Shivaji University, Maharashtra
B.E./B.Tech CSE Sem 7 syllabus

Advanced Computer Architecture

Course Title : Advanced Computer Architecture

Course Code: : CS411

Total Credits : 03

Unit 1
Architecture Development tracks towards parallel processing, Super Scalar and VLIW architecture, Vector processing concepts, pipelined vector processors, Compound Vector Processing, Multivector processor: Cray Y-MP design. SIMD Computers, Performance Metrics and Measures

Unit 2
Multithreaded architectures–principles of multithreading, Latency hiding techniques, Scalable coherent multiprocessor model with distributed shared memory, Systolic arrays and their applications, Associative memory processors, Concepts of Dataflow computing, Dataflow and Hybrid architectures

Unit 3
Loosely coupled and tightly coupled architectures, Cluster computing as an application of loosely coupled architecture. Examples – CM* and Hadoop , Advanced Processor Technology, Memory Hierarchy Technology, Virtual Memory Technology

Unit 4
Types and levels of parallelism, Operating systems for parallel processing, Models of parallel operating systems-Master-slave configuration, Separate supervisor configuration, Floating supervisor control, Data and Resource Dependences, Data dependency analysis-Bernstein‟s condition

Unit 5
Conditions of parallelism, Program Partitioning and Scheduling, Grain Sizes and Latency, Grain Packing and Scheduling, Static Multiprocessor Scheduling, Program flow mechanisms, System Interconnect Architectures-Network Properties and Routing, Static Connection Networks, Dynamic Connection Networks.

Unit 6
Parallel Programming Models-Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object Oriented Model, Functional and Logic Models, Study of Open MP, Parallel Languages and role of Compilers-Language Features for Parallelism, Parallel Language Constructs, Optimizing Compilers for Parallelism, Code Optimization and Scheduling- Scalar Optimization with Basic Blocks, Local and Global Optimizations, Vectorization and Parallelization, Code Generation and Scheduling, Trace Scheduling Compilation, Recent architecture case study.

Text Books

1. Kai Hwang, Advanced computer architecture (MGH).

Reference Books

1. Kai Hwang and Briggs, Computer Architecture and Parallel Processing – (MGH).
2. Hadoop Internet for Open MP.

Distributed Systems

CS7L02. DISTRIBUTED SYSTEMS

Section I

UNIT 1: Introduction
Definition, Goals, Types of distributed systems: Distributed Computing System, Distributed
Information System, Architecture: Architectural, Styles, System Architecture

UNIT 2: Communication and Synchronization :
Remote Procedure Call, Message Oriented Transient Communication, Physical Clock
Synchronization, Logical Clock, Mutual exclusion, Election

Algorithms

UNIT 3: Distributed File Systems and Fault Tolerance
Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Introduction to fault tolerance, Process Resilience, Distributed Commit, Recovery.

Section II

UNIT 4: Introduction to Cloud
Getting to know the Cloud, Cloud and other similar configurations, Components of Cloud Computing, Cloud Types and Models: Private Cloud, Community Cloud, Public Cloud, Hybrid Clouds.

UNIT 5: Virtualization
Introduction and benefits, Implementation Levels of Virtualization, Virtualization at the OS Level, Virtualization Structure, Virtualization Mechanism, Open Source Virtualization Technology, Xen Virtualization Architecture, Binary Translation with Full Virtualization, Paravirtualization, Virtualization of CPU, Memory and I/O Devices.

UNIT 6: Cloud Computing Services and Data Security in Cloud
Infrastructure as a Service, Platform as a Service, Software as a Service, Database as a Service , Specialized Cloud Services, Challenges with Cloud Data, Challenges with Data Security, Data Confidentiality and Encryption, Data availability, Data Integrity, Cloud Storage Gateways.

Text Books:
1. Distributed Systems: Principles and Paradigms- Tanenbaum, Steen.
2. Cloud Computing Black Book- Jayaswal, Kallakurchi, Houde, Shah, Dreamtech Press.

Reference Books:
1. Cloud Computing: Principles and Paradigms – Buyya, Broburg, Goscinski.
2. Cloud Computing for Dummies – Judith Hurwitz.

