

Tribhuvan University
Faculty of Management
Office of the Dean



Course detail of
BIM (Bachelor of Information Management) 8th Semester

IT 229: IT Entrepreneurship and Supply Chain Management	3 Cr. hrs
IT 230: Economics of Information and Communication	3 Cr. hrs
Two Elective Courses	6 Cr. hrs
IT 350: Internship	3 Cr. hrs

2017

IT 229: IT Entrepreneurship and Supply Chain Management

Credits: 3

Lecture Hours: 48

Course Objectives

This module aims to impart entrepreneurial skill in student to effectively run business and efficiently manage the supply chain. Students are required to undertake project work in this module.

Course Description

Overview of Entrepreneurship, Business Plan for a new venture-introduction, Overview of Supply Chain Management, Co-ordination in a Supply Chain, Supply Chain performance: Achieving Strategic fit and scope, Supply chain Drivers and Matrices, Designing the supply chain Network, IT in a Supply Chain, Planning demand and supply in supply chain. Supply Chain Globalization, Entrepreneurial Supply Chain.

Course Details

Unit 1: Overview of Entrepreneurship

LH 4

- Entrepreneurship
- Definition of Entrepreneur
- The entrepreneurial decision process
- Role of entrepreneurship In economic development
- Intrapreneurship
- Ethics and social responsibility of Entrepreneurship

Unit 2: Business Plan for a new venture-introduction

LH 6

- Defining the Business plan
- Scope and value of the Business plan
- Writing the Business plan
- The Marketing plan
 - Marketing research for a new venture
 - Characteristics of a Marketing plan
 - Steps in preparing a marketing plan

Unit 3: Overview of Supply Chain Management

LH 6

- Definition of Supply Chain Management
- Functions and Objective of a Supply Chain
- Decision phases of Supply Chain
- Process View of a Supply Chain - Cycle View and Pull/Push View
- The importance of a supply chain flows
- Pitfalls and opportunities in a Supply Chain
- Case Studies presentations**
 - Dell Computer: Direct Marketing

7-Eleven: A convenience Store
Toyota: A Global Auto Manufacturer
Amazon.com: An e-Business Summary

Unit 4: Co-ordination in a Supply Chain

LH 6

Lack of Supply Chain co-ordination and the Bullwhip effect
Effect of lack of co-ordination on performance
Obstacles to co-ordination in a Supply chain
Managerial Levers to achieve coordination.
Role of IT in coordination, forecasting and Replenishment

Unit 5: Supply Chain performance: Achieving Strategic fit and scope

LH 5

Competitive and Supply Chain Strategies Achieving Strategic fit
Understanding the customer
Understanding the supply chain
Achieving strategic fit
Obstacles in achieving strategic fit

Unit 6: Supply chain Drivers and Matrices

LH 4

Drivers of supply Chain performance
Frame work for structuring Drivers.
Role of each cross functional drivers in competitive strategy and supply chain strategy with components
Facility
Inventory
Information
Transportation
Sourcing
Pricing

Presentations

Role of MIS,ERP,ESS,EIS,AI ,DSS in cross functional drivers performance.

Unit 7: Designing the supply chain Network

LH 6

Role of distribution in supply chain
Factors influencing distribution network design
Design Option for a distribution Network
E-business and the Distribution Network.
Role of network design in supply chain.
Factors influencing Network Design Decisions
Frame work for Network design Decision

Network optimization Models
The capacitated plant location model
Gravity Location model

Unit 8: IT in a Supply Chain

LH 3

The role of IT in a Supply Chain and its network design
Supply chain IT Framework
Supply chain Macro process and IT
Future of IT in supply chain
Risk Management in IT
Supply chain IT in Practice

Unit 9: Planning demand and supply in supply chain

LH 3

Characteristic and role of forecasting
Role of IT in forecasting
Role of aggregate planning with problems in supply chain
Role of IT in aggregate Planning
Inventory Planning with known and uncertain demand

