HTML

HTML stands for Hyper Text Markup Language, which is the most widely used language on Web to develop web pages. HTML was created by Berners-Lee in late 1991 but "HTML 2.0" was the first standard HTML specification which was published in 1995. HTML 4.01 was a major version of HTML and it was published in late 1999. Though HTML 4.01 version is widely used but currently we are having HTML-5 version which is an extension to HTML 4.01, and this version was published in 2012.

What is HTML?

HTML is the standard markup language for creating Web pages.

- HTML stands for **H**yper **T**ext **M**arkup **L**anguage
- HTML describes the structure of Web pages using markup
- HTML elements are the building blocks of HTML pages
- HTML elements are represented by tags
- HTML tags label pieces of content such as "heading", "paragraph", "table", and so on
- Browsers do not display the HTML tags, but use them to render the content of the page

HTML Tags

HTML tags are element names surrounded by angle brackets:

<tagname>content here...</tagname>

- HTML tags normally come in pairs like and
- The first tag in a pair is the start tag, the second tag is the end tag
- The end tag is written like the start tag, but with a forward slash inserted before the tag name

The <!DOCTYPE> Declaration

The <!DOCTYPE> declaration represents the document type, and helps browsers to display web pages correctly. It must only appear once, at the top of the page (before any HTML tags).

The <!DOCTYPE> declaration is not case sensitive.

The <!DOCTYPE> declaration for HTML5 is: **<!DOCTYPE html>**

HTML Tags Chart

To use any of the following HTML tags, simply select the HTML code you'd like and copy and paste it into your web page.

Tag	Name	Code Example	Browser View
<!--	**comment**	**<!--**This can be viewed in the **HTML** part of a document**-->**	Nothing will show
<a -	**anchor**	** Visit Our Site****	Visit google
	bold	****Example****	**Example**
<big>	**big (text)**	**<big>**Example**</big>**	Example
<body>	**body of HTML document**	**<body>**The content of your **HTML** page**</body>**	Contents of your web page
 	line break	Keonics** **Hubli	Keonics Hubli
	center	** **This will center your contents** **	This will center your contents
<dd>	**definition description**	<dl> <dt>Definition Term</dt> **<dd>Definition of the term</dd>** <dt>Definition Term</dt> **<dd>Definition of the term</dd>** </dl>	Definition Term **Definition of the term** Definition Term **Definition of the term**
<dl>	**definition list**		

<dt>	**definition term**		
	emphasis	This is an ****Example**** of using the emphasis tag	This is an *Example* of using the emphasis tag
	font	**<font** face="Times New Roman" size="3" color="#ff0000">Example****	Example
<h1> <h2> <h3> <h4> <h5> <h6>	**heading 1** **heading 2** **heading 3** **heading 4** **heading 5** **heading 6**	** **Heading 1 Example** ** ** **Heading 2 Example** ** ** **Heading 3 Example** ** ** **Heading 4 Example** ** ** **Heading 5 Example** ** ** **Heading 6 Example** **	**Heading 1** **Heading 2** **Heading 3** **Heading 4** **Heading 5** **Heading 6**
<hr>	**horizontal rule**	**<hr />**	Contents of your web page Contents of your web page
<hr>	**horizontal rule**	**<hr** width="50%" size="3" />	Contents of your web page Contents of your web page
<hr>	**horizonta l rule**	**<hr** width="50%" size="3" noshade />	Contents of your web page Contents of your web page
<hr> (Internet Explorer)	**horizonta l rule**	**<hr** width="75%" color="#ff0000" size="4" />	Contents of your web page Contents of your web page
<html>	**hypertext markup language**	**<html>** <head> <meta> <title>Title of your web page</title> </head> <body>**HTML web page** contents </body> **</html>**	Contents of your web page
	italic	****Example****	*Example*
<img>	**image**	**<img** src="Earth.gif" width="41" height="41" border="0" alt="text describing the image" />	

1)
```
<html>
  <head>
    <title>
        My First web page
    </title>
  </head>
 <body>
    Welcome to HTML!...
 </body>
</html>
```

2)

```
<html>
  <head>
    <title>
        back color
    </title>
  </head>
 <body bgcolor="wheat">
    Welcome to HTML!...
 </body>
</html>
```

3)

```
<html>
  <head>
    <title>
        text color
    </title>
  </head>
 <body text="red">
    Welcome to HTML!...
 </body>
</html>
```

4)

```
<html>
  <head>
    <title>
          heading tags
    </title>
  </head>
 <body>
    <h1>Heading 1</h1>
    <h2>Heading 2</h2>
    <h3>Heading 3</h3>
    <h4>Heading 4</h4>
    <h5>Heading 5</h5>
    <h6>Heading 6</h6>
 </body>
</html>
```

5)

```
<html>
  <head>
    <title>
          font size tags
    </title>
  </head>
 <body>
    <font size="1">Font size 1</font><br>
    <font size="2">Font size 2</font><br>
    <font size="3">Font size 3</font><br>
    <font size="4">Font size 4</font><br>
    <font size="5">Font size 5</font><br>
    <font size="6">Font size 6</font><br>
    <font size="7">Font size 7</font>
 </body>
</html>
```

6)

```
<html>
  <head>
    <title>
        iframe
    </title>
  </head>
  <body>
    <h1>KEONICS</h1>
   <iframe src="29.html"  align="right"
height="500" width="180"></iframe>
    <iframe src="25.html" align="bottom"
align="left" height="200" width="300">
  </body>
</html>
```

7)

```
<html>
  <head>
    <title>
        iframe
    </title>
  </head>
  <body>
    <h1>KEONICS</h1>
   <iframe src="29.html"  align="right"
height="500" width="180"></iframe>
    <iframe src="25.html" align="bottom"
align="left" height="200" width="300">
  </body>
</html>
```

8)

```
<html>
   <head>
      <title>
           Image
      </title>
   </head>
  <body>
    <img src="5.jpg" height="300" width="400"
border="4">
  </body>
</html>
```

9)

```
<html>
  <head>
     <title>
          iframe
     </title>
  </head>
  <body>
     <h1>KEONICS</h1>
    <iframe src="29.html"  align="right"
height="500" width="180"></iframe>
    <iframe src="25.html" align="bottom"
align="left" height="200" width="300">
  </body>
</html>
```

10)

```
<html>
<head>
<title>
  use of horizontal line
</title>
</head>
<body>
<h1>This is heading 1</h1>
<p>This is some text.</p>
<hr>
<h2>This is heading 2</h2>
<p>This is some other text.</p>
<hr>
<h2>This is heading 3</h2>
<p>This is some other text.</p>
</body>
</html>
```

11)

```
<html>
   <head>
      <title>
           Paragraph with alignment tags
      </title>
   </head>
  <body>
     <p align="right">Paragraph 1</p>
     <p align="center">Paragraph 2</p>
     <p  align="left">Paragraph 3</p>
  </body>
</html>
```

