Chapter 1

Review of C++ Programming

Tokens: It is the basic building blocks of a program.
Different Type of Tokens: Keywords, Identifiers, Literals, Operators, Punctuators
Keywords: Reserved words having specific meaning. e.g. for, if
Identifiers: Names given to variables, arrays and functions. e.g.sum, x
Rules to name an Identifier

- It is the combination of letters, digits and underscore
- It should not start with digit
- Keywords are not allowed
- Special characters and whitespaces are not allowed

Literals: Constants that never change their value during the execution of a program.
Different types of Literals:

- Integers: Numbers without fractional part. e.g. 3
- Floating Point Literals: Numbers with fractional part. e.g. 3.14
- Character Literal: A single character enclosed in single quotes. e.g. 'a'
- String Literal: One or more characters enclosed in double quotes. e.g. "a"

Escape Sequence: Represents non-graphical characters. It contains a backslash followed by one or two characters. e.g. Newline ('\n'), Tab ('\t'), Backspace ('\b), Alert Bell ('\a')

Data Types		
char	1 Byte	Character
int	4 Bytes	Integer
float	4 Bytes	Floating Point Number
double	8 Bytes	Double Precision Floating Point Number
void	0 Byte	Null data

Type Modifiers		
short	1 Byte	Short integer
long	4 Bytes	Long integer
long double	10 Bytes	Large double precision float number
signed	4 Bytes	Signed integer
unsigned	4 Bytes	Unsigned integer

Depending upon the no. of operands, there are 3 types of Operators

Unary Operator	Operator with one operand	e.g. ++, --
Binary Operator	Operator with two operands	e.g. +, -
Ternary Operands	Operator with three operands	e.g. ?:

Arithmetic Operators	
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modular Division

Relational Operators	
>	Greater Than
<	Less Than
>=	Greater Than or Equal to
<=	Less Than or Equal to
=	Equal to
!=	Not equal to

Logical Operators	
&&	Returns true if both of its operands are true
||	Returns true if any of its operand is true
!	Returns true if operand is false and vice versa

Input Operator (**>>**) or Get from Operator or Extraction Operator- used to input data. e.g. cin>>a;
Output Operator (**<<**) or Put to Operator or Insertion Operator- used to output data. eg. cout<<a;
Assignment Operator (**=**): used to assign a value to a variable. e.g. a=b; (value of b to a)
Increment Operator (**++**): increments the value by 1. e.g. a++ (a=a+1)
Decrement Operator (**--**): decrement s the value by 1. e.g. a-- (a=a-1)
Arithmetic Assignment Operators: +=, -=, *=, /= and %=. e.g. x+=5; (equal to x=x+5).

Expression: It is composed of operator and operands.

- Arithmetic Expression: An expression contains arithmetic operator e.g. a+b
- Relational Expression: An expression contains relational operator only. e.g. a>b
- Logical Expression: An expression contains logical operator e.g. (a>b) && (a>c)

Statement: It is the smallest executable unit of a program

- Declaration Statement: it is used to declare variables. e.g int a;
- Assignment Statement: It is used to assign a value to a variable e.g. x=5;

teachbook.in

- Input Statement: It is used to input data e.g. cin>>x;
- Output Statement: It is used to output data e.g. cout<<a;

const: Access modifier to define symbolic constants.
e.g. const int x=5; (value of x cannot be changed during execution).

Variable Initialisation: It is assigning value to a variable at the time of its declaration.
e.g. int a=5;

Control Statements

- Selection Statement: Statements executed based on a condition. eg. if, switch
- Looping Statements: Statements executed repeatedly. e.g. while, do-while, for

If statement: If statement is executed based on a condition.
4 types: Simple if, if else, else if ladder, nested if
e.g.
```
if(a>b)
    Largest=a;
else
    Largest=b;
```

switch statement

- It is a multi-branching statement. eg.
- Four keywords in switch are switch, case, break, default
- break is used to exit from switch
- If any of the conditions are not met, default block is executed

```
switch(code)
{
    case 1:
        cout <<"One";
        break;
    case 2:
        cout<<"Two";
        break;
    default:
        cout<<"Invalid"
}
```

else if ladder	switch
Evaluates any relational or logical expression	Evaluates equality relational expression
When no match is found, else block is executed	When no match is found, default block is executed
Control automatically goes out	break is used to exit

Looping Statement: Different Elements

- Initialisation: Here the control variable is intialised.
- Test expression: Here the value of the control variable is tested.
- Updation: Here the value of the control variable is updated
- Body of Loop: statements that are to be executed repeatedly

