

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) **II SEMESTER**

DISTRIBUTED COMPUTING

UNIT I

Introduction

The different forms of computing – Monolithic, Distributed, Parallel and cooperative computing, the meaning of Distributed computing, Examples of Distributed systems, the strengths and weaknesses of Distributed computing, operating system concepts relevant to distributed computing, the architecture of distributed applications.

UNIT II

Distributed Computing Paradigms

Paradigms for Distributed Applications – Message Passing Paradigm, The Client-Server Paradigm (Java Socket API), The peer-to-peer Paradigm, **Message system (or MOM) Paradigm** – the point-to-point message model and the publish/subscribe message model, RPC model, **The Distributed Objects Paradigms** – RMI, ORB, the object space Paradigm, The Mobile Agent Paradigm, the Network Services Paradigm, The collaborative application (Groupware Paradigm) ,choosing a Paradigm for an application.

UNIT III

Distributed Objects Paradigm (RMI)

Message passing versus Distributed Objects, An Archetypal Distributed Object Architecture, Distributed Object Systems, RPC, RMI, The Java RMI Architecture, Java RMI API, A sample RMI Application, steps for building an RMI application, testing and debugging, comparison of RMI and socket API

Distributed Object Paradigm(CORBA)

The basic Architecture, The CORBA object interface, Inter-ORB protocols, object servers and object clients, CORBA object references, CORBA Naming Service and the Interoperable Naming Service, CORBA object services, object Adapters, Java IDL, An example CORBA application.

UNIT IV

Distributed Document-based Systems

WWW, Lotus Notes, comparison of WWW and Lotus Notes, **Distributed Coordination-based systems** – Introduction to coordination models, TIB, JINI, comparison of TIB and JINI
 Software Agents, Agent Technology, Mobile Agents.

Distributed Multimedia Systems – characteristics of multimedia data, QOS of service management, Resource Management, Stream Adaptation

UNIT V

Grid Computing


Definition of grid, grid types – computational grid, data grid, grid benefits and applications, drawbacks of grid computing, grid components, grid architecture and its relation to various Distributed Technologies.

Cluster Computing

Parallel computing overview, cluster computing – Introduction, Cluster Architecture, parallel programming models and Paradigms, Applications of Clusters.

TEXT BOOKS:

1. Distributed Computing, Principles and Applications, M.L.Liu, Pearson Education.
2. Distributed Systems, Principles and Paradigms, A.S.Tanenbaum and M.V.Steen , Pearson Education.
3. Client/Server Programming with Java and CORBA, second edition, R.Orfali & Dan Harkey, John Wiley & sons.


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4. Grid Computing, J. Joseph & C. Fellenstein, Pearson education.
5. High Performance Cluster Computing, Rajkumar Buyya, Pearson education

REFERENCE BOOKS:

1. A Networking Approach to Grid Computing, D. Minoli, Wiley & sons.
2. Grid Computing: A Practical Guide to Technology and Applications, A. Abbas, Firewall Media.
3. Java Network Programming, E.R. Harold, 2nd edition, O'Reilly, SPD.
4. Distributed Systems, Concepts and Design, 3rd edition, G. Coulouris, J. Dollimore and Tim Kindberg, Pearson Education.
5. Java Programming with CORBA, 3rd edition, Brose, Vogel, Duddy, Wiley Dreamtech.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) **II SEMESTER**

DISTRIBUTED DATABASES

UNIT I

Features of Distributed versus Centralized Databases, Principles of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases, Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Distributed Database Design

UNIT II

Translation of Global Queries to Fragment Queries, Equivalence transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.

Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries

UNIT III

The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions

Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

UNIT IV

Reliability, Basic Concepts, Nonblocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection


UNIT V

Architectural Issues, Alternative Client/Server Architectures, Cache Consistency, Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution, Transaction Management, Transaction Management in Object DBMSs, Transactions as Objects

Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues Transaction Management Transaction and Computation Model, Multidatabase Concurrency Control, Multidatabase Recovery, Object Orientation and Interoperability, Object Management Architecture CORBA and Database interoperability, Distributed Component Object Model, COM/OLE and Database Interoperability, PUSH-Based Technologies

TEXT BOOKS:

1. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Pelagatti, TMH.
2. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez, Pearson Education, 2nd Edition.


