



ARCHITECTURE OF COMPUTER

Contents

BLOCK 1: LOGICAL ARCHITECTURE OF COMPUTER

UNIT 1 INTRODUCTION TO MEMORY AND PROCESSOR

Preliminary Overview of Processor, Memory, and Hard Disk.
Loading Program into Memory, Loading & Storing Data to Hard Disk

UNIT 2 LOGICAL ARCHITECTURE

Registers, ALU, Internal Bus, Read/Write Cycle of Memory, Internal Bus, Control Unit, Cache Memory, Etc

UNIT 3 PROGRAM EXECUTION

Execution of Program. Fetch-Decode-Execute Cycle. With Reference To Fetch-Decode-Execute Cycle. Buffering Concept

BLOCK 2: PHYSICAL ARCHITECTURE OF COMPUTER/LAPTOP AND SMARTPHONE

UNIT 1 MEMORY CHIP AND CACHE MEMORY

Processor, Memory chip, and Cache memory – general overview

UNIT 2 LOGICAL BUS

Logical bus-oriented architecture of PC, Introduction to Buses – FSB, PCI Bus, and USB

UNIT 3 MOTHERBOARD

Motherboard - various chips on the mother board - processor, RAM, L2 Cache, BIOS & Chipset, Memory Controller Hub (North Bridge) & I/O Controller Hub (South Bridge)

UNIT 4 HARDWARE COMPONENTS OF SMARTPHONE

Applications Processor, SIM card, Wireless connectivity, Audio subsystem, memory card and flash memory, Power Management Unit, Camera & its interface, Touch screen & its interface



BLOCK 3: DEVICES FOR DISPLAY, INPUT AND POINTING

UNIT 1 DISPLAY DEVICES

LCD and LED monitors (for PC)

UNIT 2 INPUT AND POINTING DEVICES

Keyboard and mouse (for PC and Laptop), touch pad (for laptop), touch screen (for Mobile) – basic principle of each device and its interface with computer

BLOCK 4: DEVICES FOR NETWORKING, I/O AND EXTERNAL STORAGE

UNIT 1 NETWORKING DEVICES

Modem, Wireless Modem etc.

UNIT 2 I/O AND EXTERNAL STORAGE

Pen Drive, Camera, Hard Disk, Optical Storage (CD/DVD),

Drives for CD/DVD, Inkjet Printers and laser printers



OBJECT ORIENTED CONCEPTS

Contents

BLOCK 1: INTRODUCTION TO PROGRAMMING WITH JAVA

UNIT 1 PROBLEM SOLVING WITH COMPUTERS

Need of programming, Algorithms, Flowcharts, Pseudo-Code, Programming Languages Overview, and Overview of Object Oriented Concepts, Skills check, Exercises

UNIT 2 INTRODUCTION TO JAVA

History, Overview of JVM & Bytecode, Java versions (J2me etc.), Java class library, JDK, Your First Java Application, Skills check, Exercises

UNIT 2 BEGINNING WITH JAVA PROGRAMMING

Java Keywords, Comments in Java, Variables and Assignments, Strings and Characters, Arithmetic Operators and Expressions, Type Conversion in Expressions, Type Conversion, Skills check, Exercises

BLOCK 2: JAVA CONTROL STATEMENTS, OPERATORS AND CLASSES

UNIT 1 JAVA CONTROL STATEMENTS

The if statement, The if-else statement, Blocks of Code, The for statement, Increment & Decrement operators, Backslash codes, Relational and Boolean logical operators, Ternary operators, Skills check, Exercises

UNIT 2 MORE ABOUT CONTROL STATEMENTS AND OPERATORS

Nested if statement, Variations of the for loop, The while loop, The do loop, Nested loops, The break statement, The continue statement, The switch statement, The bitwise operators, Skills check, Exercises

**UNIT 3****CREATING CLASSES**

The General form of a class, Creating Simple Classes, Adding Constructors, Constructor Overloading, The this keyword, Instance variables and methods, Static variables and methods, Local variables and its scope, Method overloading, Argument Passing, Wrapper Classes, System Class, Garbage Collection, Skills check, Exercises

BLOCK 3: INHERITANCE, INTERFACE, PACKAGES AND EXCEPTIONS IN JAVA**UNIT 1 INHERITANCE**

Overview of Re-usability, Subclasses, Inheritance and Variables, Method Overriding, Inheritance and Methods, Inheritance and Constructors, Class Modifiers, Variable Modifiers, Constructor Modifiers, Method Modifiers, Object and Class classes, Skills Check, Exercises

UNIT 2 INTERFACES AND PACKAGES

Interfaces, Interface References, Interface Inheritance, The instanceof Operator, Packages, The import statement, Access control and Packages, Skills Check, Exercises