Unit 10: Supply Chain Globalization

LH 3

Rational and key strategies
Requirements and Challenges
Supply Chain Globalization
Potential hidden costs
Total Cost Strategy

Unit 11: Entrepreneurial Supply Chain

LH 2

Introduction
Strategies

Tutorial

LH 12

References

Supply chain Management, Strategy, Planning, and Operation By Sunil Chopra, Peter Meindl (Third Edition)
Entrepreneurship (Fifth Edition) By Robert D. Hisrich and Michael P. Peters
Management information system (Managing the digital firm) by Kenneth C. Laudon and Jane P. Laudon (Ninth edition)
Management Information system by James O' Brien (sixth edition)

IT 230: Economics of Information and Communications

Credits: 3
Lecture Hours: 48

Course Objective

This module aims to examine information as an economic commodity and a public good especially in relation to pricing, provision and regulation.

Course Description

Managerial Economics Basic, Markets for Information Goods, The Role of Information in an Economy, Strategies for Pricing Information, Rights Management, Market Strategies: Switching costs and Lock-in, Networks and Positive Feedback, Strategies for Information Industries, Antitrust and Information Policy, Thriving in a new economy, The knowledge-based new Economy, Information and communication Technologies in the Hollywood's global Primacy

Course Details

Unit 1: Managerial Economics Basic

LH 3

- 1.1 Defining moments of economics: from Industrial revolution to Information revolution
- 1.2 Technological change in a global economy
- 1.3 Market failure, Externalities and Public goods

Unit 2: Markets for Information Goods

LH 4

- 1.4 Foundations of the Information economy
- 1.5 Introduction to Information economy
 - 1.5.1 Definition of information good
 - 1.5.2 The cost of producing information
 - 1.5.3 Managing intellectual property
 - 1.5.4 Economic and public good
 - 1.5.5 The economics of attention
- 1.6 Technology
 - 1.6.1 Systems competition
 - 1.6.2 Lock-in and switching costs
 - 1.6.3 Positive feedback, network externalities, and standards
- 1.7 Policy

Unit 3: The Role of Information in an Economy

LH 4

- 1.8 Transaction costs and Information costs
- 1.9 The economy of search
- 1.10** Information problems
 - 1.10.1 The moral hazard problem
 - 1.10.2 The Adverse-Selection Problem
- 1.11 Speculation and Risk Bearing

1.12 The Futures Market

Unit 4: Strategies for Pricing Information

LH 6

1.13 Pricing Information Goods

1.13.1 Cost of producing information

1.13.2 Costs and competition

1.13.3 Product Personalization

1.13.4 Product pricing

1.13.5 Personalized pricing

1.13.6 Versioning

1.13.7 Group pricing- Price sensitivity, Network effects, Lock-in, Sharing

1.14 Versioning Information

1.14.1 Types of versioning

1.14.2 Value-subtracted versions

1.14.3 Avoiding pitfalls in versioning

1.14.4 On-line and off-line versions

1.14.5 Goldilocks pricing

1.14.6 Customizing the browser

1.14.7 Bundling

1.14.8 Promotional pricing

Unit 5: Rights Management

LH 3

1.15 Production and distribution costs

1.16 Lower distribution costs

1.17 Lower reproduction costs

1.18 Trusted systems

1.19 Historical examples - Growing the market

1.20 Choosing terms and conditions

Unit 6: Market Strategies: Switching costs and Lock-in

LH 5

1.21 Recognizing Lock-In

1.21.1 Examples of lock-in

1.21.2 Valuing an installed base of customers

1.21.3 Classification of lock-in

1.21.4 Suppliers and partners face lock-in, too

1.21.5 The lock-in cycle

1.22 Managing Lock-In

1.22.1 Lock-in strategy for buyers

1.22.2 Lock-in strategy for sellers

1.22.3 Investing in an installed base

1.22.4 Encouraging customer entrenchment

1.22.5 Leveraging your installed base

Unit 7: Networks and Positive Feedback

LH 7

1.23 Positive feedback

1.24 Demand-side economies of scale

- 1.25 Network externalities
- 1.26 Collective Switching Costs
- 1.27 Igniting positive feedback: performance vs. compatibility
- 1.28 Revolution: offer compelling performance
- 1.29 Igniting positive feedback: openness vs. control
- 1.30 Generic strategies in network markets
- 1.31 Historical examples of positive feedback- Telephone networks and interconnection