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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
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ADVANCED COMPUTER ARCHITECTURE

UNIT I

Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, measuring and reporting performance, quantitative principles of computer design, Amdahl's law.

Instruction set principles and examples- Introduction, classifying instruction set- memory addressing- type and size of operands, operations in the instruction set.

UNIT II

Pipelines : Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe line for RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

Memory hierarchy design : Introduction, review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT III

Instruction level parallelism the hardware approach - Instruction-level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- hardware based speculation.

ILP software approach- Basic compiler level techniques, static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.

UNIT IV

Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization.

UNIT V

Inter connection and networks – Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.

FSIntel Architecture: intel IA- 64 ILP in embedded and mobile markets Fallacies and pit falls

Text Books:

1. John L. Hennessy, David A. Patterson, Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

Reference Books :

1. John P. Shen and Miikko H. Lipasti, Modern Processor Design : Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing, Kai Hwang, Faye A. Brigs., MC Graw Hill.,
3. Advanced Computer Architecture - A Design Space Approach, Dezso Sima, Terence Fountain, Peter Kacsuk, Pearson ed.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) II SEMESTER

ADVANCED COMPUTER NETWORKS

UNIT I Review

Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet -

Foundation of Networking Protocols: 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM -

Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

UNIT II

The Link Layer and Local Area Networks: Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Virtualization -

Routing and Internetworking: Network-Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer

UNIT III

Logical Addressing: IPv4 Addresses, IPv6 Addresses - **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – **Multicasting Techniques and Protocols:** Basic Definitions and Techniques, Intradomain Multicast Protocols, Interdomain Multicast Protocols, Node-Level Multicast algorithms - **Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control – **Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server

UNIT IV


Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - **Optical Networks and WDM Systems:** Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks. Case Study: An All-Optical Switch

UNIT V

VPNs, Tunneling and Overlay Networks: Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – **VoIP and Multimedia Networking:** Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol - **Mobile Ad-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks – **Wireless Sensor Networks:** Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

TEXT BOOKS:

1. Computer Networking: A Top-Down Approach Featuring the Internet, *James F. Kurose, Keith W. Ross*, Third Edition, Pearson Education, 2007
2. Computer and Communication Networks, *Nader F. Mir*, Pearson Education, 2007


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REFERENCE BOOKS :

1. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, Tata McGraw Hill, 2007
2. Guide to Networking Essentials, *Greg Tomsho, Ed Tittel, David Johnson*, Fifth Edition, Thomson.
3. An Engineering Approach to Computer Networking, *S.Keshav*, Pearson Education.
4. Campus Network Design Fundamentals, *Diane Teare, Catherine Paquet*, Pearson Education (CISCO Press)
5. Computer Networks, *Andrew S. Tanenbaum*, Fourth Edition, Prentice Hall.
6. The Internet and Its Protocols, *A.Farrel*, Elsevier.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) II SEMESTER

WEB SERVICES
ELECTIVE III

UNIT I

Evolution and Emergence of Web Services - Evolution of distributed computing, Core distributed computing technologies -- client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA).

UNIT II

Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services - **Web Services Architecture** – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services, developing web services enabled applications.

UNIT III

Core fundamentals of SOAP – SOAP Message Structure, SOAP encoding , SOAP message exchange models, SOAP communication and messaging, SOAP security - **Developing Web Services using SOAP** – Building SOAP Web Services, developing SOAP Web Services using Java, limitations of SOAP.

UNIT IV

Describing Web Services – WSDL – WSDL in the world of Web Services, Web Services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL Tools, limitations of WSDL - **Discovering Web Services** – Service discovery, role of service discovery in a SOA, service discovery mechanisms, UDDI – UDDI Registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, support for categorization in UDDI Registries, Publishing API, Publishing information to a UDDI Registry, searching information in a UDDI Registry, deleting information in a UDDI Registry, limitations of UDDI.