UNIT 3 EXCEPTIONS

Overview of Exceptions, Exception Handling, Catch Block and searches, The throw statement, Exception and Error classes, The throws clause, Custom exceptions, Skills check, Exercises

BLOCK 4: JAVA CLASS LIBRARY, FILE HANDLING AND GUI**UNIT 1 INTRODUCTION TO JAVA CLASS LIBRARY**

Classes of java.util package, Classes of java.net package, Classes of java.lang package, Overview of Collection Framework, Skills check, Exercises



UNIT 2

FILE HANDLING IN JAVA

Overview of File Handling, File Class in Java, Using Character Stream Classes, Using Byte Stream Classes, Using Scanner and Console Classes in Java, Skills check, Exercises

UNIT 3

BUILDING GRAPHICAL USER INTERFACE (SWING)

Building applications using classes related to Graphical Interface, Creating Layouts in GUI, Using Events in GUI applications, Skills check, Exercises



RELATIONAL DATABASE MANAGEMENT

Contents

BLOCK 1: INTRODUCTION TO DATABASE MANAGEMENT SYSTEM AND CONCEPTUAL MODELLING

UNIT 1 INTRODUCTION TO DATABASE SYSTEM

Basic Concepts of Data and Database, Database management system, Data Administrator and its functions, Advantages of DBMS over file systems, Applications of DBMS, Three-tier architecture of DBMS, Data Models, Components of DBMS, Overview of Languages of DBMS (DDL, DML, DCL)

UNIT 2 CONCEPTUAL MODELLING

Introduction, Basic Concept of Entity-Relationship Diagram, Relationship concept and its types (unary, binary and ternary), Cardinalities (one-one, one-many, many-one and many-many), Overview of Extended ER model, Case Study of Extended ER model

BLOCK 2: DATABASE INTEGRITY AND NORMALIZATION

UNIT 1 DATABASE INTEGRITY CONCEPTS

Introduction, Domain Integrity constraints, Entity Integrity constraints, Referential Integrity constraints

UNIT 2 NORMALIZATION

Introduction, Basic Concept of designing, Need of normalization, Decomposition (lossy and lossless), Functional Dependency, Full Functional Dependency, Armstrong Axioms of Functional Dependencies, Normalization Rules (1NF, 2NF, 3NF and BCNF), Examples based on normalization



BLOCK 3: RELATIONAL ALGEBRA AND QUERY LANGUAGE

UNIT 1 RELATIONAL ALGEBRA

Introduction, Basic concepts of relational algebra, symbols of relational algebra, operations on relational algebra, Examples based on relational algebra

UNIT 2 QUERY LANGUAGE

Introduction, Introduction to Structured Query Language, Data Definition Language (DDL), Data Manipulation Statement (DML), Data types in MySQL, Operators (Arithmetic, Comparison, Logical), SQL Functions, Group function (AVG, MAX, MIN, SUM and COUNT), COMMIT and ROLLBACK

BLOCK 4: DATA RETRIEVAL SQL STATEMENT AND TYPES OF DATABASE SYSTEM

UNIT 1 DATA RETRIEVAL SQL STATEMENT

Introduction, Single table query without condition, Single table query with condition, Group by clause, Orders by Clause, Self Join Natural Join and Sub query, Examples based on SQL concepts

UNIT 2 TYPES OF DATABASE SYSTEMS

Introduction, Centralized Database System, Parallel Database Systems, Distributed Database Systems, Client-Server Database System



FUNDAMENTALS OF OPERATING SYSTEM

Contents

BLOCK 1: INTRODUCTION TO OPERATING SYSTEMS

UNIT 1 BASICS OF OS

Definition and Function of operating systems, Evolution of operating system, Operating system structure-monolithic layered, virtual machine and Client server

UNIT 2 TYPES OF OPERATING SYSTEM

Different types of operating system-real time systems, multi-user System, distributed system

UNIT 3 BATCH OPERATING SYSTEM

Introduction to basic terms and batch processing system: Jobs, Processes files, command interpreter

BLOCK 2: MEMORY MANAGEMENT AND PROCESS SCHEDULING

UNIT 1 MEMORY MANAGEMENT

Logical and Physical address protection, paging, and segmentation, Virtual memory, Page replacement algorithms, Cache memory, hierarchy of memory types, Associative memory

UNIT 2 PROCESS SCHEDULING

Process states, virtual processor, Interrupt mechanism, Scheduling algorithms Performance evaluation of scheduling algorithm, Threads



BLOCK 3: FILE AND I/O MANAGEMENT

UNIT 1 FILE SYSTEM

File systems-Partitions and Directory structure, Disk space allocation, Disk scheduling