Different Looping Statements

while loop	do...while loop	for loop

e.g.
i=1;
while(i<=100)
{
cout<<i;
i++;
}
	e.g.
	i=1;
	do
	{
	cout<<i;
	i++;
	} while(i<=100);
		e.g.
		for(i=1;i<=100;i++)
		cout<<i;

Entry Controlled Loop	Exit Controlled Loop
Condition is tested before the loop body	Condition is tested after the loop body
Loop body may never be executed	Loop body will be executed at least once
e.g. while , for	e.g. do...while

Conditional Operator (**?:**): It is a ternary operator used as an alternative to if..else statement.
e.g.largest= (a>b)? a:b;

Jump Statements: break, continue, goto, return

- break: it terminates a loop.
- continue: It forces the next iteration of the loop.
- goto: Trasfer program control from one place to another.

teachoo

Chapter 2 – Arrays

Array

- Array is used to store more than one data items of same data type.
- Each data item stored in an array is called **element**.
- The total number of elements stored in an array is called its **size**.
- The elements are stored in **continuous memory locations**.
- Each element is identified by its positional value called **Subscript** or **Index**.
- The value of the subscripts ranges from **"0"** to **"size-1".**

Array Declaration

Syntax: <data type><array name>[<size>];

e.g. int num[10];

Here num is array with 10 elements, index of first element is 0, index of the last element is 9

Accessing elements of the Array

Accessing each elements of the array is called **traversal**.

This is done by specifying the index in bracketsalong with array name.

e.g.

Read elements of an array num[10]	**Display elements of an array num[10]**
for(i=0;i<9;i++) cin>>num[i];	for(i=0;i<9;i++) cout<<num[i];

String Handling

String is a group of characters. Hence it can be handled by using a character array.

e.g. char str[10];

This array can store 9 characters. Further a **null character ('\0')** is stored at the end of the string automatically to act as a string terminator.

Input / Output operation on Strings

gets () : Using cin, it is not possible to input strings containing spaces. Space is treated as string delimiter. Therefore a function **gets ()** is used to input string including white spaces.

e.g. gets(str);

puts(): It is used to display the string.

e.g. puts(str);

The gets() and puts() function is defined in **cstdio.**

teachbook.in

Chapter 3- Functions

Modular Programming- Advantages: Reduces the size of the program, less chance of error occurrence, reduces programming complexity, improves reusability

Arguments: The data given to the function for performing the task are called **arguments (parameters).** The arguments used in the function calling statement (calling function) are known as **actual arguments**. The arguments used in the function header (called function) are known as **formal arguments**.

Type	Built- In Functions	Use	Example
Console Functions (Header File: cstdio)	getchar()	Read a character	ch=getchar();
	putchar()	Display a character	putchar(ch);
Stream Functions (Header File: iostream)	get()	Read a character or a string	cin.get(ch);
	getline()	Read a string	cin.getline(str,10);
	put()	Display a character	cout.put(ch);
	write()	Display a string	cout.put(str,10);
String Functions (Header File: cstring)	strlen()	Find the length of a string	strlen(str);
	strcpy()	Copy string to another string	strcpy(str1,str2);
	strcat()	Concatenates (appends) 2 strings	strcat(str1,str2);
	strcmp()	Compare 2 strings. Returns 0, if two strings are equal.	strcmp(str1,str2);
	strcmpi()	Compare 2 string by ignoring cases	strcmpi(str1,str2);
Mathematical Functions (Header File: cmath)	abs()	Finds absolute value of a number	e.g. abs(-5) : 5
	sqrt()	Finds square root of a number	e.g. sqrt(25) : 5
	pow()	Finds the power of a number.	eg. pow(x,y) : find x^y
Character Type Functions (Header File: cctype)	isdigit()	Check whether a character is digit or not.	If digit returns 1, else 0.
	isalpha()	Check whether a character is alphabet or not	If alphabet returns 1, else 0.
	isalnum()	Check whether a character is alphanumeric or not	If alphanumeric returns1, else 0.
	islower()	Check whether a character is lower case or not	If lowercase returns1, else 0.
	isupper()	Check whether a character is upper case or not	If uppercase returns1, else 0.
	tolower()	Convert a character to lower case.	tolower(ch);
	toupper()	Convert a character to upper case.	toupper(ch);

Function Calling Methods (Parameter Passing Techniques)