UNIT V

Web Services Interoperability – Means of ensuring Interoperability, Overview of .NET and J2EE. **Web Services Security** – XML security frame work, XML encryption, XML digital signature, XKMS structure, guidelines for signing XML documents.

TEXT BOOKS:

1. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India, rp -- 2008.
2. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education, 2008.
3. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.

REFERENCE BOOKS:

1. Building Web Services with Java, 2nd Edition, S. Graham and others, Pearson Edn., 2008.
2. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly,SPD.
3. McGovern, et al., "Java Web Services Architecture", Morgan Kaufmann Publishers,2005.
4. J2EE Web Services, Richard Monson-Haefel, Pearson Education.
5. Web Services, G. Alonso, F. Casati and others, Springer, 2005.


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M.Tech (CSE) II SEMESTER

INFORMATION RETRIEVAL SYSTEMS
ELECTIVE III

UNIT I

Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses, **Information Retrieval System Capabilities** - Search, Browse, Miscellaneous.

UNIT II

Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction, **Data Structures:** Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure - **Automatic Indexing:** Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

UNIT III

Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters - **User Search Techniques:** Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext - **Information Visualization:** Introduction, Cognition and perception, Information visualization technologies.

UNIT IV

Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. **Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

UNIT V

Multimedia Information Retrieval – Models and Languages – Data Modeling, Query Languages, Indexing and Searching - **Libraries and Bibliographical Systems** – Online IR Systems, OPACs, Digital Libraries.

TEXT BOOKS:

1. Information Storage and Retrieval Systems: Theory and Implementation By Kowalski, Gerald, Mark T Maybury Kluwer Academic Press, 2000.
2. Modern Information Retrieval By Ricardo Baeza-Yates, Pearson Education, 2007.
3. Information Retrieval: Algorithms and Heuristics By David A Grossman and Ophir Frieder, 2nd Edition, Springer International Edition, 2004.

REFERENCE BOOKS :

1. Information Retrieval Data Structures and Algorithms By William B Frakes, Ricardo Baeza-Yates, Pearson Education, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Introduction to Information Retrieval By Christopher D. Manning and Prabhakar Raghavan, Cambridge University Press, 2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) II SEMESTER

SEMANTIC WEB AND SOCIAL NETWORKS
ELECTIVE-III

Unit -I: Web Intelligence

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web,The Next Generation Web, Machine Intelligence,Artificial Intelligence,Ontology,Inference engines,Software Agents,Berners-Lee www,Semantic Road Map,Logic on the semantic Web.

Unit -II: Knowledge Representation for the Semantic Web

Ontologies and their role in the semantic web,Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL),UML,XML/XML Schema.

Unit-III: Ontology Engineering

Ontology Engineering,Constructing Ontology,Ontology Development Tools,Ontology Methods,Ontology Sharing and Merging,Ontology Libraries and Ontology Mapping,Logic,Rule and Inference Engines.

Unit-IV: Semantic Web Applications, Services and Technology

Semantic Web applications and services, Semantic Search,e-learning,Semantic Bioinformatics,Knowledge Base .XML Based Web Services,Creating an OWL-S Ontology for Web Services,Semantic Search Technology,Web Search Agents and Semantic Methods,

Unit-V: Social Network Analysis and semantic web


What is social Networks analysis,development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities,Web Based Networks.Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Thinking on the Web - Berners Lee,Godel and Turing,Wiley interscience,2008.
2. Social Networks and the Semantic Web ,Peter Mika,Springer,2007.

REFERENCE BOOKS:

1. Semantic Web Technologies ,Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web,T.Segaran,C.Evans,J.Taylor,O'Reilly,SPD.


