Chapter 1 Structures and Pointers

<u>Structure</u> is a user-defined data type to represent a collection of different types of data under a common name.

Eg: struct stud { int roll; char name[20]; }

Pointer is a variable that can hold the address of a memory location.

Syntax to declare pointer variable: data type * variable;

The *address of operator* (&), is used to get the address of a variable.

The *value at operator* (*) is used to retrieve the value pointed to by the pointer.

Two types of memory allocation:

The memory allocation before the execution of the program is *static memory allocation*. Memory allocation during run-time is *dynamic memory allocation*. The **new** operator is used for dynamic memory allocation and **delete** to de-allocate (free) the memory.

Chapter 2 Concepts of Object Oriented Programming

Procedural paradigm V/s OOP

Procedural paradigm		Object Oriented Paradigm	
٠	Data is undervalued.	٠	Data is given importance.
•	Procedure is given importance.	•	Procedure is driven by data.

Basic Concepts of OOP

1. <u>Data abstraction</u>: Showing only the essential features and hiding the details.

- 2. Data encapsulation: Binds the data and functions together.
- 3. <u>Polymorphism</u>: The ability to process objects differently.
- 4. Inheritance: Creating new classes by deriving properties from existing class.
- 5. <u>Modularity</u>: Partitioning a program into small segments.

Chapter 3 Data Structures and Operations

Data structure is a way of organising logically related data items which can be processed as a single unit.

Classification of data structures:





Operations on Data Structures: Traversing, searching, inserting, deleting, sorting and merging.

Stack: Data structure that follows LIFO (Last In First Out) principle.

Push Operation: Inserting a new data item into the stack at Top position. Attempt to insert an item in a filled stack is **stack overflow**.

Pop Operation: Deleting an element from the top of a stack. Attempt to delete an item from an empty stack is *stack underflow*.

Algorithm to Push	Algorithm to Pop	
Start	Start	
1: If (TOS < N-1) Then	1: If (TOS > -1) Then //	
2: TOS = TOS + 1	2: VAL = STACK[TOS]	
3: STACK[TOS] = VAL	3: TOS = TOS - 1	
4: Else	4: Else	
5: Print "Stack Overflow "	5: Print "Stack Underflow "	
6: End of If	3: End of If	
Stop	Stop	

Queue: Data structure that follows the FIFO (First In First Out) principle. A queue has two end points - **Front** and **Rear**.

Linked list: It is a collection of nodes, where each node consists of two parts – a *data* and a *link*. Linked list is a dynamic data structure.

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Chapter 4

Web Technology

Static web page V/s Dynamic web page

Static web page	Dynamic web page
The content and layout of a web page is fixed.	The content and layout may change during run time.
Static web pages never use databases.	Database is used to generate dynamic content through queries.

Client side scripting V/s Server side scripting

Client side scripting	Server side scripting
Script is copied to the client browser	Script remains in the web server
Script is executed in the client browser	Script is executed in the web server and the web page produced is returned to the client browser

Client side scripting languages: JavaScript, VB Script Server side scripting languages: PHP, JSP, ASP, Pearl

Structure of HTML code

<HTML> <HEAD> <TITLE> </TITLE> </HEAD> <BODY> </BODY> </HTMI >

HTML Tags

Tags	Use	Attributes	Values and Purpose
<html></html>	To start an HTML document		
<head></head>	To specify the head section of an HTML document.		
<title></title>	This tag pair contains the text to be displayed in the title bar of browser.		
	Defines the body	Bgcolor	Colour for the background of a web page.
<body></body>	section of the web	Background	Image as the background of a web page.
	page.	Text	Colour of the text in the web page.