Call By Value	Call By Reference
Ordinary variables are used as formal arguments	Reference variables are used as formal arguments
Actual arguments can be variables, constants or expressions	Actual arguments can be variables only.
Separate memory locations for actual and formal arguments	Same memory location is shared by actual and formal arguments

Local Variable	Global Variable
Variable declared within a function	Variable declared outside all the functions
It can only be accessed within a function.	It can be accessed by all the functions.
Its life time is function execution time.	Its life time is program execution time.

teachbook.in

Chapter 4

Web Technology

Static Web Page	Dynamic Web page
Content is fixed	Contents are changed frequently
It never uses databases.	Database is used
Easy to design.	Requires programming skills

Client side scripting languages are used to create client side scripts .e.g. JavaScript, VB Script
Server side scripting languages are used to create server side scripts .e.g. ASP, JSP, PHP

Client Side Script	Server Side Script
Processed by the client machine	Processed by the server machine
Used for data validation	Used to access and manipulate the databases
Users can block client side scripts.	Users cannot block server side scripts.

Software Ports: 20, 21- FTP, 25- SMTP, 53- DNS, 80- HTTP, 110- POP, 443- HTTPS

Structure of an HTML program

An HTML program contains two sections

- Head Section: contains basic information including title. (between <HEAD> and </HEAD>)
- Body Section: Actual contents. (Between <BODY> and </BODY>

Container Tag: Tag with both opening tag and closing tag**.**
eg. <HTML>, <TITLE><BODY> etc.
Empty Tag: Tag with only opening tag.
eg.
, <HR><IMG> etc.

<BODY>

Attributes	Meaning
BGCOLOR	background colour
BACKGROUND	background image
TEXT	colour of the text
LEFTMARGIN	left margin of the webpage.
TOPMARGIN	top margin of the webpage.
LINK	colour of the hyperlink. Default colour is **blue.**
ALINK	colour of the activated link. Default colour is **green.**

Heading Tags :

- <H1>, <H2>, <H3>, <H4>, <H5> and <H6>are known as Heading Tags,
- used to display headings in different sizes.
- <H1> displays the biggest heading,<H6> displays the smallest heading.
- Attribute is **ALIGN** : It specifies the alignment of the heading; values are; left, right or center.

e.g. <H1 ALIGN="center"> Govt. H.S.S Thirunalloor</H1>

<P>: It specifies the paragraph.Attribute is ALIGN: It specifies the alignment of the paragraph. Values are; left right , center or justify.

e.g. <P ALIGN="center">India is my country</P>

**
:** line break.
<HR>: draws a horizontal line.

Attributes	Meaning
SIZE	thickness of the line.
WIDTH	length of the line
ALIGN	alignment of the line.
COLOR	colour of the line.
NOSHADE	draw the line without any shading effect. It has no value.

teachbook.in

Text Formatting Tags

Tag	Description	Example	Output
<B>	displays the text in bold.	<B>Kerala</B>	**Kerala**
<I>	displays the text in italics.	<I>Kerala</I>	*Kerala*
<U>	displays the text with underline.	<U>Kerala</U>	Kerala
<S>	displays the text in strike through style.	<S>Kerala</S>	~~Kerala~~
<SUB>	displays the text as subscript.	H₂	H_2O
<SUP>	displays the text as superscript.	x³	x^3
<Q>	displays the text in double quotation marks (small quotations)	<Q>Kerala</Q>	"Kerala"
<BIG>	displays the text in font size bigger than the normal text size	<BIG>Kerala</BIG>	Kerala
<SMALL>	displays the text in font size smaller than the normal text size	<SMALL>Kerala </SMALL>	Kerala
<STRONG>	used as a phrase tag to specify an important text. (same as <B>) .	<STRONG>Kerala </STRONG>	**Kerala**
<EM>	used to emphasise a text. (same as <I>).	<EM>Kerala</EM>	*Kerala*
<BLOCKQUOTE>	used to indent a content. (large quotations)	<BLOCKQUOTE> Knowledge is the best weapon to conquer this world. <BLOCKQUOTE>	
<CENTER>	used to display the content centrally aligned.	<CENTER>All the best </CENTER>	

<MARQUEE>: It displays a text or an image scrolling either horizontally or vertically.

Attributes	Meaning
DIRECTION	direction of the scrolling. values left, right, up or down.
BEHAVIOUR	behaviour of the scrolling. values; scroll, slide or alternate.
SCROLLDELAY	time delay between two successive scrolling.
SCROLLAMOUNT	speed of the scrolling.
LOOP	how many times the element should scroll in a web page. Default value is infinite.