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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
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WIRELESS NETWORKS AND MOBILE COMPUTING
ELECTIVE – IV

UNIT I : INTRODUCTION TO MOBILE AND WIRELESS LANDSCAPE

Definition of Mobile and Wireless, Components of Wireless Environment, Challenges

Overview of Wireless Networks, Categories of Wireless Networks

Wireless LAN : Infra red Vs radio transmission, Infrastructure and Ad-hoc Network, IEEE 802.11, HIPERLAN, Bluetooth

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS(GSM)

GSM Architecture, GSM Entities, Call Routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security

UNIT II: MOBILE NETWORK LAYER

Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP), Mobile Ad-hoc networks : Routing, destination Sequence Distance Vector, Dynamic Source Routing.

MOBILE TRANSPORT LAYER

Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT III: BROADCAST SYSTEMS

Overview, Cyclical repetition of data, Digital audio broadcasting: Multimedia object transfer protocol, Digital video broadcasting: DVB data broadcasting, DVB for high-speed internet access, Convergence of broadcasting and mobile communications.

UNIT IV : PROTOCOLS AND TOOLS:

Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers) Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

WIRELESS LANGUAGE AND CONTENT – GENERATION TECHNOLOGIES

Wireless Content Types, Markup Languages: HDML, WML, HTML, cHTML, XHTML, VoiceXML.

Content- Generation Technologies: CGI with Perl, Java Servlets, Java Server Pages, Active Server Pages, XML with XSL Stylesheets, XML Document, XSL Stylesheet

UNIT V: MOBILE AND WIRELESS SECURITY

Creating a Secure Environment, Security Threats, Security Technologies, Other Security Measures, WAP Security Smart Client Security

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Pearson Education, Second Edition, 2008.
2. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley, 2008.
3. Asoke K Talukder, et al, "Mobile Computing", Tata McGraw Hill, 2008.

REFERENCE BOOKS:

1. Mobile Computing, Raj Kamal, Oxford University Press.
2. William Stallings, "Wireless Communications & Networks", Person, Second Edition, 2007.
3. Frank Adelstein et al, "Fundamentals of Mobile and Pervasive Computing", TMH, 2005.
4. Jim Geier, "Wireless Networks first-step", Pearson, 2005.
5. Sumit Kasera et al, "2.5G Mobile Networks: GPRS and EDGE", TMH, 2008.
6. Matthew S.Gast, "802.11 Wireless Networks", O'Reilly, Second Edition, 2006.
7. Ivan Stojmenovic, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2007.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) II SEMESTER

INFORMATION SECURITY
ELECTIVE-IV

UNIT I

Security Goals, Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs

UNIT II

Conventional Encryption Principles & Algorithms(DES, AES, RC4), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution, Public key cryptography principles, public key cryptography algorithms(RSA, RABIN, ELGAMAL, Diffie-Hellman, ECC), Key Distribution

UNIT III

Approaches of Message Authentication, Secure Hash Functions(SHA-512, WHIRLPOOL) and HMAC Digital Signatures: Comparison, Process- Need for Keys, Signing the Digest, Services, Attacks on Digital Signatures, Kerberos, X.509 Directory Authentication Service

UNIT IV

Email Security: Pretty Good Privacy (PGP) and S/MIME.
 IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management
 Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

UNIT V


Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats, Virus Countermeasures
 Firewall Design principles, Trusted Systems, Intrusion Detection Systems

TEXT BOOKS :

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education, 2008.
2. Cryptography & Network Security by Behrouz A. Forouzan, TMH 2007.

REFERENCE BOOKS :

1. Information Security by Mark Stamp, Wiley – India, 2006.
2. Information Systems Security, Godbole, Wiley Student Edition.
3. Cryptography and Network Security by William Stallings, Fourth Edition, Pearson Education 2007.
4. Fundamentals of Computer Security, Springer.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Computer Security Basics by Rick Lehtinen, Deborah Russell & G.T.Gangemi Sr., SPD O'REILLY 2006.
7. Modern Cryptography by Wenbo Mao, Pearson Education 2007.
8. Principles of Information Security, Whitman, Thomson.