12)

```
<html>
   <head>
      <title>
           order listing
      </title>
   </head>
  <body>
         <H2>ORDERED LIST</H2>
     <ol>
          <li>C</li>
          <li>C++</li>
          <li>Java</li>
     </ol>
     <ol type="I">
          <li>C</li>
          <li>C++</li>
          <li>Java</li>
     </ol>
     <ol type="i">
          <li>C</li>
          <li>C++</li>
          <li>Java</li>
     </ol>
     <ol type="A">
          <li>C</li>
          <li>C++</li>
          <li>Java</li>
     </ol>
     <ol type="a">
          <li>C</li>
          <li>C++</li>
          <li>Java</li>
     </ol>
  </body>
</html>
```

13)

```
<html>
   <head>
     <title>
          Unorder listing
     </title>
   </head>
  <body>
   <H2>UNORDERED LIST</H2>
    <ul>
         <li>C</li>
         <li>C++</li>
         <li>Java</li>
    </ul>
    <ul type="square">
         <li>C</li>
         <li>C++</li>
         <li>Java</li>
    </ul>
    <ul type="circle">
         <li>C</li>
         <li>C++</li>
         <li>Java</li>
    </ul>
    <ul type="disc">
         <li>C</li>
         <li>C++</li>
         <li>Java</li>
    </ul>
  </body>
</html>
```

14)

```
<html>
        <head>
                <title>definition list</title>
        </head>
<body>
<h2>Definition List</h2>
        <dl>
        <dt>COMPUTER</dt>
        <dd>Computer is an electronic device
accepts data from
              user and process the data ,gives you
required result as                output
        </dd>
        </dt>
        </dl>
        <dl>
        <dt>What is HTML?</dt>
        <dd>HTML is the standard markup
language for creating     Web pages.
        </dd>
        </dt>
        </dl>
</body>
</html>
```

15)

```
<html>
   <head>
     <title>
          MOVING text
     </title>
   </head>
  <body>
      <marquee direction="right" bgcolor="orange">
       <h1>KEONICS COMPUTER CENTRE</h1>
      </marquee>
  </body>
</html>
```

16)

```
<html>
   <head>
     <title>
          Login page
     </title>
   </head>
  <body>
      <table border="1" bgcolor="pink">
         <tr>
            <th colspan="2">Login Up </th>
         </tr>
         <tr>
            <th>User Name</th>
                <td><input type="text"></td>
         </tr>
         <tr>
            <th>Password</th>
                <td><input type="password"
maxlength="8"></td>
         </tr>
         <tr>

         <tr>
                <td colspan="2" align="center">
                <input type="Submit"
value="Login">
                <input type="Reset"
value="Clear">
              </td>
        </tr>
      </table>
  </body>
</html>
```

17)

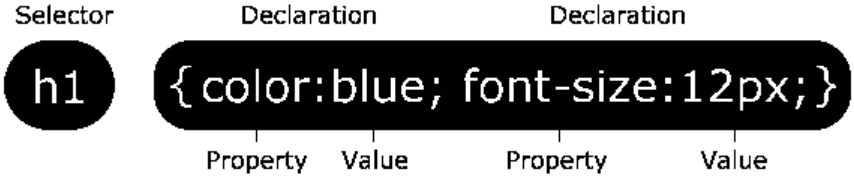
```
<html>
  <head>
    <title>
        Sign up page
    </title>
  </head>
 <body>
     <table border="1" bgcolor="pink">
        <tr>
           <th colspan="2">Sign Up </th>
        </tr>
        <tr>
           <th>First Name</th>
                <td><input type="text"></td>
        </tr>
        <tr>
           <th>Middle Name</th>
                <td><input type="text"></td>
        </tr>
        <tr>
           <th>Last Name</th>
                <td><input type="text"></td>
        </tr>
        <tr>
           <th>Address</th>

         <td><TextArea>hubli</TextArea></td>
        </tr>
        <tr>
           <th>Gender</th>
                <td>
                <input type="radio"
name="gr1">Male
                <input type="radio"
name="gr1">Female
                </td>
        </tr>
        <tr>
           <th>Language Known</th>
                <td>
                <input type="Checkbox">Kannada
<br>
                <input
type="Checkbox">Hindi<br>
                <input
type="Checkbox">English<br>
                </td>
        </tr>
        <tr>
           <th>Select Country</th>
                <td>
                <Select>
                  <option>India</option>
                  <option>Aus</option>
                  <option>England</option>
                      <option>USA</option>
                </Select>
                </td>
        </tr>
        <tr>
                <td colspan="2" align="center">
                <input type="Submit"
value="Save">
                <input type="Reset"
value="Clear">
                </td>
        </tr>
      </table>
  </body>
</html>
```

18)

```
<frameset cols="20%,20%,30%,30%">
  <frame src="29.html">
 <frame src="36.html">
  <frame src="25.html">
  <frame src="26.html">
 </frameset>
```

What is CSS?

- **CSS** stands for **C**ascading **S**tyle **S**heets
- CSS describes **how HTML elements are to be displayed on screen, paper, or in other media**
- CSS **saves a lot of work**. It can control the layout of multiple web pages all at once
- External style sheets are stored in **CSS files**
- CSS Syntax
- A CSS rule-set consists of a selector and a declaration block:



- The selector points to the HTML element you want to style.
- The declaration block contains one or more declarations separated by semicolons.
- Each declaration includes a CSS property name and a value, separated by a colon.

- A CSS declaration always ends with a semicolon, and declaration blocks are surrounded by curly braces.
- In the following example all <p> elements will be center-aligned, with a red text color:

The element Selector

The element selector selects elements based on the element name.

You can select all <p> elements on a page like this (in this case, all <p> elements will be center-aligned, with a red text color):

Example

```
p {
   text-align: center;
   color: red;
}
```

The id Selector

The id selector uses the id attribute of an HTML element to select a specific element. The id of an element should be unique within a page, so the id selector is used to select one unique element! To select an element with a specific id, write a hash (#) character, followed by the id of the element.

The style rule below will be applied to the HTML element with id="para1":

Example

```
#para1 {
   text-align: center;
   color: red;
}
```

The class Selector

The class selector selects elements with a specific class attribute.

To select elements with a specific class, write a period (.) character, followed by the name of the class.

In the example below, all HTML elements with class="center" will be red and center-aligned:

Example

```
.center {
   text-align: center;
   color: red;
}
```

Grouping Selectors

If you have elements with the same style definitions, like this:

```
h1 {    text-align: center;
        color: red;  }
h2 {      text-align: center;
          color: red;  }
p {       text-align: center;
         color: red;}
```

It will be better to group the selectors, to minimize the code.

To group selectors, separate each selector with a comma.

In the example below we have grouped the selectors from the code above:

Example

```
h1, h2, p {
   text-align: center;
   color: red; }
```

CSS Comments

Comments are used to explain the code, and may help when you edit the source code at a later date. Comments are ignored by browsers.