<IMG>: It displays an image. It is an empty tag.

Attributes	Meaning
SRC	file name of the image.
HEIGHT	height of the image.
WIDTH	width of the image.
ALIGN	alignment of the picture with respect to a text. Values: Top, Middle or Bottom.
ALT	It specifies the alternative text to be displayed if the browser cannot display the image.

e.g.<IMG SRC="kerala.jpg" HEIGHT=300 WIDTH=300>

<FONT>: It specifies the font settings for a text in a webpage.

Attributes	Meaning
FACE	Font name
SIZE	Font size
COLOR	Font colour.

e.g.<FONT FACE="verdana" SIZE=5 COLOR="green"> Speed thrills; but kills;</FONT>

techbook.in

Chapter 5
Web Designing using HTML

Hyperlink: Text or an image that links to another webpage or another part of the same webpage
<A>(anchor tag) is used to specify hyperlinks in a webpage. Its attribute HREF specifies the URL or file name of webpage to which the hyperlink is referenced.
External links are hyperlinks to another webpage
e.g. <A HREF="address.html"> Contact Details </A>

Internal links are hyperlinks to another part of the same webpage.
<A HREF="#kerala"> Kerala State </A>

ORDERED LIST
<OL> and <LI> is used to display ordered list in a webpage.
<OL>:It specifies an order list.AttributeTYPE specifies the type of the ordered list.
<LI> : It specifies each item in an ordered list.

TYPE="1"(Default value)	1 English 2 Hindi 3 Malayalam	<OL> <LI>English</LI> <LI>Hindi</LI> <LI>Malayalam</LI></OL>
TYPE="a"	a English b Hindi c Malayalam	<OL TYPE="a"> <LI>English</LI> <LI>Hindi</LI> <LI>Malayalam</LI></OL>
TYPE="A"	A English B Hindi C Malayalam	<OL TYPE="A"> <LI>English</LI> <LI>Hindi</LI> <LI>Malayalam</LI></OL>
TYPE="i"	i English ii Hindi iii Malayalam	<OL TYPE="i"> <LI>English</LI> <LI>Hindi</LI> <LI>Malayalam</LI></OL>
TYPE="I"	I English II Hindi III Malayalam	<OL TYPE="I"> <LI>English</LI> <LI>Hindi</LI> <LI>Malayalam</LI></OL>

UNORDERED LIST
<UL> and <LI> is used to display unordered list.
<UL>: It specifies an unordered list. AttributeTYPE specifies the type of the unordered list
<LI> : It specifies each item in an unordered list.

TYPE="disc" (Default value)	• English • Hindi • Malayalam	<UL> <LI>English</LI> <LI>Hindi</LI> <LI>Malayalam</LI> </UL>
TYPE="circle"	o English o Hindi o Malayalam	<UL TYPE="circle"> <LI>English</LI> <LI>Hindi</LI> <LI>Malayalam</LI> </UL>
TYPE="square"	▪ English ▪ Hindi ▪ Malayalam	<UL TYPE="square"> <LI>English</LI> <LI>Hindi</LI> <LI>Malayalam</LI> </UL>

teachbook.in

DEFINITION LIST

<DL>, <DT> and <DD> is used to display definition list.

- <DL> : It specifies a definition list
- <DT>: It specifies each term in a definition list.
- <DD>: It specifies the definition of each term.

e.g.

```
CPU
        Central Processing Unit
ALU
        Arithmetic and Logical Unit
RAM
        Random Access Memory
```

```
<DL>
<DT>CPU </DT>
<DD>Central Processing Unit</DD>
<DT>ALU </DT>
<DD>Arithmetic and Logical
Unit</DD>
<DT>RAM </DT>
<DD>Random Access Memory</DD>
</DL>
```

TABLE

<TABLE>, <TR>, <TH> and <TD> are used to display tables.

<TABLE>:It specifies table in a webpage

BORDER	It specifies the border of the table
BGCOLOR	It specifies the background colour of the table
BACKGROUND	It specifies a background picture for a table
ALIGN	It specifies alignment of the table (values are left, right or center)
HEIGHT	It specifies the height of the table (usually it is given in pixels)
WIDTH	It specifies the width of the table (usually it is given in percentage)
CELLSPACING	It specifies the space difference between two adjacent cells of the table
CELLPADDING	It specifies the space difference between the cell border and its data

<TR>	**<TH>**	**<TD>**
It specifies each row in a table.	It specifies heading cells of a table	It specifies data cells of a table.
	Data are displayed in bold face	Data are displayed in normal face
	Alignment is center by default	Alignment is left by default

Attributes of <TR>, <TD> and <TH>

ALIGN: It specifies the horizontal alignment (values are left, right and center)

VALIGN: It specifies the vertical alignment (values are top, middle and bottom)

BGCOLOR: It specifies the background colour.