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M.Tech (CSE) II SEMESTER

STORAGE AREA NETWORKS
ELECTIVE-IV

Unit I: Introduction to Storage Technology

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

Unit II: Storage Systems Architecture

Hardware and software components of the host environment, Key protocols and concepts used by each component, Physical and logical components of a connectivity environment, Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems, High-level architecture and working of an intelligent storage system

Unit III: Introduction to Networked Storage

Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN, Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfills the need, Understand the appropriateness of the different networked storage options for different application environments

Unit IV: Information Availability & Monitoring & Managing Datacenter

List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR), RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures, Architecture of backup/recovery and the different backup/recovery topologies, replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities

Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center

Unit V: Securing Storage and Storage Virtualization

Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes

Case Studies

The technologies described in the course are reinforced with EMC examples of actual solutions. Realistic case studies enable the participant to design the most appropriate solution for given sets of criteria.

TEXT BOOKS :

1. EMC Corporation, Information Storage and Management, Wiley.
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.
3. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne, 2001.
4. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) I SEMESTER

DATABASES AND COMPILER LAB

DATABASES

Objective: This lab enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example company named "Roadway Travels" whose description is as follows. The student is expected to practice the designing, developing and querying a database in the context of example database "Roadway travel". Students are expected to use "Mysql" database.

Roadway Travels

"Roadway Travels" is in business since 1997 with several buses connecting different places in India. Its main office is located in Hyderabad.

The company wants to computerize its operations in the following areas:

- ? Reservations
- ? Ticketing
- ? Cancellations

Reservations:

Reservations are directly handled by booking office. Reservations can be made 60 days in advance in either cash or credit. In case the ticket is not available, a wait listed ticket is issued to the customer. This ticket is confirmed against the cancellation.

Cancellation and Modifications:

Cancellations are also directly handed at the booking office. Cancellation charges will be charged. *Wait listed tickets that do not get confirmed are fully refunded.*

Week1: E-R Model

Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc.

Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

Example: **Entities:**

1. BUS
2. Ticket
3. Passenger


PRIMARY KEY ATTRIBUTES:

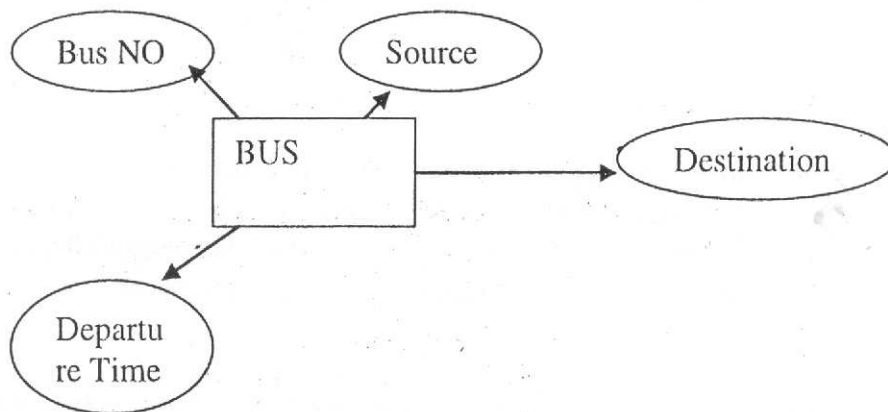
1. Ticket ID (Ticket Entity)
2. Passport ID (Passenger Entity)

Apart from the above mentioned entities you can identify more. The above mentioned are few.

Week2: Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc wherever required.


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Example: E-r diagram for bus**Week3: Relational Model**

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the cardinality. Represent attributes as columns in tables or as tables based on the requirement. Different types of attributes (Composite, Multivalued and Derived) have different way of representation.

Example: The passenger tables look as below. This is an example. You can add more attributes based on your E-R model.

Passenger

Name	Age	Sex	Address	Passport ID

Week4: Normalization

Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies. For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the data within the table is updated, leading to a loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure reflects the basic assumptions for when multiple instances of the same information should be represented by a single instance only.

Week5: Installation of Mysql and practicing DDL commands

Installation of MySQL. In this week you will learn Creating databases, How to create tables, altering the database, dropping tables and databases If not required. You will also try truncate, rename commands etc.