Unit 8: Strategies for Information Industries

LH 4

- 1.32 Cooperation and Compatibility
 - 1.32.1 How standards change the game
 - 1.32.2 Winners and Loser from standards
 - 1.32.3 Tactics in formal standard-setting
 - 1.32.4 Managing open standards
 - 1.32.4.1 Case Study- Linux Adoption in the Public Sector: An Economic Analysis
- 1.33 Waging a Standards War
 - 1.33.1 Classification of standards wars
 - 1.33.2 Information-age standards wars
 - 1.33.3 Key assets in network markets
 - 1.33.4 Two basic tactics in standards wars
 - 1.33.5 Capstone case: Microsoft vs. Netscape,

Unit 9: Antitrust and Information Policy

LH 2

- 1.34 Policy overview
- 1.35 Price differentiation
- 1.36 Competition policy
- 1.37 Telecommunications regulation and policy in brief (Nepalese context)

Unit 10: Thriving in a new economy

LH 2

- 1.38 The components of Digital Economics
- 1.39 Twelve theme of the new economy
- 1.40 The ten technology shift
- 1.41 The Internet Economy and its Indicators
- 1.42 E-commerce and Digital Economy

Unit 11: Information and communication Technologies in the Hollywood's global Primacy **LH 3**

- Hollywood, defined, Hollywood's economic leadership, Economic analysis of the Hollywood system
- Drivers of Hollywood's competitive Advantage
- The economic drivers of Hollywood's global
 - Competitive advantage
 - Factor conditions
 - Relating and supporting industries
 - Strategy, structure and rivalry
 - Demand conditions
 - The potential threats to Hollywood's global primacy in an evolving landscape

Unit 12: The effects of continual disruption: technological resources supporting resilience in regions of conflict **LH 2**

- Technologies to aid resilient behavior
- Research setting
- Technologies resources supporting resilience

Information systems in crisis

- Introduction
- Exploring key information resources
- Fundamental components of an information environment

References

Robert S. Pindyck and Daniel S. Rubinfeld. *Microeconomics*, 5th Edition, PHI.(ISBN: 81-203-2336-X)

H. Craig Petersen and W. Cris Lewsi. *Managerial economics*. (ISBN: 81-203-0963-4)

Carl Shapiro and Hal R. Varian. *Information Rules: A Strategic Guide for the Network Economy*. Harvard Business School Press, Cambridge, MA, 1998.

Roy J. Ruffin and Paul R. Gregory: *Principles of economics*. 7th edition, Addison Wiley Pub, 2000.

Don Tapscott. *The digital economy: Promise and peril in the age of networked intelligence*. McGraw-Hill. (ISBN : 0-07-063342-8)

Amrit Tiwana. *The knowledge Management Toolkit: Practical techniques for building a knowledge Management System*. Pearson Education . (ISBN 981-405-873-4)

Efraim Turban, Jae Lee, David King, H. Michael Chung. *Electronic Commerce- A managerial Perspective*. Pearson Education. (ISBN: 81-7808-362-0)

Niraj K Gupta. *The Business of telecommunication- Networking in the New Millennium*. Tata McGraw-Hill. (ISBN: 0-07-463497-6)

Pete Moulton. *The telecommunications survival guide*. Pearson Education. (ISBN: 81-7808-302-7)

Information Technology for development. IT Policy and Strategy papers for Nepal. HMG of Nepal, NPC Secretariat, Kathmandu, Nepal.