A CSS comment starts with /* and ends with */. Comments can also span multiple lines:

Example

```
p {
   color: red;
   /* This is a single-line comment */
   text-align: center;}
/* This isa multi-line
comment */
```

Three Ways to Insert CSS

There are three ways of inserting a style sheet:

- External style sheet
- Internal style sheet
- Inline style

External Style Sheet

With an external style sheet, you can change the look of an entire website by changing just one file!

Each page must include a reference to the external style sheet file inside the <link> element. The <link> element goes inside the <head> section:

Example

```
<head>
<link rel="stylesheet" type="text/css" href="mystyle.css">
</head>
```

An external style sheet can be written in any text editor. The file should not contain any html tags. The style sheet file must be saved with a **.css extension.**

Here is how the "**mystyle.css"** looks:

```
body {
   background-color: lightblue;
}
h1 {
   color: navy;
   margin-left: 20px;
}
```

Internal Style Sheet

An internal style sheet may be used if one single page has a unique style.

Internal styles are defined within the <style> element, inside the <head> section of an HTML page:

Example

```
<head>
<style>
body {
   background-color: linen;
}

h1 {
   color: maroon;
   margin-left: 40px;
}
</style>
</head>
```

Inline Styles

An inline style may be used to apply a unique style for a single element.

To use inline styles, add the style attribute to the relevant element. The style attribute can contain any CSS property.
The example below shows how to change the color and the left margin of a <h1> element:
Example
```
<h1 style="color:blue;margin-left:30px;">This is a heading</h1>
```
CSS Comments
Comments are used to explain your code, and may help you when you edit the source code at a later date. Comments are ignored by browsers.
A CSS comment starts with /* and ends with */. Comments can also span multiple lines:
Example
```
p {
   color: red;
   /* This is a single-line comment */
   text-align: center;
}

/* This is
a multi-line
comment */
```

CSS Programs

1)
```
<html>
<body>
<h2 style="background-color:red">
Red background-color
</h2>
<h2 style="background-color:green">
Green background-color
</h2>
<h2 style="background-color:blue;color:FFFFFF">
Blue background-color and white text color
</h2>
<h2 style="background-color:orange">
Orange background-color
</h2>
<h2 style="background-color:yellow">
Yellow background-color
</h2>
<h2 style="background-color:CYAN">
Cyan background-color
</h2>
<h2 style="background-color:black;color:white">
Black background-color and white text color
</h2>
</body>
</html>
```

2)

```
<html>
<head>
<style>
body {
   background-image: url("1.jpg");
   background-repeat:repeat;
   background-position: left top;
   background-attachment:fixed;
}
</style>
</head>
<body>
<h1>Hello World!</h1>
<p>The background-image is fixed. Try to scroll down the page.</p>
<p>copy paragraph 20 times for scrolling</p>
</body>
</html>
```

3)

```
<html>
<head>
<style>
p.dotted {border-style: dotted;}
p.dashed {border-style: dashed;}
p.solid {border-style: solid;}
p.double {border-style: double;}
p.groove {border-style: groove;}
p.ridge {border-style: ridge;}
p.inset {border-style: inset;}
p.outset {border-style: outset;}
p.none {border-style: none;}
p.hidden {border-style: hidden;}
p.mix {border-style: dotted dashed solid double;}
</style>
</head>
<body>
<h2>The border-style Property</h2>
<p>This property specifies what kind of border to display:</p>

<p class="dotted">A dotted border.</p>
<p class="dashed">A dashed border.</p>
<p class="solid">A solid border.</p>
<p class="double">A double border.</p>
<p class="groove">A groove border.</p>
<p class="ridge">A ridge border.</p>
<p class="inset">An inset border.</p>
<p class="outset">An outset border.</p>
<p class="none">No border.</p>
<p class="hidden">A hidden border.</p>
<p class="mix">A mixed border.</p>
</body>
</html>
```

4)

```
<html>
<head>
<style>
div {
   background-color: lightgrey;
   width: 300px;
   border: 25px solid green;
   padding: 25px;
   margin: 50px;
}
</style>
</head>
<body>
<h2>Demonstrating the Box Model</h2>
<p>The CSS box model is essentially a box that wraps around every HTML element. It consists of: borders, padding, margins, and the actual content.</p>
<div>This text is the actual content of the box. We have added a 25px padding, 25px margin and a 25px green border. </div>
</body>
</html>
```

5)

```
<html>
<body>

<h3 style="color:Tomato;">Hello World</h3>

<p style="color:Blue;">You can set the color of text</p>

<p style="color:Green;">You can set the color of text</p>

</body>
</html>
```

6)

```
<html>
<head>
<style>
p.normal {
   font-weight: normal;
  font-family: IMPACT;
 font-size: 250%;
 font-style: italic;
}
p.light {
   font-weight: lighter;
 font-size: 300%;
 font-style: oblique;

}
p.thick {
   font-weight: bold;
 font-size: 40px;
font-variant: small-caps;
}
p.thicker {
   font-weight: 900;
}
</style>
```

```
</head>
<body>
<p class="normal">This is a paragraph. normal</p>
<p class="light">This is a paragraph. light</p>
<p class="thick">This is a paragraph . thick</p>
<p class="thicker">This is a paragraph. thicker</p>
</body>
</html>
```

7)

```
<html>
<head>
<style>
/* unvisited link */
a:link {
   color: red;
}

/* visited link */
a:visited {
   color: green;
}

/* mouse over link */
a:hover {
   color: hotpink;
}

/* selected link */
a:active {
   color: blue;
}
</style>
</head>
<body>

<p><b><a href="f1.html" >This is a link</a></b></p>
<p><b>Note:</b> a:hover MUST come after a:link and a:visited in the CSS definition in order to be effective.</p>
<p><b>Note:</b> a:active MUST come after a:hover in the CSS definition in order to be effective.</p>

</body>
</html>
```

8)

```
<html>
<head>
<style>
  h1
    {
     color:Crimson ;    /* any color  value*/
     letter-spacing:3px;  /* any pixel value*/
     word-spacing:5px;  /* any pixel value */
     text-align:center;     /* left center right justify */
    text-decoration:underline; /* overline line-through */
     text-transform:capitalize; /* uppercase lowercase */
    text-shadow: 3px 3px Gold ;
   /* horizontal_shadow vertical_shadow color */
    }
h2
{
  text-indent: 25px;
   direction:ltr; /* rtl */
}
</style>
</head>
<body>
    <h1>KEONICS COMPUTER TRAINING CENTRE</h1>
<h2> IT PARK HUBLI</h2>
 </body>
</html>
```

9)

```
<html>
<body>
<h1 style="border: 2px solid Tomato;">Hello World</h1>
<h1 style="border: 2px solid DodgerBlue;">Hello World</h1>
<h1 style="border: 2px solid Violet;">Hello World</h1>
</body>
</html>
```

10)

```
<html>
<head>
<style>
p {     display: block;   }
h1 {     display:inline; }
</style>
</head>
<body>
<p>Hello Javatpoint</p>
<p>Java </p>
<h1>SQL </h1>
<h1>HTML </h1>
<h1>CSS </h1>
</body>
</html>
```

JavaScript - Overview

What is JavaScript ?