Roll No	**Name**	**Total**
1	Arjun	546
2	Bindu	466

```
<TABLE >
<TR>
        <TH>Roll No</TH>
        <TH>Name</TH>
        <TH>Total</TH>
</TR>
<TR>
        <TD>1</TD>
        <TD>Arjun</TD>
        <TD>546</TD>
</TR>
<TR>
        <TD>2</TD>
        <TD>Bindu</TD>
        <TD>466</TD>
</TR>
</TABLE>
```

teachbook.in

Form

Form is used to collect data from the user and submit it to the server machine.

An HTML form contain different controls such as

- Text Box
- Password Box,
- Text Area
- Radio Button
- Check Box
- Select Box
- Submit Button
- Reset Button

<INPUT>: It is used to display different controls.

<INPUT TYPE="text">	text box.	To enter data in single line
<INPUT TYPE="password">	password box.	To enter password
<INPUT TYPE="radio">	radio button.	To select an option from multiple options
<INPUT TYPE="checkbox">	check box.	To select one or more options
<INPUT TYPE="submit">	submit button	Submits the data to the server machine.
<INPUT TYPE="reset">	reset button	Clears the data entered in a form.

<TEXTAREA>: Displays text area through which user can enter multiple line of text.

<SELECT> and **<OPTION>:** It is used to display the select box (drop down box)

Chapter 6
Client Side Scripting using JavaScript

Brendan Eich: Developer of JavaScript

<SCRIPT>: It is used to include JavaScript codes in an HTML page. Its attribute "language" to specifies the name of the scripting language.

Data types

- Number: It represents numbers
- String: It represents string
- Boolean: It represents a data item that has two values; either true or false.

Variable Declaration

In Javascript, variables are declared by using the keyword **var**.

e.g. var x, y;

It only specifies the names of variables. It does not specify their data types. The definition of a variable is completed only when it is assigned a value.

Undefined Data Type

If a variable is declared, but it is not assigned a value, then JavaScript engine cannot understand its data type. Hence it is assigned as undefined data type.

Operators: Arithmetic, Relational, Logical, Assignment, Increment, decrement operators (similar to C++)

Control structures: if, switch, while, for (similar to C++)

String Addition Operator (+)

"+" operator behaves differently according to the type of operands. If both the operands are numbers, then it will add the numbers. If both the operands are strings, then it will concatenate the strings.

Built-in Functions

- **Number() :** converts a string data to a number.
- **alert() :** displays a message in a message window.
- **isNaN():**checks whether a value is number or not. Returns true if the value is not a number.
- **toUpperCase():**converts a string to upper case.
- **toLowerCase():**converts a string to lower case.
- **charAt():**returns a character at a particular position.charAt(0) returns the first character.
- **length:** It is a property that returns the length of a string.

teachbook.in

Chapter 7
Web Hosting

Web Hosting

It is the service of providing storage space in a web server to store websites in order to avail that site on the internet.

Web Hosts: Companies that provide web hosting services are called web hosts

Types of web hosting: Shared Hosting, Dedicated Hosting, Virtual Private Server

Shared Hosting: In shared hosting, different websites are stored in a single server.

Advantages

- Servers are cheap & easy to use
- Security issues are taken care by the web host

Disadvantages

- If any of the website has a large volume of traffic, it will slow down the remaining websites.
- Not suitable for websites that require huge storage space, huge bandwidth.

Dedicated Hosting

In dedicated hosting, the web server and all its resources are exclusively used by a single client.

Advantages

- Client has the complete freedom to choose the hardware and software requirements
- Websites can be accessed quickly.

Disadvantages

- It is expensive

Virtual Private Server (VPS)

In this case, the server machine is virtually partitioned into a number of virtual servers using virtualization softwares. Each virtual server is assigned with specific amount of storage space & memory, and other softwares.

Advantages

- It provides almost all the services of dedicated hosting at lesser cost.
- It provides dedicated bandwidth to each website on the server.
- Users are permitted to install and configure any software on their VPS.