An Introduction to the Economics of Information 2nd Edition Oxford –Ines Macho-Stadler and J.David Tiz Castrillo

IT 305: Object Oriented Database Management System

(Elective)

Credits: 3

Lecture Hours: 48

Course Objective

This module aims to provide the students the knowledge of Object Oriented Database Management System.

Course Description

Introduction, Object Orientated DBMS, Semantic Database Models & Systems, Object Oriented Database Systems, OODBMS Architecture – An Introduction, Introducing object oriented programming, Objects in the Database, Large Objects

Course Details

Unit 1: Introduction

LH 4

- A major Change: The relational Data Model
- Object Roles in Databases
- Sample uses of Object-oriented Databases
- Benefits of Object Orientation

Unit 2: Object Orientated DBMS

LH 8

- The Object-oriented Data Model
 - Object-Oriented Data Relationships
 - Object Identifiers
 - One-to-Many relationships
 - Many-to-Many relationships
 - The IS-A relationship
 - The Extends relationship
 - The Whole-Part relationship
- Relationship Integrity
- ER Diagramming Models for Object-Oriented Relationships
 - Booch Notation
 - Unified Modeling Language
- Integrating Objects into a Relational Database
- The Extended Relational Model Approach
- The Semantic Database Approach
- The Proposed Object Database Standard
 - Basic OODBMS Terminology
 - Understanding Types
 - External specifiers
 - Implementations
 - Primitive Types
 - Inheritance
 - Interfaces and Inheritance
 - Classes and Extensions
- Objects
 - Collection Objects
 - Structured Objects
 - Creating and Destroying Objects
- Representing Logical Relationships

Unit 3: Semantic Database Models & Systems

LH 3

- The Entity relationship Model
- Relational Model – Tasmania (RMT)

Unit 4: Object Oriented Database Systems	LH 3
➤ Performance Issues in OODBMS	
➤ Application Selection for OODBMS	
➤ The Object Oriented Database Paradigm Manifesto	
➤ The Mandatory Features	
➤ The Optional Features	
Unit 5: OODBMS Architecture – An Introduction	LH 2
➤ An overview	
Unit 6: Introducing object oriented programming	LH 10
Data and Procedural Abstraction	
Object Type Overview	
Creating Object Types	
Object type specification: attributes, methods	
Declaring and initializing objects	
SELF parameter	
MAP and ORDER Methods	
Object type inheritance	
Unit 7: Objects in the Database	LH 10
Introduction to objects in the database	
Object Tables: creating Object tables, Inheritance and attribute chaining	
Object views	
Creating Basic Object views	
Accessing Column Objects	
DEREF	
IS DANDLING	
TREAT	
VALUE	
SYS_TYPEID	
UTL_REF	
Unit 8: Large Objects	LH 8
Introduction to Large Objects	
Features Comparison	
Types of LOBS, LOB Locators	
Internal LOBs: BLOB, CLOB, NCLOB	
External LOBS: BFILE	
VARRAY	

Text Books

- *Harrington J.L, (2000) “Object-Oriented Database Design, Clearly Explained”, Morgan Kaufmann.*
- *Scott Urman, Ron Hardman, Micheal McLaughlin, Oracle Database 10g PL/SQL Programming, Tata McGraw Hill*
- *Prabhu C.S.R, (2003), “Object-Oriented Database Systems”, Prentice Hall India*

References:

- *Feuerstein S., Pribyl B., Oracle PL/SQL Programming, O’Reilly*
- *McLaughlin M., (2008), Oracle Database 11g PL/SQL Programming, Oracle Press*

IT 306: Software Project Management

(Elective)

Credits: 3

Lecture Hours: 48

Course Objectives

The module aims to provide an overview of the roles, responsibilities and management methods of the software project manager. The course intended to teach students how to develop approaches and styles of management for software projects.