JavaScript is a dynamic computer programming language. It is lightweight and most commonly used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages. It is an interpreted programming language with object-oriented capabilities.

Client-Side JavaScript

Client-side JavaScript is the most common form of the language. The script should be included in or referenced by an HTML document for the code to be interpreted by the browser.

It means that a web page need not be a static HTML, but can include programs that interact with the user, control the browser, and dynamically create HTML content.

Advantages of JavaScript

The merits of using JavaScript are −

- **Less server interaction** − You can validate user input before sending the page off to the server. This saves server traffic, which means less load on your server.
- **Immediate feedback to the visitors** − They don't have to wait for a page reload to see if they have forgotten to enter something.
- **Increased interactivity** − You can create interfaces that react when the user hovers over them with a mouse or activates them via the keyboard.
- **Richer interfaces** − You can use JavaScript to include such items as drag-and-drop components and sliders to give a Rich Interface to your site visitors.

JavaScript - Syntax

JavaScript can be implemented using JavaScript statements that are placed within the **<script>... </script>** HTML tags in a web page.

You can place the **<script>** tags, containing your JavaScript, anywhere within your web page, but it is normally recommended that you should keep it within the **<head>** tags.

The <script> tag alerts the browser program to start interpreting all the text between these tags as a script. A simple syntax of your JavaScript will appear as follows.

```
<script ...>
  JavaScript code
</script>
```

The script tag takes two important attributes −

- **Language** − This attribute specifies what scripting language you are using.
- **Type** − This attribute is what is now recommended to indicate the scripting language in use and its value should be set to **"text/javascript".**

```
<script language = "javascript" type = "text/javascript">
  JavaScript code
</script>
```

First JavaScript Code

```
<html>
  <body>
    <script language = "javascript" type = "text/javascript">
            document.write("Hello World!")
    </script>
  </body>
</html>
```

Comments in JavaScript

JavaScript supports both C-style and C++-style comments, Thus −

- Any text between a // and the end of a line is treated as a comment and is ignored by JavaScript.
- Any text between the characters /* and */ is treated as a comment. This may span multiple lines.
- JavaScript also recognizes the HTML comment opening sequence <!--. JavaScript treats this as a single-line comment, just as it does the // comment.
- The HTML comment closing sequence --> is not recognized by JavaScript so it should be written as //-->.
- JavaScript Variables
- Like many other programming languages, JavaScript has variables. Variables can be thought of as named containers. You can place data into these containers and then refer to the data simply by naming the container.
- Before you use a variable in a JavaScript program, you must declare it. Variables are declared with the **var** keyword as follows.

```
<script type = "text/javascript">
    var name;
    var address;
</script>
```

Note − Use the **var** keyword only for declaration or initialization, once for the life of any variable name in a document. You should not re-declare same variable twice.

JavaScript Variable Scope

The scope of a variable is the region of your program in which it is defined. JavaScript variables have only two scopes.

- **Global Variables** − A global variable has global scope which means it can be defined anywhere in your JavaScript code.
- **Local Variables** − A local variable will be visible only within a function where it is defined. Function parameters are always local to that function.

JavaScript Variable Names

While naming your variables in JavaScript, keep the following rules in mind.

- You should not use any of the JavaScript reserved keywords as a variable name.
- JavaScript variable names should not start with a numeral (0-9). They must begin with a letter or an underscore character. For example, **123test** is an invalid variable name but **_123test** is a valid one.
- JavaScript variable names are case-sensitive. For example, **Name** and **name** are two different variables.

JavaScript – Operators

JavaScript supports the following types of operators.

- Arithmetic Operators
- Comparison Operators
- Logical (or Relational) Operators
- Assignment Operators
- Conditional (or ternary) Operators

Java script Programs

1)
```
<HTML>
<body>
<p> SUM OF TWO NUMBERS</P>
<script type="text/javascript">
var a,b;
a=10;
b=20;
var sum=a+b;
document.write("a+b="+sum);
</script>
</body>
</HTML>
```

2)

```
<HTML>
<body>
<p> ARITHMATIC OPERATION</P>
<script type="text/javascript">
var a,b;
a=20;
b=3;
var sum=a+b;
var d=a-b;
var p=a*b;
var q=a/b;
var r=a%b;
document.write("</h3>a+b="+sum+"</br>");
document.write("a-b="+d+"</br>");
document.write("a*b="+p+"</br>");
document.write("a/b="+q+"</br>");
document.write("a%b="+r+"</br></h3>");
</script>
</body>
</HTML>
```

3)

```
<!--program to illustrate do while -->
<html>
<body>
<script type = "text/javascript">
var count = 0;
document.write("Starting Loop" + "<br />");
do {
document.write("Current Count : " + count + "<br />");
count++;
}
while (count < 5);
document.write ("Loop stopped!");
</script>
<p>Set the variable to different value and then try...</p>
</body>
</html>
```

4)

```
<html>
<body>
<script type = "text/javascript">
var n=-5;
if(n>0)
{
document.write("<br> Given no  "+n+" is +ve no")
}
if(n<0)
{
document.write("<br> Given no   "+n+" is -ve no")
}
</script>
</body>
</html>
```

5)

```
<html>

<body>
<script type = "text/javascript">

var n1=3,n2=4;
if(n1>n2)
{
document.write("<br>"+n1+" is big")
}
else
{
document.write("<br>"+n2+" is big")
}
</script>
</body>
</html>
```

6)

```
<html>
<body>
<script type = "text/javascript">
var area,l=2,b=2,r=2,pi=3.142,h=2;
var ch=2;
document.write("<br>1-->area of a traingle");
document.write("<br>2-->area of a rectangle");
document.write("<br>3-->area of a circle")  ;
document.write("<br>Your choice is 2:");
switch(ch)
{
case 1:
area=0.5*b*h;
document.write("<br>Area of a traingle="+area);
break;
case 2:
area=l*b;
```

```
            document.write("<br>Area of a
rectangle="+area);
            break;
      case 3:
            area=pi*r*r;
            document.write("<br>Area of a
circle="+area);
            break;
     default:
            document.write("<br>Invalid Choice");
   }
</script>
</body>
</html>
```

7)

```
<html>
<body>
<script type = "text/javascript">
var i=1;
while(i<=20)
   {
        document.write("<br>"+i);
     i=i+2;
    }
</script>
</body>
</html>
```

8)

```
<html>
<body>
<script type = "text/javascript">
var i;
for(i=1;i<=5;i++)
{
document.write("<br>"+i);
}
</script>
</body>
</html>
```

9)

```
<html>
  <head>
    <script type = "text/javascript">
      function sayHello(name, age) {
        document.write (name + " is " + age + "
years old.");
      }
    </script>
  </head>

  <body>
    <p>Click the following button to call the
function</p>
    <form>
      <input type = "button" onclick =
"sayHello('John', 7)" value = "Say Hello">
    </form>
    <p>Use different parameters inside the function
and then try...</p>
  </body>
</html>
```

10)

```
<html>
<body>
<p id="demo">JavaScript can change HTML
content.</p>
<button type="button"
onclick='document.getElementById("demo").innerH
TML = "Hello JavaScript!"'>
Click Me!</button>
</body>
</html>
```

C Programming

Introduction to C Programming

C is a general-purpose, high-level language that was originally developed by Dennis M. Ritchie to develop the UNIX operating system at Bell Labs. C was originally first implemented on the DEC PDP-11 computer in 1972.