Virtualisation Softwares : - VMware, VirtualBox, Microsoft Hyper-V

Free Hosting

- Provides web hosting free of charge.
- Displays advertisements in the websites to meet the expenses.
- Size of the files that can be uploaded is limited.
- Audio/ video files may not be permitted.

e.g. yola.com

FTP Client Software

The FTP Client Software is used to transfer the files of the websites from our computer to the web server. The software requires a user name and a password to connect to the web server. The software uses SFTP protocol that encrypts and sends data to the server machine.

eg. Cute FTP, Smart FTP, FileZilla

CMS (Content Management System)

- It is a web based software system for designing and publishing websites.
- Different templates are available to design websites.
- Web designing and programming knowledge is not needed.

e.g. Wordpress, Drupal, Joomla

Responsive Web Designing

- It is designing web sites suitable to work on every device by adjusting itself to the screen size.
- It is implemented by using flexible grid layout, flexible images and media queries.

teachbook.in

Chapter 8
Database Management System

DBMS

DBMS (Database Management System) is for defining, constructing and manipulating databases.
e.g. Oracle, MySQL, MS SQL Server, MS Access

Advantages of DBMS

- It controls data redundancy (duplication of data).
- It avoids data inconsistencycy
- It allows sharing of data.
- It provides data security.
- It ensures data integrity(correctness of the data).
- It ensures data recovery.

Components of DBMS

- Hardware: Computer system used to store and manage database
- Software: Programs and utilities to manage the database
- Database: Organised collection of related data
- User: Users access and manage the database
- Procedures: Commands or rules to access and manipulate the databases

Structure of the Database

- A **File** is a collection of related records
- A **Record** is a collection of related fields.
- A **Field**is the smallest unit of data.

Data Abstraction: Representing important details of the database by hiding its complex storage and management details.

Levels of Data Abstraction

- Physical Level: It specifies how the data is actually stored in the storage medium.
- Logical Level: It specifies the data stored and the relationship among the data.
- View Level: It specifies how user views and accesses the data.

Schema: Structure of the database
Instance: Content of the database
Metadata: Data about the data
Data Independence: Ability to modify the schema definition in one level without affecting the schema definition in higher levels. 2 types of data independence.

- Physical Data Independence: Ability to modify the schema definition in physical level without affecting the schema definitions in logical level and view level.
- Logical Data Independence: Ability to modify the schema definition in logical level without affecting the schema definitions in view level.

Users of the Database

- Database Administrator (DBA): Person having centralised control over the database.
- Application programmer: Programmers access the database through application programs.
- Sophisticated users: Doctors, engineers, accountants etc. access the database through queries.
- Naïve users: Ordinary users access database through programs written previously.

Duties of Database Administrator

- Defining and maintaining physical level and logical level.
- Creating other users and granting them permission to access the database.
- Ensuring data recovery from system crashes or failures.

Terminologies in Relational Data Model

- Entity: Entity is an object or a concept that has certain characteristics.
- Relation: Relation refers to a table in which data are arranged in rows and columns.
- Tuple: Each row in a table is called Tuple.
- Attribute: Columns of a relation are called attributes.
- Cardinality: Number of tuples in a relation is called cardinality.

teachbook.in

- Degree: Number of attributes in a relation is called degree.
- Domain: It is the set of all the possible values that can be assigned to an attribute.

Key

- Primary Key: It is an attribute that uniquely identifies each tuple in a relation
- Candidate Key: It is an attribute which are candidates to select as a primary key.
- Alternate Key: A candidate key which is not selected as the primary key is called alternate key.
- Foreign Key: It is an attribute in a relation which is a primary key in another relation.

Relational Algebra

It defines the set of operations performed on relations. Different operations are

- Select (σ)
- Project (π)
- Union (U)
- Intersection (∩)
- Set Difference (-)
- Cartesian Product (X)

Select (σ): It is a unary operation that selects tuples of a relation satisfying a certain condition.

e.g. Display the details of students in Commerce batch

Ans: $\sigma_{BATCH="Commerce"}(STUDENT)$

Project (π):It is a unary operation that projects certain attributes of a relation.

e.g. Display roll number and name of all the students

Ans: $\pi_{ROLLNO, NAME}(STUDENT)$

Union (∪): R1UR2 is a relation containing tuples of both R1 and R2 without repetition.

Intersection (∩):R1∩R2 a new relation with common tuples of R1 and R2.