UNIT 2 I/O MANAGEMENT

I/O Hardware, I/O Drivers, DMA controlled I/O and programmed I/O, I/O Supervisors

BLOCK 4: BASICS OF DISTRIBUTED OPERATING SYSTEM

UNIT 1 DISTRIBUTED OPERATING SYSTEM

Introduction and need for distributed OS, Architecture of Distributed OS, Models of distributed system

UNIT 2 MORE ON OPERATING SYSTEM

Remote procedure Calls, Distributed shared memory, Unix Operating System: Case Studies



FUNDAMENTALS OF COMPUTER NETWORKING

(FCN)

Contents

BLOCK 1: NETWORKING CONCEPT

UNIT 1 INTRODUCTION AND NETWORKING BASICS

Advantages of computer networking, computer networks and the Internet, WAN, LAN and PAN basics, Topologies, Connecting Media: Wired and Wireless and their characteristics, Introduction to NIDs and their specifications

UNIT 2 NETWORK INTERFACE DEVICES

Network Adaptor Cards (both wired and wireless), Hubs, Switches, Routers, Access Points (Wireless), Repeaters. Their basic architecture, working and use/application, understanding their technical specifications/data sheets.

BLOCK 2: CREATING WIRED AND WI-FI LAN

UNIT 1 CREATING A SWITCHED WIRED ETHERNET LAN

Introduction to UTP CAT series cables, RJ-45 connectors, color coding scheme, crimping a UTP cable to RJ-45 connector, physically connecting individual nodes to the switch, selection of server machine, Windows 8.1 Server Installation and Configuration on Server Machine, Windows 8.1 Desktop installation and configuration on client nodes, checking connectivity, basic troubleshooting/diagnostic commands.

UNIT 2 CREATING A WI-FI LAN:

Introduction to Wi-Fi Technology, how to provide Wi-Fi capability to a PC, creating an ad-hoc Wi-Fi based LAN, creating an infrastructure based LAN using Wireless AP, configuration of AP and client Machines, accessing data from File Server through Wi-Fi Interface from client machine.



BLOCK 3: ADSL BROADBAND INTERNET AND WI-FI USB DONGLES

UNIT 1 ADSL BROADBAND INTERNET

Introduction to ADSL broadband technology, motivation for ADSL Broadband, PSTN Basics, ADSL Modem basic architecture, working, standards, ADSL Wi-Fi Modem and Router, configuring a wired ADSL Modem for Internet Access, configuring a Wi-Fi ADSL modem/Router for Internet Access

UNIT 2 WI-FI USB DONGLES

Motivation and Need for Wi-Fi Dongles, basic architecture and working, connecting and configuring a Wi-Fi Dongle with a PC.

BLOCK 4: INTERNET ACCESSING AND APPLICATION

UNIT 1 TETHERING FOR INTERNET ACCESS

Need and Motivation for Tethering, Tethering with Wi-Fi, Tethering with Bluetooth, Tethering with USB Cable, Reverse Tethering

UNIT 2 INTERNET/LAN APPLICATIONS

Popular Browsers like Internet Explorer and Chrome, their configuration and settings, FileZilla File Transfer software, Team Viewer, Remote Desktop, Telnet, Microsoft Outlook Express.



WEB APPLICATION DEVELOPMENT

Contents

BLOCK 1: INTRODUCTION TO PHP

UNIT 1 INTRODUCTION TO WEB APPLICATION

The architecture of a web application, static and dynamic web application, Installing WAMP.

UNIT 2 PHP BASICS

Embedding PHP Code in Your Web Pages, Commenting Your Code, Outputting Data to the Browser, PHP's Supported Data types, Identifiers, Variables, Constants, Expressions, String Interpolation, Control Structures.

BLOCK 2: ARRAY, FUNCTION AND EXPRESSION

UNIT 1 ARRAY IN PHP

Array introduction, creating an array, adding and removing array element, determining array size and uniqueness sorting array,

UNIT 2 FUNCTION IN PHP

In built functions: String functions, array functions, mathematical functions, File System functions, Date and Time Functions, Miscellaneous Functions, User Defined Functions, arguments passing by reference , Argument passing by value

UNIT 3 FUNCTION IN PHP

Regular Expression, Error Handling Regular Expressions, Exception handling



BLOCK 3: OO AND FILE HANDLING IN PHP

UNIT 1 OBJECT ORIENTED PHP

The benefits of OOP, Key OOP Concepts, Create and Use class, properties, Constructors and Destructors, Methods, Create and Use Object, class constant, static properties and method, loop through an object's properties, clone and compare objects, inspect an object, inherit a class, use the protected access modifier, create abstract classes and methods, create final classes and methods, work with interfaces, Introducing Namespaces