Course Description

Software Project Basics, Tools and Techniques, Estimation, Project Schedules, Reviews, Software requirements, Design and Programming, Software Testing, Using Project management effectively, Management and leadership, Managing an outsourced Project, Process Improvement

Course Details

Unit 1: Software Project Basics

LH 5

Introduction

Types of Software Projects

Classification of software projects: Based on software development life cycle, approach driven, maintenance, web application, agile development

Approaches to software project management

Alignment of software engineering methodology with project: management methodology

The Ad Hoc Methods-based Approach

The process-Driven Approach

Comparison between Ad Hoc Approach with the process-driven approach

Software Project Acquisition

Writing proposal, negotiating, contract acceptance

Unit 2: Tools and Techniques

LH 4

Software project planning

Understanding the why is project needed and needs of project

Project management plan: resources, skill sets, computer systems

Risk assessment and management plan

Create the project plan

Unit 3: Estimation

LH 4

Elements of successful estimate

Wideband Delphi Estimation

Other Estimation Techniques

Evaluation Estimation Problems

Unit 4: Project Schedules

LH 5

Building the project schedule

The Work breakdown structure

Graphic representation of a schedule

Managing multiple projects

Schedule to manage commitments

Evaluation scheduling problems

Unit 5: Reviews	LH 4
Inspections	
Deskchecks	
Walkthroughs	
Code reviews	
Pair Programming	
Inspect to manage commitments	
Unit 6: Software requirements	LH 5
Requirement elicitations	
Use Cases	
Software requirement specification	
Change control	
Unit 7: Design and Programming	LH 4
Review the design	
Version control with subversion	
Refactoring	
Unit Testing	
Use automation	
Unit 8: Software Testing	LH 4
Test plans and cases	
Test execution	
Unit 9: Using Project management effectively	LH 4
Understanding change, making change successful	
Unit 10 Management and leadership	LH 3
Take responsibility	
Doing everything out in open	
Manage the organization	
Manage the team	
Unit 11: Managing an outsourced Project	LH 3
Prevent major sources of project failure	
Management issues in outsourced projects	
Collaborate with the Vendor	
Unit 12: Process Improvement	LH 3
Software process improvement	
Moving forward	

References

AdnerwStellman, Jennifer Greene, “Applied Software Project management”, First edition, O’Reilly Meida

Murali K. Chemuturi, Thomas M. CagelyJr, “Mastering software project management” ,J. Ross Publishing

Highes, B. and Cotterell, M., “Software Project Management”. McGraw Hill, 1999.

Conway, K., “Software Project Management”, -From Concept to Deployment”, DreamTech Press, 2001

Garmus, D. and Herron, D., “Function Point Analysis, Measurement Practices for Successful Software Projects”, Addison-Wesley, 2001.

IT 308: Data Mining and Data Warehousing

(Elective)

Credits: 3

Lecture Hours: 48

Course Objective

The objective of the course is to make learner understand foundation principles and techniques of data mining and data warehousing. Students will be able to select and use various data mining language and tools very useful for adding business value of an organization.

Course Description

Introduction, Data Preprocessing- Data Integration and Transformation, Classification, Association Analysis, Cluster Analysis, Information Privacy and Data Mining, Advanced Applications, Search engines, Data Warehouses, Capacity Planning.