Set Difference (-): R1-R2 is a new relation with all the tuples of R1, but not in R2.

e.g. consider the following 2 relations, R1 and R2

R1

ROLLNO	NAME	BATCH
1	Ajith	Commerce
2	Anand	Science
3	Aravind	Commerce

R2

ROLLNO	NAME	BATCH
2	Anand	Science
3	Bijoy	Science
4	Deepak	Commerce

R1 U R2

ROLLNO	NAME	BATCH
1	Ajith	Commerce
2	Anand	Science
3	Aravind	Commerce
3	Bijoy	Science
4	Deepak	Commerce

R1 ∩ R2

ROLLNO	NAME	BATCH
2	Anand	Science

R1 - R2

ROLLNO	NAME	BATCH
1	Ajith	Commerce
3	Aravind	Commerce

Cartesian Product: It is a binary operation that returns a relation containing all the possible combinations of tuples of both the relations .

e.g. consider the following 2 relations, R1 and R2

R1

AdmNo	Name
100	Mithun
102	Rahul

R2

PEN	Teacher	Subject
4102	Pradeep	Eco
3456	Ajith	Acc
2450	Arun	Eng

R1 X R2

AdmNo	Name	PEN	Teacher	Subject
100	Mithun	4102	Pradeep	Eco
100	Mithun	3456	Ajith	Acc
100	Mithun	2450	Arun	Eng
102	Rahul	4102	Pradeep	Eco
102	Rahul	3456	Ajith	Acc
102	Rahul	2450	Arun	Eng

Let c1 and c2 be the cardinalities of R1 and R2 respectively, then the cardinality of R1 X R2 is c1 x c2.

Let d1 and d2 be the degrees of R1 and R2 respectively, then the degree of R1 X R2 is d1 + d2.

ke-book.in

CHAPTER 9
Structured Query Language

Components of SQL

DDL (Data Definition Language): It provides commands to define and modify the structure of the database.e.g. CREATE, ALTER, DROP

DML (Data Manipulation Language): It provides commands to manipulate the database such as adding data, deleting data, modifying data and retrieving data.
e.g. INSERT, DELETE, UPDATE, SELECT

DCL (Data Control Language) : It provides 2 commands to control the accessing of database.

- GRANT: It gives the user the privileges to access the database.
- REVOKE: It withdraws the privileges already given to the user.

SQL Data Types

- INT or INTEGER :It specifiesinteger data
- DEC or DECIMAL: It specifies floating point data.
- CHAR or CHARACTER: It specifies fixed length strings.
- VARCHAR: It specifiesvariable length strings.
- DATE: It specifies date.
- TIME: It specifies time.

Difference between CHAR(n) and VARCHAR(n)

CHAR	VARCHAR
It specifies fixed length strings.	It specifies variable length strings.
It always allocates fixed bytes of memory.	It allocates only sufficient bytes of memory
It can store a max of 255 characters	It can store a max of 65535 characters

Constraints

- PRIMARY KEY: It specifies an attribute as primary key.
- NOT NULL: It specifies that an attribute should not contain any null value.
- UNIQUE: It specifies that an attribute should contain unique values.
- AUTO_INCREMENT: It automatically increments the value of an attribute.
- DEFAULT : It specifies a default value for an attribute

SQL Commands

- CREATE TABLE: Creates a table.
- ALTER TABLE: Modify the structure of a table.
- DROP TABLE: Deletes the table.
- DESCRIBE (DESC): Displays the structure of a table.
- INSERT: Adding rows to a table.
- SELECT: Displaying rows of a table.
- UPDATE: Modifying rows of a table.
- DELETE: Deleting rows of a table.

DISTINCT: used in SELECT statement to display values of an attribute without repetition**.**
WHERE: used in SELECT statement to display rows of a table based on a condition.
LIKE: Pattern matching operator
ORDER BY: Used in SELECT statement to display rows in ascending or descending order.
GROUP BY: used in SELECT statement to group the rows of a table based on an attribute.
HAVING: Used in SELECT statement with GROUP BY clause to specify the condition.

Aggregate Functions

- SUM: returns sum of values of an attribute.
- MIN: returns the minimum value of an attribute.
- MAX: returns the maximum value of an attribute.
- AVG: returns the average value of an attribute.
- COUNT: returns the total number of values of an attribute.

Teachbook.in

CHAPTER 10
ERP (Enterprise Resource Planning)

Enterprise Resource Planning (ERP): ERP combines all the business requirements of an enterprise together into a single integrated software system that runs off a centralised database.

