithm Evaluation
- Multi-Processor Scheduling

• Process Coordination

⊛ Synchronization

- Background
- Critical Region
- Critical Section Problems
- Synchronization Hardware
- Classical Problems of Synchronization
- Semaphores

⊛ Deadlocks

- What is Deadlock?

Syllabus III

- Deadlock Characterization
- Methods for Handling Deadlocks
- Deadlock Prevention
- Deadlock Avoidance
- Deadlock Detection
- Recovery from Deadlock

- Memory Management
  - Memory-Management Strategy
    - Logical Vs. Physical Address Space
    - Swapping
    - Contiguous Memory Allocation
    - Paging
    - Segmentation
    - Segmentation with Paging
  - Virtual Memory
    - Demand Paging
    - Page Replacement
    - Page Replacement Algorithm
    - Allocation of Frames

Syllabus IV

- Trashing

- Storage Management
  - File System
    - File Concept
    - Access Methods
    - Directory Structure
    - File System Structure
    - Allocation Methods
    - Free-Space Management
    - Directory Implementation
    - Efficiency and Performance
  - Disk Management
    - Disk Reliability
    - Disk Formatting
    - Boot Block
    - Bad Blocks
    - Swap-Space Management
  - I/O Systems
    - I/O Hardware

Syllabus V

- Polling
- Interrupts
- DMA
- Application I/O Interface
- Kernel I/O Subsystem
- Performance

- Protection and Security
  - System Protection
    - Goals of Protection
    - Domain of Protection
    - Access Matrix
    - Access Control
  - System Security
    - Security Problem
    - One Time Password
    - Program Threats
    - System Threats
    - User Authentication
    - Threat Monitoring
    - Encryption

Outline I

- Overview
  - Introduction
    - What is OS?
    - Tasks of OS
    - Types of OS
    - Kernel
    - User Space Vs. Kernel Space
  - OS Structure
    - User-OS Interface
    - System Software Vs. Application Software
    - OS Vs. System Software
    - System Call
    - Different Types of System Calls
    - Virtual Machine

What is OS?

Outline I

Outline I

Outline I

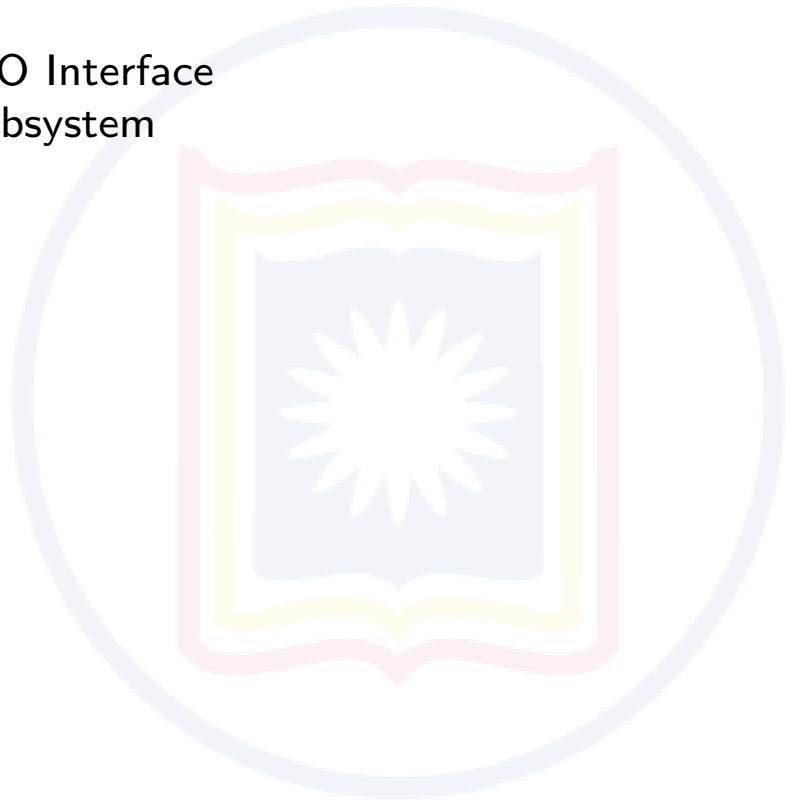
- Memory Management
  - ⊛ Memory-Management Strategy
    - ∗ Logical Vs. Physical Address Space
    - ∗ Swapping
    - ∗ Contiguous Memory Allocation
    - ∗ Paging
    - ∗ Segmentation
    - ∗ Segmentation with Paging
  - ⊛ Virtual Memory
    - ∗ Demand Paging
    - ∗ Page Replacement
    - ∗ Page Replacement Algorithm
    - ∗ Allocation of Frames
    - ∗ Trashing

Outline I

- Storage Management
  - ⊛ File System
    - ∗ File Concept
    - ∗ Access Methods
    - ∗ Directory Structure
    - ∗ File System Structure
    - ∗ Allocation Methods
    - ∗ Free-Space Management
    - ∗ Directory Implementation
    - ∗ Efficiency and Performance
  - ⊛ Disk Management
    - ∗ Disk Reliability
    - ∗ Disk Formatting
    - ∗ Boot Block
    - ∗ Bad Blocks
    - ∗ Swap-Space Management
  - ⊛ I/O Systems
    - ∗ I/O Hardware

Outline II

* Polling
* Interrupts
* DMA
* Application I/O Interface
* Kernel I/O Subsystem
* Performance



Swap Space Management

Outline I

- Protection and Security
  - ⊛ System Protection
    - Goals of Protection
    - Domain of Protection
    - Access Matrix
    - Access Control
  - ⊛ System Security
    - Security Problem
    - One Time Password
    - Program Threats
    - System Threats
    - User Authentication
    - Threat Monitoring
    - Encryption

References I