In 1978, Brian Kernighan and Dennis Ritchie produced the first publicly available description of C, now known as the K&R standard.

The UNIX operating system, the C compiler, and essentially all UNIX application programs have been written in C. C has now become a widely used professional language for various reasons −

- Easy to learn
- Structured language
- It produces efficient programs
- It can handle low-level activities
- It can be compiled on a variety of computer platforms

Facts about C

- C was invented to write an operating system called UNIX.
- C is a successor of B language which was introduced around the early 1970s.
- The language was formalized in 1988 by the American National Standard Institute (ANSI).
- The UNIX OS was totally written in C.
- Today C is the most widely used and popular System Programming Language.
- Most of the state-of-the-art software have been implemented using C.
- Today's most popular Linux OS and RDBMS MySQL have been written in C.

Why use C?

C was initially used for system development work, particularly the programs that make-up the operating system. C was adopted as a system development language because it produces code that runs nearly as fast as the code written in assembly language.

Some examples of the use of C might be −

- Operating Systems
- Language Compilers
- Assemblers
- Text Editors
- Print Spoolers
- Network Drivers
- Modern Programs
- Databases
- Language Interpreters
- Utilities

Example:/*Program to Display a message*/

```
#include<stdio.h>
main()
{     clrscr();
      printf("Hello,World");
return(0);
}
```

Let us take a look at the various parts of the above program −

- The first line of the program *#include <stdio.h>* is a preprocessor command, which tells a C compiler to include stdio.h file before going to actual compilation.
- The next line *int main()* is the main function where the program execution begins.
- The next line /*...*/ will be ignored by the compiler and it has been put to add additional comments in the program. So such lines are called comments in the program.
- The next line *printf(...)* is another function available in C which causes the message "Hello, World!" to be displayed on the screen.
- The next line **return 0;** terminates the main() function and returns the value

C - Basic Syntax

You have seen the basic structure of a C program, so it will be easy to understand other basic building blocks of the C programming language.

Tokens in C

A C program consists of various tokens and a token is either a keyword, an identifier, a constant, a string literal, or a symbol. For example, the following C statement consists of five tokens −

```
printf("Hello, World! \n");
```

The individual tokens are −

```
printf
(
"Hello, World! \n"
);
```

Semicolons

In a C program, the semicolon is a statement terminator. That is, each individual statement must be ended with a semicolon. It indicates the end of one logical entity.

Given below are two different statements −

```
printf("Hello, World! \n");
return 0;
```

Comments

Comments are like helping text in your C program and they are ignored by the compiler. They start with /* and terminate with the characters */ as shown below −

```
/* my first program in C */
```

You cannot have comments within comments and they do not occur within a string or character literals.

Identifiers

A C identifier is a name used to identify a variable, function, or any other user-defined item. An identifier starts with a letter A to Z, a to z, or an underscore '_' followed by zero or more letters, underscores, and digits (0 to 9).

C does not allow punctuation characters such as @, $, and % within identifiers. C is a **case-sensitive** programming language. Thus, *Manpower* and *manpower*are two different identifiers in C. Here are some examples of acceptable identifiers −

```
mohd       zara    abc   move_name  a_123
myname50   _temp   j     a23b9      retVal
```

Keywords

The following list shows the reserved words in C. These reserved words may not be used as constants or variables or any other identifier names.

Auto	else	Long	switch
Break	enum	register	typedef
Case	extern	return	union
Char	float	short	unsigned
Const	for	signed	void
Continue	goto	sizeof	volatile
Default	If	static	while
Do	int	struct	_Packed
Double			

Whitespace in C

A line containing only whitespace, possibly with a comment, is known as a blank line, and a C compiler totally ignores it.

Whitespace is the term used in C to describe blanks, tabs, newline characters and comments. Whitespace separates one part of a statement from another and enables the compiler to identify where one element in a statement, such as int, ends and the next element begins. Therefore, in the following statement −

```
int age;
```

there must be at least one whitespace character (usually a space) between int and age for the compiler to be able to distinguish them. On the other hand, in the following statement −

```
fruit = apples + oranges;   // get the total fruit
```

no whitespace characters are necessary between fruit and =, or between = and apples, although you are free to include some if you wish to increase readability.

C - Data Types

Data types in c refer to an extensive system used for declaring variables or functions of different types. The type of a variable determines how much space it occupies in storage and how the bit pattern stored is interpreted.

C - Variables

A variable is nothing but a name given to a storage area that our programs can manipulate. Each variable in C has a specific type, which determines the size and layout of the variable's memory; the range of values that can be stored within that memory; and the set of operations that can be applied to the variable.

The name of a variable can be composed of letters, digits, and the underscore character. It must begin with either a letter or an underscore. Upper and lowercase letters are distinct because C is case-sensitive. Based on the basic types explained in the previous chapter, there will be the following basic variable types −

Type	Description
char	Typically a single octet(one byte). This is an integer type.
int	The most natural size of integer for the machine.
float	A single-precision floating point value.
double	A double-precision floating point value.
void	Represents the absence of type.

C programming language also allows to define various other types of variables, which we will cover in subsequent chapters like Enumeration, Pointer, Array, Structure, Union, etc. For this chapter, let us study only basic variable types.

Variable Definition in C

A variable definition tells the compiler where and how much storage to create for the variable. A variable definition specifies a data type and contains a list of one or more variables of that type as follows −

```
type variable_list;
```

Here, **type** must be a valid C data type including char, w_char, int, float, double, bool, or any user-defined object; and **variable_list** may consist of one or more identifier names separated by commas. Some valid declarations are shown here −

```
int    i, j, k;
char   c, ch;
float  f, salary;
double d;
```

C - Constants & Literals

Constants refer to fixed values that the program may not alter during its execution. These fixed values are also called **literals**.