Course Details

Unit 1: Introduction

LH 2

- 1.1. Data Mining Origin
- 1.2. Data Mining & Data Warehousing basics

Unit 2: Data Preprocessing

LH 6

- 2.1. Data Types and Attributes
- 2.2. Data Pre-processing
- 2.3. OLAP
- 2.4 Characteristics of OLAP Systems
- 2.5 Multidimensional View and Data cube
- 2.6 Data Cube Implementation
- 2.7 Data Cube Operations
- 2.8 Guidelines for OLAP Implementation

Unit 3: Classification

LH 7

- 3.1. Basics and Algorithms
- 3.2. Decision Tree Classifier
- 3.3. Rule Based Classifier
- 3.4. Nearest Neighbor Classifier
- 3.5. Bayesian Classifier
- 3.6. Artificial Neural Network Classifier
- 3.7. Issues : Overfitting, Validation, Model Comparison

Unit 4: Association Analysis

LH 7

- 4.1. Basics and Algorithms
- 4.2. Frequent Itemset Pattern & *Apriori* Principle
- 4.3. FP-Growth, FP-Tree
- 4.4. Handling Categorical Attributes

Unit 5: Cluster Analysis	LH 7
5.1. Basics and Algorithms	
5.2. K-means Clustering	
5.3. Hierarchical Clustering	
5.4. DBSCAN Clustering	
Unit 6: Information Privacy and Data Mining	LH 3
6.1 Basic principles to Protect Information Privacy	
6.2 Uses and Misuses of Data Mining	
6.3 Primary Aims of data Mining	
6.4 Pitfalls of Data Mining	
Unit 7: Advanced Applications	LH 3
7.1. Web-mining: Web content mining, web usage mining	
7.2. Time-series data mining	
Unit 8: Search Engines	LH 3
8.1 Characteristics of search engine	
8.2 Search Engine functionality	
8.3 Ranking of Web pages	
Unit 9: Data Warehousing	LH 7
9.1 Operational Data sources	
9.2 ETL (Extract, Transform, Load)	
9.3 Data Warehouse Processes, Managers and their functions	
9.4 Data Warehouses and Data Warehouses Design	
9.5 Guidelines for Data Warehouse Implementation	
Unit 10 Capacity Planning	LH 3
10.1 Calculating storage requirement, CPU requirements	

Practical:

Students should practice enough on real-world data intensive problems

References:

- Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining, 2005, Addison-Wesley.
- Jiawei Han and Micheline Kamber, *Data Mining: Concepts and Techniques*, 2nd Edition, 2006, Morgan Kaufmann.
- G.K. Gupta, Introduction to Data Mining with Case Studies, Prentice Hall of India
- IBM, An Introduction to Building the Data Warehouse, Prentice Hall of India
- IBM, Introduction to Business Intelligence and Data Warehousing, Prentice Hall of India
- Adriaans Pieter, D. Zantige, "Data Mining", Pearson Education Asia Pub. Ltd, 2002

IT 309: Client Server Computing

(Elective)

Credits: 3
Lecture Hours: 48

Course Objectives

This module aims to revisit and reinforce the knowledge in the networking system with special emphasis to Internet protocols, and client server based architecture. Laboratory work is essential in this course.

Course Description

Introduction to Client / Server, Client / Server Components, Networking and Communication, Transport Layer Protocols, Introduction to Operating System, Understanding Middleware , Client Server Database, Socket Programming in Java ,Performance Tuning and Optimization, and Securing a Client / Server System, and Distributed System Architecture

Course Details

Unit 1: Introduction to Client / Server

LH 4

Introduction to Client / Server.
2-tier Architecture
3-tier Architecture
Benefits and Characteristics of Client / Server Architecture.
Client / Server Models
Distributed Presentation
Remote Presentation
Distributed Logic
Remote Data
Distributed Data.
Fat vs. Thin

Unit 2: Client / Server Components

LH 3

Network Operating Systems for Client / Server.
Examples of NOS (Explanation not required)
Common Services of NOS.

Unit 3: Networking and Communication

LH 4

Seven Layers Function of OSI Model
Cables(Structure, Application)
Guided(Twisted, Coaxial,Optical)
Unguided (Microwaves, Radiowaves, Bluetooth, Wimax)
Concepts of Logical and Physical Topologies.
Effect of Bandwidth on Client/Server.