Advanced Database Systems

CS7L03. ADVANCED DATABASE SYSTEMS

Section - I

Unit I: Parallel and Distributed Databases
Database System Architectures: Centralized and Client – Server Architectures – Server System Architectures – Parallel Systems – Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies.

Unit II: Object And Object Relational Databases
Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL – Case Studies.

Unit III : Advanced SQL
PL SQL- A Basic introduction, Functions and Procedure, Packages, Synonyms, Database Links, Embedded SQL and Dynamic SQL. Database Design: systems development life cycle, database life cycle, DBMS Software Selection, top-down versus bottom-up design, centralized versus decentralized design.

Section - II

Unit IV: Database Security and Authorization
Discretionary Access Control, Mandatory Access Control, Audit Trails in Databases,
Statistical Databases

Unit V: Databases on the Web and Semi-structured data
Overview of XML, structure of XML data, document schema, querying XML data, storage of XML data, XML applications, the semi-structure data model, implementation issues, indexes for text data.

Unit VI: Business Intelligence and Data Warehouses
The Need for Data Analysis, Business Intelligence, Business Intelligence Architecture, Decision Support Data, Online Analytical Processing, Star Schemas, Implementing a Warehouse, Data Mining, SQL Extension for OLAP.

Text Books:

1. Database System Concepts – Silberschatz, Korth, Sudarshan – 5th Edi (MGH International edition). (Unit No.1,Unit No.5,Unit No.2)
2. Fundamentals of Database Systems - Elmasri and Navathe [4e], Pearson Education (Unit No.2)
3. Database Systems, Design, Implementation and Management - Coronel-Morris- Rob (Unit No.3,4,6)

References:
1. Database Management System – Raghu Ramkrishnan, Johannes Gehrke, Database Management Systems[3e], (MGH).
2. Advanced Database Management System – Rini Chakrabarti - Shilbhadra Dasgupta.

Mobile Applications

Unit 1: Introduction
Mobile Development Importance, Survey of mobile based application development, Mobile
myths, Third party frameworks, Mobile Web Presence and Applications, Creating consumable
web services for mobile, JSON, Debugging Web Services, Mobile Web Sites, Starting with
Android mobile Applications.
Unit 2: Mobile Web
Introduction, WAP1, WAP2, Fragmentation Display, Input Methods, Browsers and Web
Platforms, Tools for Mobile Web Development.
Unit 3: Application Architectures and Designs
Mobile Strategy, Navigation, Design and User Experience, WML, XHTML Mobile Profile and
Basics, Mobile HTML5, CSS for Mobile, WCSS extensions, CSS3, CSS for mobile browsers,
HTML5 Compatibility levels, Basics of Mobile HTML5: Document Head, Document Body,
HTML5 Mobile Boilerplate, the Content, HTML5 Forms: Design, Elements, Attributes,
validation.

Unit 4 : Devices, Images, Multi-Media
Device Detection, Client-side Detection, Server-side Detection, Device Interaction, Images,
Video, Audio, Debugging and Performance, Content Delivery, Native and Installed Web Apps.

Unit 5: Advanced Tools, Techniques

J2ME programming basics, HTML5 Script Extensions,Code Execution, Cloud based browsers,
JS Debugging and profiling, Background Execution, Supported Technologies and API,Standard
JavaScript Behavior, Java Libraries, Mobile Libraries, UI Frameworks: Sencha Touch,
JQueryMobile, Enyo, Montage, iUI, jQTouch, JavaScript Mobile UI Patterns.

Unit 6: Advanced Applications

Geolocation and Maps APP, Offline Apps, Storage, and Networks, Distribution and Social Web
2.0

Text Books:

1. Jeff McWherter, Scott Gowell, Professional Mobile Application Development, John Wiley &
Sons, Ref: www.it-ebooks.org
2. Maximiliano Firtman, Programming the mobile Web, Oreilly, 2nd Edition, 2013, ISBN: 978-
1-449-33497-0

Reference Books:

1. Digital Content: http://en.wikibooks.org/wiki/Category: J2ME Programming
2. Android Studio Development Essentials, ref: http://www.techotopia.com/