C - Operators

An operator is a symbol that tells the compiler to perform specific mathematical or logical functions. C language is rich in built-in operators and provides the following types of operators −

- Arithmetic Operators
- Relational Operators
- Logical Operators

- Bitwise Operators
- Assignment Operators

Arithmetic Operators

The following table shows all the arithmetic operators supported by the C language. Assume variable **A** holds 10 and variable **B** holds 20 then −

Operator	Description	Example
+	Adds two operands.	A + B = 30
−	Subtracts second operand from the first.	A − B = 10
*	Multiplies both operands.	A * B = 200
/	Divides numerator by de-numerator.	B / A = 2
%	Modulus Operator and remainder of after an integer division.	B % A = 0
++	Increment operator increases the integer value by one.	A++ = 11
--	Decrement operator decreases the integer value by one.	A-- = 9

Relational Operators

The following table shows all the relational operators supported by C. Assume variable **A** holds 10 and variable **B** holds 20 then −

Operator	Description	Example
==	Checks if the values of two operands are equal or not. If yes, then the condition becomes true.	(A == B) is not true.
!=	Checks if the values of two operands are equal or not. If the values are not equal, then the condition becomes true.	(A != B) is true.
>	Checks if the value of left operand is greater than the value of right operand. If yes, then the condition becomes true.	(A > B) is not true.
<	Checks if the value of left operand is less than the value of right operand. If yes, then the condition becomes true.	(A < B) is true.
>=	Checks if the value of left operand is greater than or equal to the value of right operand. If yes, then the condition becomes true.	(A >= B) is not true.
<=	Checks if the value of left operand is less than or equal to the value of right operand. If yes, then the condition becomes true.	(A <= B) is true.

Logical Operators

Following table shows all the logical operators supported by C language. Assume variable **A** holds 1 and variable **B** holds 0, then −

Operator	Description	Example
&&	Called Logical AND operator. If both the operands are non-zero, then the condition becomes true.	(A && B) is false.
||	Called Logical OR Operator. If any of the two operands is non-zero, then the condition becomes true.	(A || B) is true.
!	Called Logical NOT Operator. It is used to reverse the logical state of its operand. If a condition is true, then Logical NOT operator will make it false.	!(A && B) is true.

Assignment Operators The following table lists the assignment operators supported by the C language −

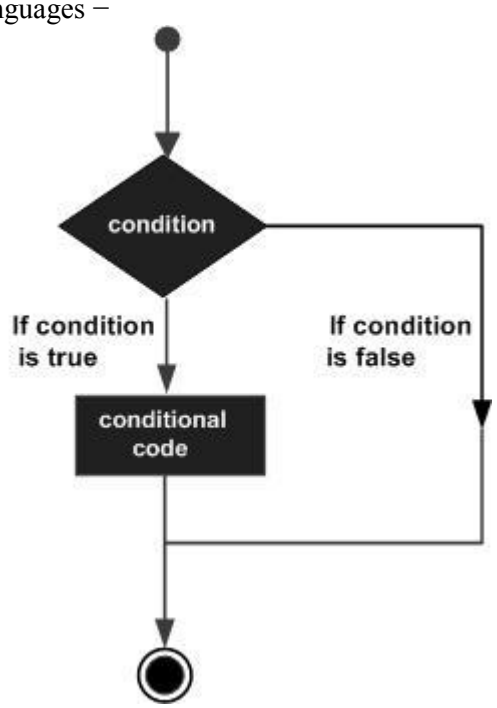
Operator	Description	Example
=	Simple assignment operator. Assigns values from right side operands to left side operand	C = A + B will assign the value of A + B to C
+=	Add AND assignment operator. It adds the right operand to the left operand and assign the result to the left operand.	C += A is equivalent to C = C + A
-=	Subtract AND assignment operator. It subtracts the right operand from the left operand and assigns the result to the left operand.	C -= A is equivalent to C = C - A

*=	Multiply AND assignment operator. It multiplies the right operand with the left operand and assigns the result to the left operand.	C *= A is equivalent to C = C * A

C - Decision Making

Decision making structures require that the programmer specifies one or more conditions to be evaluated or tested by the program, along with a statement or statements to be executed if the condition is determined to be true, and optionally, other statements to be executed if the condition is determined to be false.

Show below is the general form of a typical decision making structure found in most of the programming languages −



C programming language assumes any **non-zero** and **non-null** values as **true**, and if it is either **zero** or **null**, then it is assumed as **false** value.

C programming language provides the following types of decision making statements.

- Simple if statements
- If. Else statements
- Ladder if statements
- Nested if statements
- Switch statements

The ? : Operator

We have covered **conditional operator ? :** in the previous chapter which can be used to replace **if...else** statements. It has the following general form −

```
Exp1 ? Exp2 : Exp3;
```

Where Exp1, Exp2, and Exp3 are expressions. Notice the use and placement of the colon.

The value of a ? expression is determined like this −

- Exp1 is evaluated. If it is true, then Exp2 is evaluated and becomes the value of the entire ? expression.
- If Exp1 is false, then Exp3 is evaluated and its value becomes the value of the expression.

C - Loops

You may encounter situations, when a block of code needs to be executed several number of times. In general, statements are executed sequentially: The first statement in a function is executed first, followed by the second, and so on.

C programming language provides the following types of Looping statements

- While loop

- Do while loop
- For loop

C - Functions

A function is a group of statements that together perform a task. Every C program has at least one function, which is **main()**, and all the most trivial programs can define additional functions.

You can divide up your code into separate functions. How you divide up your code among different functions is up to you, but logically the division is such that each function performs a specific task.

A function **declaration** tells the compiler about a function's name, return type, and parameters. A function **definition** provides the actual body of the function.

The C standard library provides numerous built-in functions that your program can call. For example, **strcat()** to concatenate two strings, **memcpy()** to copy one memory location to another location, and many more functions.

A function can also be referred as a method or a sub-routine or a procedure, etc.

Defining a Function

The general form of a function definition in C programming language is as follows −

```
return_type function_name( parameter list ) {
   body of the function
}
```

A function definition in C programming consists of a *function header* and a*function body*. Here are all the parts of a function −

- **Return Type** − A function may return a value. The **return_type** is the data type of the value the function returns. Some functions perform the desired operations without returning a value. In this case, the return_type is the keyword **void**.
- **Function Name** − This is the actual name of the function. The function name and the parameter list together constitute the function signature.
- **Parameters** − A parameter is like a placeholder. When a function is invoked, you pass a value to the parameter. This value is referred to as actual parameter or argument. The parameter list refers to the type, order, and number of the parameters of a function. Parameters are optional; that is, a function may contain no parameters.
- **Function Body** − The function body contains a collection of statements that define what the function does.

Example

Given below is the source code for a function called **max()**. This function takes two parameters num1 and num2 and returns the maximum value between the two −

```
/* function returning the max between two numbers */
int max(int num1, int num2) {
   /* local variable declaration */
   int result;
   if (num1 > num2)
      result = num1;
   else
      result = num2;
   return result;
}
```

Function Declarations

A function **declaration** tells the compiler about a function name and how to call the function. The actual body of the function can be defined separately.