Unit 4: Transport Layer Protocols

LH 5

Introduction to UDP (User Datagram Protocol)

Operation of UDP

Characteristics of UDP

Application of UDP

Introduction to TCP (Transmission Control Protocol)

Operation of TCP.

Characteristics of TCP

TCP three-way handshake process.

Application of TCP

Relationship between TCP & IP

Standard TCP / IP services

Port numbers and socket address

Unit 5: Understanding Middleware

LH 5

The Database Connectivity Challenge

Data Source Differences, Approaches to Database Connectivity

Basic view of Middle Ware

General Characteristics

Introduction to Groupware.

The main types of Middleware,

DCE (Distributed Computing Environment)

Components

Application

MOM (Message Oriented Middleware)

Working Mechanism

Application

Transaction processing Monitors

Working Mechanism (ACID)

Application

ODBC (Open Database Connectivity) & JDBC(Java Database Connectivity)

Components

Features and Application.

Unit 6: Client Server Database

LH 8

1.1 Database System Architectures

1.2 Classic Client/Server Architecture

1.3 Setting ODBC/JDBC for connecting database in MSSQL Server, Oracle

1.4 Developing Three-Tier Client/Server Architecture

1.5 Open Database Connectivity

Unit 7: Socket Programming in Java

LH 9

1.6 Creating Client and Server Sockets (UDP and TCP sockets)

1.7 Reading from and writing to a Socket

1.8 Writing the Server Side of a Socket

Unit 8: Performance Tuning and Optimization

LH 4

- Client Performance
 - Hardware and Software.
- Server Performance
 - Hardware and Software.
- Database Performance
 - Index design
 - Query design
 - Database design
- Network Performance
 - Data rate
 - Bandwidth
 - Throughput
 - Congestion

Unit 9: Securing a Client/Server System

LH 3

- The Challenges of Client / Server Security
- Security for the Clients and Servers
 - Physical security
 - Software security
 - Network security

Unit 10: Distributed System Architecture

LH 3

- Remote Procedure Call (RPC)
- Object Management Architecture (OMA)
- Distributed Resource Architecture
 - Distributed data Architecture
 - Distributed Server Architecture
 - Distributed Computing Architecture

Project Work: Instructor should assign project work to each group of student demonstrating distributed client server architecture overview using the following tools:

Back End : My SQL1 or oracle

Front End : VB.Net or Java

References

- Alex Berson, Client / Sever Architecture
- Neil Jonkins et al, "Client/Server Unleashed"
- Jeffrey D. Schank, Client-Server Applications and Architecture
- Robert Orfail, Dan Harkey, Cliet/Server Programming with Java and CORBA, First Edition, Wiley

IT 307: Operating Systems

(Elective)

Credits: 3
Lecture Hours:48

Course Objectives

This module aims to provide the concepts of Operating Systems and Implementation of Systems Utilities for Inter-process communication in a multiprocessor environment.

Course Description

Overview, Process Management, Scheduling, Basic Synchronization principles, Memory Management, File Management, Protection and Security, Device Management

Detailed Course

Unit 1: Overview

LH 5

- 1.1 Introduction
- 1.2 System Structures
- 1.3 The abstract Model of computing
- 1.4 Resources: files
- 1.5 Processes: Creating Processes (using C functions: FORK, JOIN, and QUIT,)
- 1.6 Threads: C threads

Unit 2: Process Management

LH 8

- 2.1 The system view of processes and resources
- 2.2 Initializing the Operating System
- 2.3 Process address spaces
 - 2.3.1 Creating the address space
 - 2.3.2 Loading the program
 - 2.3.3 Maintaining consistency in the address space
- 2.4 The process abstraction
 - 2.4.1 Process descriptors
 - 2.4.2 Process state diagram
- 2.5 The resource abstraction
- 2.6 Process hierarchy
 - 2.6.1 Refining the process manager
 - 2.6.2 Specializing resource allocation strategies