Example for creation of a table.

```

CREATE TABLE Passenger (
  Passport id    INTEGER PRIMARY KEY,
  Name CHAR (50) NULL,
  Age Integer,
  Sex Char
);
  
```

Note: Detailed creation of tables is given at the end.

Week6: Practicing DML commands

DML commands are used to for managing data within schema objects. Some examples:

? SELECT - retrieve data from the a database

? INSERT - insert data into a table

? UPDATE - updates existing data within a table

? DELETE - deletes all records from a table, the space for the records remain

Inserting values into Bus table:

Insert into Bus values (1234,'hyderabad', 'tirupathi');

Insert into Bus values (2345,'hyderabad', 'Banglore');

Inserting values into Passenger table:

Insert into Passenger values (1, 45,'ramesh', 45,'M','abc123');

Insert into Passenger values (2, 78,'geetha', 36,'F','abc124');

Few more Examples of DML commands:

Select * from Bus; (selects all the attributes and display)

UPDATE BUS SET Bus No = 1 WHERE BUS NO=2;

Week7: Querying

In this week you are going to practice queries (along with sub queries) using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Practice the following Queries:

1. Display unique PNR_no of all passengers.
2. Display all the names of male passengers.
3. Display the ticket numbers and names of all the passengers.
4. Display the source and destination having journey time more than 10 hours.
5. Find the ticket numbers of the passengers whose name start with 'A' and ends with 'P'.
6. Find the names of passengers whose age is between 30 and 45.
7. Display all the passengers names beginning with 'A'
8. Display the sorted list of passengers names
9. Display the Bus numbers that travel on Sunday and Wednesday
10. Display the details of passengers who are traveling either in AC or NON_AC(Using only IN operator)

Week8 and week9: Querying (continued...)

You are going to practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

? Write a Query to display the Information present in the Passenger and cancellation tables. **Hint:** Use UNION Operator.

? Write a Query to display different travelling options available in British Airways.

? Display the number of days in a week on which the 9W01 bus is available.

? Find number of tickets booked for each PNR_no using GROUP BY CLAUSE. **Hint:** Use GROUP BY on PNR_No.

? Find the distinct PNR numbers that are present.

? Find the number of tickets booked in each class where the number of seats is greater than 1. **Hint:** Use GROUP BY, WHERE and HAVING CLAUSES.

? Find the total number of cancelled seats.

? Write a Query to count the number of tickets for the buses, which travelled after the date '14/3/2009'.

Hint: Use HAVING CLAUSES.

Week10: Triggers

In this week you are going to work on Triggers. Creation of insert trigger, delete trigger, update trigger. Practice triggers using the above database.

```
Eg: CREATE TRIGGER updcheck BEFORE UPDATE ON passenger
FOR EACH ROW
BEGIN
  IF NEW.TickentNO > 60 THEN
    SET New.Ticket no = Ticket no;
  ELSE
    SET New.Ticketno = 0;
  END IF;
END;
```

Week11: Procedures

In this session you are going to learn Creation of stored procedure, Execution of procedure and modification of procedure. Practice procedures using the above database.

```
Eg: CREATE PROCEDURE myProc()
BEGIN
SELECT COUNT(Tickets) FROM Ticket WHERE age >= 40;
End;
```

Week12: Cursors

In this week you need to do the following: Declare a cursor that defines a result set.

Open the cursor to establish the result set. Fetch the data into local variables as needed from the cursor, one row at a time. Close the cursor when done

```
CREATE PROCEDURE myProc(in_customer_id INT)
BEGIN
  DECLARE v_id INT;
  DECLARE v_name VARCHAR(30);
  DECLARE c1 CURSOR FOR SELECT stdId, stdFirstname FROM students WHERE
stdId=in_customer_id;
  OPEN c1;
  FETCH c1 into v_id, v_name;
  Close c1;
END;
```

Tables

BUS

Bus No: Varchar: Pk

Source : Varchar

Destination : Varchar

Passenger

PNR_No : Numeric(9) : PK
 Ticket_No: Numeric (9)
 Name: Varchar(15)
 Age : int (4)
 Sex:Char(10) : Male / Female
 PPNO: Varchar(15)