Tags	Use	Attributes	Values and Purpose
<h1></h1>	To provide different	Align	"left" "right" and "center" are the values
<h6></h6>	levels of headings.	Alight	iere, light and center are the values.
 	To break the current line of text and continues in the next line. No attributes.		
<p></p>	To create a paragraph leaving a blank line.		
<hr/>	To draw a horizontal line across the width of the browser window		

Text formatting tags

Tags	Use
 and 	To make the text bold face.
<i> and </i>	To make the text <i>italics</i> or <i>emphasis</i> .
<u></u>	To <u>underline</u> the text
<s> and <strike></strike></s>	To strike through the text
<big></big>	To make the text big sized
<small></small>	To make the text small sized
	To make the text subscripted
	To make the text superscripted
<q></q>	To enclose the text in "double quotes"
<blockquote></blockquote>	To indent the text

Tags	Use	Attributes	Values and Purpose
<marquee></marquee>	To scroll a text or image in the browser		
	To change the	Color	To set the text colour
	size, style and	Face	It specifies the font face like Arial, Calibri, etc.
<funt></funt>	colour of the	Sino	It energifies the fast size
	text enclosed	Size	It specifies the font size
	To insert		
	image in a	Src	To specify the file name of the image
	web page		

Chapter 5 Web Designing using HTML

Different types of Lists in HTML

There are three kinds of lists in HTML - unordered lists, ordered lists and definition lists.

Tags	Use	Attributes	Values and Purpose
	To create bulleted list	Туре	To specify the type of bullet. "Disc" , "Circle" and "Square" are the values for ●, ○ and ∎
	To create numbered list	Туре	To specify the type of numeral. The values are "1", "I", "i", "a" and "A".
<0L>		Start	To specify the starting number. The value should be an integer.
	To specify an item in the unordered or ordered list. Used inside the pairs and 		
<dl></dl>	To create a definition list		
<dt></dt>	Used inside <dl> </dl> to specify each data item (or term) in the list		
<dd></dd>	Used after each <dt></dt> to describe the term		

Links in HTML

A hyperlink (or simply link) is a text or an image in a web page, on clicking which another document or another section of the same document will be opened. The <A> tag, called anchor tag is used to give hyperlinks. Href is the main attribute of <A> tag. The URL (address of the web page/site) is given as its value. There are two types of linking – internal linking and external linking.

Creating Table in Web page

Tags	Use	Attributes	Values and Purpose	
<table></table>	To create table	Border	Thickness of the border line around the table.	
<tr></tr>	To specify a row in a table			
<th></th>		To specify the heading cell.		
<td></td> <td colspan="3">To specify the data in a cell.</td>		To specify the data in a cell.		

Input controls in Forms

Textbox – To input a line of text Password box – To input passwords Option button (Radio button) – To select an item from a groups of options Checkbox – To select one or more items in a group List box – To select one or more items from list of items Text area – To input multi line text Submit button – To submit data to the Form handler Reset button – To clear the entries in the Form

Chapter 6

Client side Scripting using JavaScript

<SCRIPT> tag: To embed JavaScript code in an HTML file.

Data Types in JavaScript: Number, String, Boolean

Variables: Used for storing values. Declared using the keyword var as: var x;

Operators

Arithmetic operators	+ - * / %
Increment, decrement	++
Assignment operators	= += -= *= /= %=
Relational operators	< <= > >= == !=
Logical operators	&& !
String concatenation	+

Control Statements

	if (test_expression)		
	Statement;		
	if (test_expression)		
	statement_1;		
	else		
	statement_2;		
if statements	if (test_expression1)		
II statements	statement_1;		
	else if (test_expression2)		
	statement_2;		
	:		
	:		
	else		
	statement_n;		
	switch (variable/expression)		
	{		
	case value1: statement1; break;		
switch	case value2: statement2; break;		
statement	:		
	:		
	default: statement;		
	}		
forloop	for (initialization; test; update)		
	body;		
	initialization;		
	while (test_expression)		
while loon	{		
while loop	body;		
	update;		
	}		

Built-in Functions

Function	Use	Syntax / Example
alert()	To display a text in a message window.	alert("Welcome");
isNaN()	Returns True if the given value is not a number. That is, the argument contains a non-numeric character. Returns False is the argument is numeric.	isNaN("welcome"); and isNaN("A123"); return True. isNaN("13"); and isNaN(13); return False
toUpperCase()	Returns the upper case form of the given string.	Output of "Java".toUpperCase(); will be JAVA.
toLowerCase()	Returns the lower case form of the given string.	Output of "JavaSCIPT".toLowerCase(); will be javascript.
charAt()	Returns the character at a particular position. charAt(0) gives the 1 st character of a string.	"JavaScript".charAt(4); gives S, the 5 th character.
length property	Returns the length (number of characters) of the string.	"JavaScript".length will give 10.