Unit 3: Scheduling

LH 9

- 3.1 Scheduling Mechanisms
 - 3.1.1 The process scheduler organization
 - 3.1.2 Saving the process context
 - 3.1.3 Voluntary CPU Sharing
 - 3.1.4 Involuntary CPU Sharing
 - 3.1.5 Performance

- 3.3 Strategy Selection
 - 3.3.1 Partitioning s process into small processes
- 3.4 Nonpreemptive Strategies
 - 3.4.1 First come first served
 - 3.4.2 Shortest Job next
 - 3.4.3 Priority Scheduling
 - 3.4.4 Deadline scheduling
- 3.5 Preemptive strategies
 - 3.5.1 Round robin
 - 3.5.2 Multiple-level queues
 - 3.5.3 Monitors

Unit 4: Basic Synchronization principles

LH 5

- 4.1 Interacting processes
 - 4.1.1 Critical Sections
 - 4.1.2. Deadlock
- 4.2 Coordinating processes
- Semaphores
 - 4.2.1 Principles of operation
 - Practical considerations

Unit 5: Memory Management

LH 8

- 5.1 The Basics
 - 5.1.1 Requirements on the primary memory
 - 5.1.2 Mapping the address space to primary memory
 - 5.1.3 Dynamic memory for data structures
- 5.2 Memory Allocation
 - 5.2.1 Fixed-partition memory strategies
 - 5.2.2 Variable-partition memory strategies
 - 5.2.3 Contemporary Allocation Strategies
- 5.3 Dynamic Address Resolution
 - 5.3.1 Runtime bound Checking
- 5.4 Memory Manager Strategies
 - 5.4.1 Swapping
 - 5.4.2 Virtual Memory
 - 5.4.3 Shared-memory Multiprocessors

Unit 6:File Management

LH 5

- 6.1 File System
 - 6.1.1 File Concept
 - 6.1.2 Access Methods
 - 6.1.3 Directory Structure
 - 6.1.4 File System Mounting
 - 6.1.5 File Sharing
 - 6.1.6 Protection

- 6.2 Implementing File Systems
 - 6.2.1 File System Structure
 - 6.2.2 File System Implementation
 - 6.2.3 Directory Implementation
 - 6.2.4 Allocation Methods
 - 6.2.5 Free Space Management
- 6.3 Secondary Storage Structure
 - 6.3.1 Disk Structure
 - 6.3.2 Disk Scheduling
 - 6.3.3 Disk Management
 - 6.3.4 Swap Space Management
- 6.4 I/O Systems
 - 6.4.1 I/O Hardware
 - 6.4.2 Application I/O Interface

Unit 7: Protection and Security

LH 3

- 7.1 Fundamentals
 - 7.1.1 Policy and Mechanism
 - 7.1.2 Implementing Policy and mechanism
 - 7.1.3 Authentication Mechanisms
 - 7.1.4 Authorization Mechanisms
 - 7.1.5 Encryption

Unit 8: Device Management

LH 5

- 8.1 Device Management approaches
 - 8.1.1 I/O System Organization
 - 8.1.2 Direct I/O with Polling
 - 8.1.3 Interrupt-Driven I/O
 - 8.1.4 Memory-Mapped I/O
 - 8.1.5 Direct memory access
- 8.2 Device Drivers
 - 8.2.1 The device driver interface
 - 8.2.2 CPU-device interactions
 - 8.2.3 I/O optimization
- 8.3 Some Device Management Scenarios
 - 8.3.1 Serial Communications
 - 8.3.2 Sequentially accessed storage devices
 - 8.3.3 Randomly accessed devices

Laboratory:

- Students should implement operating system functionality in their project.

Text Book:

- Gary Nutt, Operating Systems A modern Perspective, Second edition, Pearson Education
- Silberschatz, A., Galvin, P. & Gagne, G., Operating System Principles, Seventh Edition, John Wiley & Sons

References:

- Andrew S. Tanenbaum, Modern Operating System, PHI
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