A function declaration has the following parts −

```
return_type function_name( parameter list );
```

For the above defined function max(), the function declaration is as follows −

```
int max(int num1, int num2);
```

Parameter names are not important in function declaration only their type is required, so the following is also a valid declaration −

```
int max(int, int);
```

Function declaration is required when you define a function in one source file and you call that function in another file. In such case, you should declare the function at the top of the file calling the function.

Calling a Function

While creating a C function, you give a definition of what the function has to do. To use a function, you will have to call that function to perform the defined task.

When a program calls a function, the program control is transferred to the called function. A called function performs a defined task and when its return statement is executed or when its function-ending closing brace is reached, it returns the program control back to the main program.

To call a function, you simply need to pass the required parameters along with the function name, and if the function returns a value, then you can store the returned value. For example −

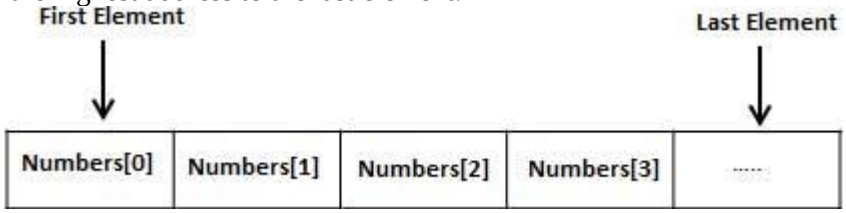
```
#include <stdio.h>
 /* function declaration */
int max(int num1, int num2);
int main () {
   /* local variable definition */
   int a = 100;
   int b = 200;
   int ret;
   /* calling a function to get max value */
   ret = max(a, b);
   printf( "Max value is : %d\n", ret );
   return 0;}
/* function returning the max between two numbers */
int max(int num1, int num2) {   /* local variable declaration */
   int result;
   if (num1 > num2)      result = num1;
   else       result = num2;    return result; }
```

C - Arrays

Arrays a kind of data structure that can store a fixed-size sequential collection of elements of the same type. An array is used to store a collection of data, but it is often more useful to think of an array as a collection of variables of the same type.

Instead of declaring individual variables, such as number0, number1, ..., and number99, you declare one array variable such as numbers and use numbers[0], numbers[1], and ..., numbers[99] to represent individual variables. A specific element in an array is accessed by an index.

All arrays consist of contiguous memory locations. The lowest address corresponds to the first element and the highest address to the last element.



Declaring Arrays

To declare an array in C, a programmer specifies the type of the elements and the number of elements required by an array as follows −

```
type arrayName [ arraySize ];
```

This is called a *single-dimensional* array. The **arraySize** must be an integer constant greater than zero and **type** can be any valid C data type. For example, to declare a 10-element array called **balance** of type double, use this statement −

```
double balance[10];
```

Here *balance* is a variable array which is sufficient to hold up to 10 double numbers.

Initializing Arrays

You can initialize an array in C either one by one or using a single statement as follows −

```
double balance[5] = {1000.0, 2.0, 3.4, 7.0, 50.0};
```

The number of values between braces { } cannot be larger than the number of elements that we declare for the array between square brackets [ ].

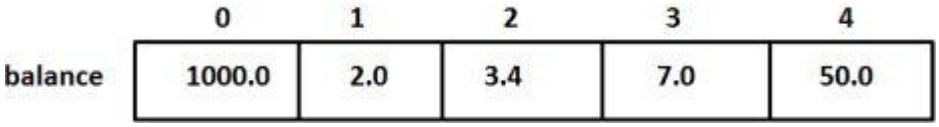
If you omit the size of the array, an array just big enough to hold the initialization is created. Therefore, if you write −

```
double balance[] = {1000.0, 2.0, 3.4, 7.0, 50.0};
```

You will create exactly the same array as you did in the previous example. Following is an example to assign a single element of the array −

```
balance[4] = 50.0;
```

The above statement assigns the 5th element in the array with a value of 50.0. All arrays have 0 as the index of their first element which is also called the base index and the last index of an array will be total size of the array minus 1. Shown below is the pictorial representation of the array we discussed above −



Accessing Array Elements

An element is accessed by indexing the array name. This is done by placing the index of the element within square brackets after the name of the array. For example −

```
double salary = balance[9];
```

The above statement will take the 10th element from the array and assign the value to salary variable. The following example Shows how to use all the three above mentioned concepts viz. declaration, assignment, and accessing arrays −

```
#include <stdio.h>
int main () {
   int n[ 10 ]; /* n is an array of 10 integers */
   int i,j;
   /* initialize elements of array n to 0 */
   for ( i = 0; i < 10; i++ ) {
      n[ i ] = i + 100; /* set element at location i to i + 100 */
   }
   /* output each array element's value */
   for (j = 0; j < 10; j++ ) {
      printf("Element[%d] = %d\n", j, n[j] );
   }
   return 0;
}
```

When the above code is compiled and executed, it produces the following result −

```
Element[0] = 100
Element[1] = 101
Element[2] = 102
Element[3] = 103
Element[4] = 104
Element[5] = 105
Element[6] = 106
```

```
Element[7] = 107
Element[8] = 108
Element[9] = 109
```

C - Pointers

Pointers in C are easy and fun to learn. Some C programming tasks are performed more easily with pointers, and other tasks, such as dynamic memory allocation, cannot be performed without using pointers. So it becomes necessary to learn pointers to become a perfect C programmer. Let's start learning them in simple and easy steps.

As you know, every variable is a memory location and every memory location has its address defined which can be accessed using ampersand (&) operator, which denotes an address in memory. Consider the following example, which prints the address of the variables defined −

```
#include <stdio.h>
int main () {
  int  var1;
  char var2[10];
  printf("Address of var1 variable: %x\n", &var1  );
  printf("Address of var2 variable: %x\n", &var2  );
  return 0;
}
```

When the above code is compiled and executed, it produces the following result −

```
Address of var1 variable: bff5a400
Address of var2 variable: bff5a3f6
```

What are Pointers?

A **pointer** is a variable whose value is the address of another variable, i.e., direct address of the memory location. Like any variable or constant, you must declare a pointer before using it to store any variable address. The general form of a pointer variable declaration is −

```
type *var-name;
```

Here, **type** is the pointer's base type; it must be a valid C data type and **var-name** is the name of the pointer variable. The asterisk * used to declare a pointer is the same asterisk used for multiplication. However, in this statement the asterisk is being used to designate a variable as a pointer. Take a look at some of the valid pointer declarations −

```
int    *ip;    /* pointer to an integer */
double *dp;    /* pointer to a double */
float  *fp;    /* pointer to a float */
char   *ch     /* pointer to a character */
```

C - Strings

Strings are actually one-dimensional array of characters terminated by a **null**character '\0'. Thus a null-terminated string contains the characters that comprise the string followed by a **null**.