Reservation

PNR_No: Numeric(9) : FK
 Journey_date : datetime(8)
 No_of_seats : int (8)
 Address : Varchar (50)
 Contact_No: Numeric (9) —> Should not be less than 9 and Should not accept any other character other than Integer
 Status: Char (2) : Yes / No

Cancellation

PNR_No: Numeric(9) : FK
 Journey_date : datetime(8)
 No_of_seats : int (8)
 Address : Varchar (50)
 Contact_No: Numeric (9) —> Should not be less than 9 and Should not accept any other character other than Integer
 Status: Char (2) : Yes / No

Ticket

Ticket_No: Numeric (9): PK
 Journey_date : datetime(8)
 Age : int (4)
 Sex:Char(10) : Male / Female
 Source : Varchar
 Destination : Varchar
 Dep_time : Varchar

ii) COMPILER

Consider the following mini Language, a simple procedural high-level language, only operating on integer data, with a syntax looking vaguely like a simple C crossed with Pascal. The syntax of the language is defined by the following BNF grammar:

```

<program> ::= <block>
<block> ::= { <variabledefinition> <slist> }
| { <slist> }
<variabledefinition> ::= int <vardeflist>;
<vardeflist> ::= <vardec> | <vardec> , <vardeflist>
<vardec> ::= <identifier> | <identifier> [ <constant> ]
<slist> ::= <statement> | <statement> ; <slist>
<statement> ::= <assignment> | <ifstatement> | <whilestatement>
| <block> | <printstatement> | <empty>
<assignment> ::= <identifier> = <expression>
| <identifier> [ <expression> ] = <expression>

```

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```

<ifstatement> ::= if <bexpression> then <slist> else <slist> endif
| if <bexpression> then <slist> endif
<whilestatement> ::= while <bexpression> do <slist> enddo
<printstatement> ::= print ( <expression> )
<expression> ::= <expression> <addingop> <term> | <term> | <addingop> <term>
<bexpression> ::= <expression> <relop> <expression>
<relop> ::= < | <= | == | >= | > | !=
<addingop> ::= + | -
<term> ::= <term> <multop> <factor> | <factor>
<multop> ::= * | /
<factor> ::= <constant> | <identifier> | <identifier> [ <expression> ]
| ( <expression> )
<constant> ::= <digit> | <digit> <constant>
<identifier> ::= <identifier> <letterordigit> | <letter>
<letterordigit> ::= <letter> | <digit>
<letter> ::= a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z
<digit> ::= 0|1|2|3|4|5|6|7|8|9

```

<empty> has the obvious meaning

Comments (zero or more characters enclosed between the standard C/Java-style comment brackets /*...*/) can be inserted. The language has rudimentary support for 1-dimensional arrays. The declaration `int a[3]` declares an array of three elements, referenced as `a[0]`, `a[1]` and `a[2]`. Note also that you should worry about the scoping of names.

A simple program written in this language is:

```

{ int a[3],t1,t2;
t1=2;
a[0]=1; a[1]=2; a[t1]=3;
t2=-(a[2]+t1*6)/(a[2]-t1);

```

```

if t2>5 then
print(t2);
else {
int i=3;
i=i-9;
t2=-25;
print(-t1+t2*t3); /* this is a comment
on 2 lines */
} endif }

```

1. Design a Lexical analyzer for the above language. The lexical analyzer should ignore redundant spaces, tabs and newlines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
2. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools.
3. Design Predictive parser for the given language
4. Design LALR bottom up parser for the above language.
5. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
6. Write program to generate machine code from the abstract syntax tree generated by the parser. The following instruction set may be considered as target code.

The following is a simple register-based machine, supporting a total of 17 instructions. It has three distinct internal storage areas. The first is the set of 8 registers, used by the individual instructions as detailed below, the second is an area used for the storage of variables and the third is an area used for the storage of program. The instructions can be preceded by a label. This consists of an integer in the range 1 to 9999 and the label is followed