Functional Units of ERP

- Financial Module
- Manufacturing Module
- Production Planning Module
- HR Module
- Inventory Control Module
- Purchasing Module
- Marketing Module
- Sales & Distribution Module
- Quality Management Module

BPR (Business Process Re-engineering)

- It is restructuring and redesigning of business processes to achieve improvements in performance such as cost, quality, service and speed of an enterprise.
- It includes identification of business processes, analysis of business processes, designing of a revised process and implementation of the revised process.

Popular ERP packages

- **Oracle ERP:** It is an ERP package from Oracle Corporation, USA.
- **SAP:** SAP stands for Systems Applications and Products for Data Processing.
- **Odoo:** It is an open source ERP package (free software). It was formerly known as Open ERP.
- **Microsoft Dynamics:** It is an ERP package from Microsoft Corporation.
- **Tally ERP:** It is a business accounting software developed by Bangalore based Company.

Benefits of ERP

- Improved Resource Utilisation
- Better Customer Satisfaction
- Provides accurate information
- Decision Making Capability
- Increased Flexibility
- Information Integrity

Risks of ERP

- High Cost
- Implementation is time consuming process
- Requirement of additional trained staff
- Operational and maintenance issues

ERP related Technologies

- Product Life Cycle Management (PLM)
- Customer Relationship Management (CRM)
- Management Information System (MIS)
- Supply Chain Management (SCM)
- Decision Support System (DSS)

CHAPTER 11
Trends and Issues in ICT

GPRS: GPRS (General Packet Radio Service): packet oriented data service.
EDGE (Enhanced Data rates for GSM Evolution): offers higher data transmission rates than GPRS.
Mobile Communication Services: SMS, MMS, GPS & Smart Card

SMS (Short Message Service)

- It is a text messaging service to send short text messages (up to 160 characters).
- It is SMS is sent through a Short Message Service Centre (SMSC)
- It is delivered by using the protocol called Signaling System No. 7 (SS7).

MMS (Multimedia Messaging Service)

- It is a standard way to send and receive multimedia messages by using mobile phones.
- An MMS server is used to store and forward the multimedia messages.

GPS (Global Positioning System)

- It is a satellite based navigation system used to locate a geographic position anywhere on earth.
- It consists of satellites, control and monitoring stations and receivers.
- It is used by transporting companies to track the movement of their vehicles.

teachbook.in

Smart Card

- A small plastic card embedded with a chip that contains a memory and a processor.
- It can be used to store and process data.
- SIM (Subscriber Identity Module) is a type of smart card.
- Smart cards are also used as Credit Cards, Debit Cards etc.

Mobile Operating System

It is the operating system used in mobile devices such as smart phones, tablets etc.
eg. Android, iOS, Blackberry OS

Android Operating System (First version is Cupcake)

- It is a Linux based mobile operating system from Google.
- It was originally developed by **Andy Rubin**& his friends in 2003.
- Supports touch screen operations like swiping, tapping, pinching etc.

Big Data in Business: Large volume of data that comes from social media posts, digital pictures and videos and transaction records which are related to a particular business.
Big Data Analytics: It is the process of examining big data to uncover market trends, customer preferences and other useful business information.

Business Logistics

It is the management of the flow of goods in a business between the point of origin and point of consumption. It ensures the availability of right product in the right quantity and condition, at the right place and time for right customer, at the right cost.

RFID (Radio Frequency Identification) Technology

- It is used to identify, track or detect objects in logistics.
- It consists of a **RFID tag** and a **reader.**
- These tags are pasted or inserted on products or containers.

Intellectual Property Rights

Patent	Trademark	Copyright
Applies to invention of a product or service	Refers to Name, logo and symbols related to a product	Applies to Creative Intellectual works
Registration is required, not renewable	Registration is required, renewable	Not necessary to register
For a period of 20 years	For a period of 10 years	Until 60 years after the death of the last surviving creator

Cyber Crime against Individuals

- Using another person's identifying information to commit crimes
- Posting humiliating comments in chat rooms or social media.
- Impersonation and Cheating

Cyber Crime against Property

- Credit Card Fraud
- Intellectual Property Theft
- Internet Time Theft

Cyber Crime against Government

- Cyber terrorism against government computer networks.
- Hacking of government websites and posting antinational comments in it.
- DoS attack against e-governance websites.

Cyber Forensics: It is defined as a discipline to collect and analyse the data from computer systems, networks and storage devices in a way that is admissible as evidence in a court of law.

Infomania

- It is the state of a person exhausted with excess information.
- It occurs due to the accumulation of information from internet and mobile phones
- Constantly checking e–mails, social networking sites etc. are symptoms of infomania.

ictbook.in