Chapter 7 Web Hosting

Types of web hosting

- (i) Shared hosting: Most suitable for small websites that have less traffic. Cheaper and easy to use. Services will be slow.
- (ii) **Dedicated hosting:** Dedicated servers provide guaranteed performance, round-the-clock power supply, and fast access. But they are very expensive.
- (iii) Virtual Private Server (VPS): VPS provides almost the same services at a lesser cost than that of dedicated hosting. Some popular server virtualization softwares are VMware, FreeVPS, etc.

FTP Client software: FTP client software establishes a connection with a remote server and is used to transfer files from our computer to the server computer. SFTP uses Secure Shell (SSH) protocol which provides facilities for secure file transfer. The popular FTP client software are FileZilla, CuteFTP, SmartFTP, etc.

Free Hosting: Provides web hosting services free of charge. The size of the files that can be uploaded may be limited. Audio/video files may not be permitted. Sites.google.com, yola.com, etc. are free web hosting services.

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Chapter 8 Database Management System

Database is an organized collection of inter-related data stored together with minimum redundancy, which can be retrieved as desirable.

Database Management System (DBMS) is essentially a set of programs which facilitates storage, retrieval and management of database.

Advantages of DBMS:

- Data redundancy (duplication of data) is controlled.
- Data inconsistency is avoided.
- Data are efficiently accessed.
- Data integrity is maintained.
- Data security is ensured.
- Data sharing is allowed.

Components of DBMS: Hardware, Software, Database, Users, Procedures:

Data organisation:

- <u>Field:</u> The smallest unit of stored data.
- <u>Record:</u> A collection of related fields.
- <u>File:</u> A collection of all occurrences of same type of records.
- <u>Database</u>: A collection of files associated with an organisation.

Types of Users of database

- <u>Database Administrator (DBA)</u>: The person responsible for the control of the centralized and shared database.
- <u>Application Programmers:</u> Computer professionals who interact with the DBMS through application programs.
- <u>Sophisticated Users:</u> They interact with the database through their own queries.
- <u>Naive Users:</u> People accessing data by invoking one of the application programs.

Relation: A relation is also called Table. Data are organized in the form of rows and columns

Tuple: The rows (records) of a relation are known as tuples.

Attribute: The columns of a relation are called attributes.

Degree: The number of attributes in a relation determines the degree of a relation.

Cardinality: The number of rows (records) or tuples in a relation is called cardinality of the relation.

Domain: It is a pool of values in a given column of a table.

Schema: The description or structure of a database is called the database schema.

Instance: An instance of a relation is a set of tuples in it.

Types of Keys:

- <u>Candidate key:</u> It is the minimal set of attributes that uniquely identifies a row in a relation.
- <u>Primary key:</u> It is one of the candidate keys chosen to uniquely identify tuples within the relation.
- <u>Alternate key:</u> It is a candidate key that is not chosen as the primary key.
- Foreign key: A key in a table can be called foreign key if it is a primary key in another table.

Relational algebra

The fundamental operations in relational algebra are SELECT(σ), PROJECT (π), UNION, INTERSECTION, SET DIFFERENCE, CARTESIAN PRODUCT, etc.

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Chapter 9

Structured Query Language

Components of SQL: Data Definition Language (DDL), Data Manipulation language (DML) and Data Control Language (DCL).

DDL commands: CREATE TABLE, ALTER TABLE, DROP TABLE, CREATE VIEW, DROP VIEW. *DML commands*: INSERT INTO, SELECT, UPDATE, DELETE FROM. *DCL commands*: GRANT, REVOKE.

SQL Data Types: INT or INTEGER, DEC or DECIMAL, CHAR or CHARACTER, VARCHAR, DATE, TIME.