UNIT 2 FILE AND DIRECTORY HANDLING

Get a directory listing, read and write an entire file, read and write part of a file, read and write CSV data, copy, rename and delete a file, file uploading

BLOCK 4: DATABASE AND STATE MANAGEMENT IN PHP

UNIT 1 PHP AND MYSQL DATABASE

Three ways to use PHP to work with MySQL (PDO, mysqli extension, MySQL extension), database connection, select data, insert, update and delete data in PHP using MySQL

UNIT 2 STATE MANAGEMENT IN PHP

Session, Cookies



Mobile Application Development

Contents

BLOCK 1: BASICS OF ANDROID APPLICATION

UNIT 1 INTRODUCTION TO ANDROID, TOOLS AND BASICS

The Android Platform, Installing Android Studio, Java for Android, Android Studio for Android Software Development, Building a sample Android application

UNIT 2 ANDROID APPLICATION DESIGN ESSENTIALS - I

A Framework for a Well-Behaved Application, Application Context, Activities, Services, Intents, Intent Filter, Permissions, Receiving and Broadcasting Intents,

BLOCK 2: ANDROID APPLICATION AND USER INTERFACE DESIGN

UNIT 1 ANDROID APPLICATION DESIGN ESSENTIALS - II

Using Intent Filter, Permissions, Android Manifest File and its common settings, managing different types application resources in a hierarchy

UNIT 2 Android User Interface Design and Common APIs

User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation ,Drawing 2D and 3D Graphics and Multimedia,



BLOCK 3: ANDROID NETWORKING AND DEVELOPMENT

UNIT 1 ADVANCED TOPICS - I

Android Networking, Web and Telephony API, Search, Location and Mapping, Sensors, NFC, Speech, Gestures, and Accessibility,

UNIT 2 ADVANCED TOPICS - II

Communication, Identity, Sync, and Social Media, The Android Native Development Kit (NDK)

BLOCK 4: ANDROID APPLICATION PUBLISHING AND CONTENT PROVIDERS

UNIT 1 MORE ON ANDROID

Handling and Persisting Data, A Content Provider as a Facade for a RESTful Web Service, Using Content Providers

UNIT 2 PUBLISHING ANDROID APPLICATION

Deploying Android Application to the World, Selling your Android application



OBJECT ORIENTED ANALYSIS AND DESIGN

Contents

BLOCK 1: OBJECT ORIENTED MODELLING

UNIT 1 INTRODUCTION TO OBJECT ORIENTED MODELLING

Object Oriented Modeling, Characteristics Object Oriented Modeling: Class and Objects, Links and Association, Generalization and Inheritance, An Object Model. Benefits of OO Modeling, Introduction to OOAD tools,

UNIT 2 ADVANCE MODELING CONCEPTS

Aggregation, Abstract Class, Multiple Inheritance, Generalization as an Extension, Generalization as a Restriction, Metadata, Constraints, An Object Model

BLOCK 2: OBJECT ORIENTED ANALYSIS AND SYSTEM DESIGN

UNIT 1 OBJECT ORIENTED ANALYSIS

Object Oriented Analysis, Problem Statement: an Example, Differences between Structured Analysis and Object Oriented Analysis, Analysis Techniques: Object Modeling, Dynamic Modeling, and Functional Modeling. Adding Operations. Analysis Iteration

UNIT 2 SYSTEM DESIGN

System Design: An Object Oriented Approach, Breaking into Subsystems, Concurrency Identification, Management of data store, Controlling events between Objects, Handling Boundary Conditions



BLOCK 3: OBJECT DESIGN AND DYNAMIC MODELING

UNIT 1 OBJECT DESIGN

Object Design for Processing, Object Design Steps, Designing a Solution, Choosing Algorithms, Choosing Data Structures, Defining Classes and delegation of Responsibilities to Methods

UNIT 2 DYNAMIC MODELING

Events, State and State Diagram, Elements of State Diagrams, Examples of State Diagrams, Advance Concepts in Dynamic Modeling, Concurrency, A Dynamic model

BLOCK 4: FUNCTIONAL MODELING AND UML

UNIT 1 FUNCTIONAL MODELING

Functional Models, Data Flow Diagrams, Features of a DFD, Design flaws in DFD, A Functional model, Relationship between Object, Dynamic, and Functional Models

UNIT 2 USING UML

UML: Introduction, Object Model Notations: Basic Concepts, Structural Diagrams: Class, Object, Composite, Package, Component, Deployment. Behavioral Diagrams: Use Case, Communication, Sequence, Interaction Overview, Activity, State. Modeling with Objects

UNIT 3 CASE STUDY

This unit will cover all the OOAD aspects Covered in previous units of this course.