Aggregate Functions in SQL			
COUNT()	To count the non-null values of a column.	SELECT COUNT(Fee) FROM Student;	
	Also used to get number of rows	SELECT COUNT(*) FROM Student;	
SUM()	To find the sum of values in a column.	SELECT SUM(Fee) FROM Student;	
AVG()	To find the average of values in a column.	SELECT AVG(Salary) FROM Employee;	
MAX()	To find the highest value in a column.	SELECT MAX(Marks) FROM Student;	
MIN()	To find the lowest value in a column.	SELECT MIN(Marks) FROM Student;	

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Chapter 10 Server side Scripting using PHP

Output statements - echo() and print()

echo	print
Can take more than one parameter when used without parenthesis.	Takes only one parameter
Does not return any value.	Returns TRUE or 1 on successful output and FALSE if it was unable to print out the string.
Little faster than print.	Little bit slower than echo

Data Types in PHP

- (i) Core data types Integer, Float/Double, String, Boolean
- (ii) Special data types Null, Array, Object, Resource

An example for String concatenation:

\$x = "PHP"; \$y = "Script"; \$z = \$x.\$y;

The . (dot) operator will add the two strings.

Built-in Functions

Function	Use	Syntax / Example
date()	To display a date in given format	<pre>date("d-m-y") displays a</pre>
		date as 09-11-2017
chr()	Returns a character from the specified ASCII	chr(65) returns A
	value.	
strlen()	Returns the length of a string.	<pre>strlen("hello") returns 5</pre>
strpos()	Finds the position of the first occurrence of a	strpos ("hello", "e")
	string inside another string.	returns 1
strcmp()	Compares two strings	strcmp ("he", "HE")
		returns False

Chapter 11 Advances in Computing

Serial Computing V/s Parallel Computing

Serial Computing	Parallel Computing
(a) Single processor is used.	(a) Multiple processors with shared memory.
(b) Instructions are executed sequentially.	(b) Instructions are executed concurrently.

Cloud Computing

It refers to the use of computing resources that reside on a remote machine and are delivered to the end user as a service over a network

Cloud services are grouped into three – Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

Applications of Computational Intelligence

Biometrics: It refers to the measurements (metrics) related to human characteristics.

Robotics: It is the scientific study associated with the design, fabrication, theory and application of robots.

Computer vision: It is the construction of meaningful description of the structure and properties of the 3-dimensional world from 2-dimensional images.

Natural Language Processing (NLP): It is branch of computer science that focuses on developing systems which allow computers to communicate with people using human languages such as English, Malayalam etc.

Automatic Speech Recognition (ASR): It refers to the AI methods of communicating with a computer in a spoken language like Malayalam.

Optical Character Recognition (OCR) and Handwritten Character Recognition (HCR): The task of OCR and HCR are integral parts of pattern recognition.

Bio-informatics: It is the application of computer technology to the management of biological information.

Geometric Information System (GIS): It is a computer system for capturing, storing, checking, and displaying data related to various positions on earth's surface.

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Chapter 12

ICT and Society

Interactions in e-Governance: Government to Government (G2G), Government to Citizens (G2C), Government to Business (G2B), Government to Employees (G2E)

e-Governance infrastructure: In India, the e-Governance infrastructure mainly consists of State Data Centers (SDC) for providing core infrastructure and storage, State Wide Area Network (SWAN) for connectivity and Common Service Centers (CSC) as service delivery points.

e-Business is the sharing of business information, maintaining business relationships and conducting business transactions by means of the ICT application.

Electronic Payment System (EPS) is a system of financial exchange between buyers and sellers in an online environment.

e-Banking or electronic banking is defined as the automated delivery of banking services directly to customers through electronic channel.

e-Learning tools: Electronic books reader (e-Books), e-Text, Online chat, e-Content, Educational TV channels.

Cyber Crime: Cyber crimes include phishing, hacking, denial of service attacks, etc.

Cyber crimes against individuals:

- **Identity theft** occurs when someone uses another person's identifying information, like their name, credit card number, etc. without their permission to commit fraud or other crimes.
- **Harassment** means posting humiliating comments focusing on gender, race, religion, nationality at specific individuals in chat rooms, social media, e-mail, etc. is harassment.
- **Impersonation and cheating:** Impersonation is an act of pretending to be another person for the purpose of harming the victim.
- **Violation of privacy:** Violation of privacy is the intrusion into the personal life of another, without a valid reason.
- **Dissemination of obscene material:** The Internet has provided a medium for the facilitation of crimes like pornography. The distribution and posting of obscene material is one of the important cyber crimes today.