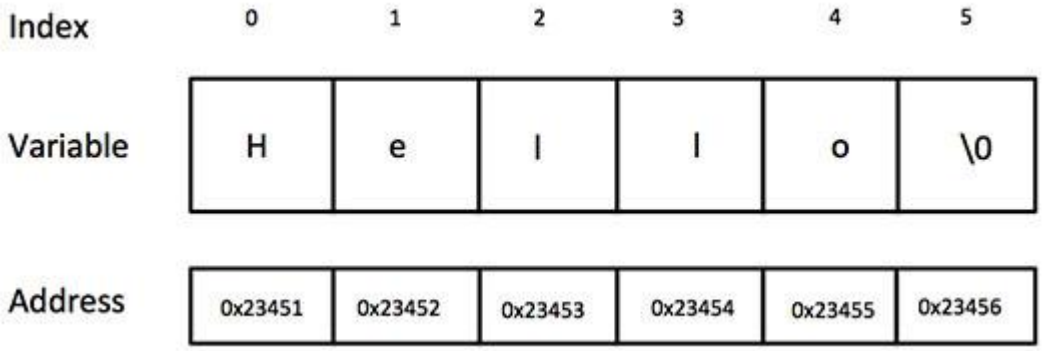
The following declaration and initialization create a string consisting of the word "Hello". To hold the null character at the end of the array, the size of the character array containing the string is one more than the number of characters in the word "Hello."

```
char greeting[6] = {'H', 'e', 'l', 'l', 'o', '\0'};
```

If you follow the rule of array initialization then you can write the above statement as follows −

```
char greeting[] = "Hello";
```

Following is the memory presentation of the above defined string in C/C++ −



Actually, you do not place the *null* character at the end of a string constant. The C compiler automatically places the '\0' at the end of the string when it initializes the array. Let us try to print the above mentioned string −

```
#include <stdio.h>
int main () {
   char greeting[6] = {'H', 'e', 'l', 'l', 'o', '\0'};
   printf("Greeting message: %s\n", greeting );
   return 0;
}
```

When the above code is compiled and executed, it produces the following result −

```
Greeting message: Hello
```

C supports a wide range of functions that manipulate null-terminated strings −

S.N.	Function & Purpose
1	**strcpy(s1, s2);** Copies string s2 into string s1.
2	**strcat(s1, s2);** Concatenates string s2 onto the end of string s1.
3	**strlen(s1);** Returns the length of string s1.
4	**strcmp(s1, s2);** Returns 0 if s1 and s2 are the same; less than 0 if s1<s2; greater than 0 if s1>s2.
5	**strchr(s1, ch);** Returns a pointer to the first occurrence of character ch in string s1.
6	**strstr(s1, s2);** Returns a pointer to the first occurrence of string s2 in string s1.

The following example uses some of the above-mentioned functions −

```
#include <stdio.h>
#include <string.h>
int main () {
   char str1[12] = "Hello";
   char str2[12] = "World";
   char str3[12];
   int  len ;
   /* copy str1 into str3 */
   strcpy(str3, str1);
   printf("strcpy( str3, str1) :  %s\n", str3 );
   /* concatenates str1 and str2 */
   strcat( str1, str2);
   printf("strcat( str1, str2):   %s\n", str1 );
  /* total lenghth of str1 after concatenation */
```

```
   len = strlen(str1);
   printf("strlen(str1) :  %d\n", len );
   return 0;
}
```

When the above code is compiled and executed, it produces the following result −

```
strcpy( str3, str1) :  Hello
strcat( str1, str2):   HelloWorld
strlen(str1) :  10
```

C - Structures

Arrays allow to define type of variables that can hold several data items of the same kind. Similarly **structure** is another user defined data type available in C that allows to combine data items of different kinds.

Structures are used to represent a record. Suppose you want to keep track of your books in a library. You might want to track the following attributes about each book −

- Title
- Author
- Subject
- Book ID

Defining a Structure

To define a structure, you must use the **struct** statement. The struct statement defines a new data type, with more than one member. The format of the struct statement is as follows −

```
struct [structure tag] {
   member definition;
   member definition;
   ...
   member definition;
} [one or more structure variables];
```

The **structure tag** is optional and each member definition is a normal variable definition, such as int i; or float f; or any other valid variable definition. At the end of the structure's definition, before the final semicolon, you can specify one or more structure variables but it is optional. Here is the way you would declare the Book structure −

```
struct Books {
   char  title[50];
   char  author[50];
   char  subject[100];
   int   book_id;
} book;
```

Accessing Structure Members

To access any member of a structure, we use the **member access operator (.)**. The member access operator is coded as a period between the structure variable name and the structure member that we wish to access. You would use the keyword **struct** to define variables of structure type. The following example shows how to use a structure in a program −

```
#include <stdio.h>
#include <string.h>
 struct Books {
   char  title[50];
   char  author[50];
   char  subject[100];
   int   book_id;
};
```

```
int main( ) {
   struct Books Book1;        /* Declare Book1 of type Book */
   struct Books Book2;        /* Declare Book2 of type Book */
   /* book 1 specification */
   strcpy( Book1.title, "C Programming");
   strcpy( Book1.author, "Nuha Ali");
   strcpy( Book1.subject, "C Programming Tutorial");
   Book1.book_id = 6495407;

   /* book 2 specification */
   strcpy( Book2.title, "Telecom Billing");
   strcpy( Book2.author, "Zara Ali");
   strcpy( Book2.subject, "Telecom Billing Tutorial");
   Book2.book_id = 6495700;

   /* print Book1 info */
   printf( "Book 1 title : %s\n", Book1.title);
   printf( "Book 1 author : %s\n", Book1.author);
   printf( "Book 1 subject : %s\n", Book1.subject);
   printf( "Book 1 book_id : %d\n", Book1.book_id);

   /* print Book2 info */
   printf( "Book 2 title : %s\n", Book2.title);
   printf( "Book 2 author : %s\n", Book2.author);
   printf( "Book 2 subject : %s\n", Book2.subject);
   printf( "Book 2 book_id : %d\n", Book2.book_id);
   return 0;
}
```

When the above code is compiled and executed, it produces the following result −

```
Book 1 title : C Programming
Book 1 author : Nuha Ali
Book 1 subject : C Programming Tutorial
Book 1 book_id : 6495407
Book 2 title : Telecom Billing
Book 2 author : Zara Ali
Book 2 subject : Telecom Billing Tutorial
Book 2 book_id : 6495700
```

1) // program to print the message.

```
#include<stdio.h>
#include<conio.h>
void main ()
{
printf (“welcome to c program”);
getch ();
}
```

2)// program to find sum and average of two numbers.

```
#include<stdio.h>
#include<conio.h>
void main ()
{
int a, b;
float sum, avg;
clrscr ();
printf (“enter the value of a and b :”);
scanf (“%d%d”, &a, &b);
sum=a+b;
avg=sum/2;
printf (“sum: =%f”, sum);
printf (“\n average: =%f”, avg);
getch ();
}
```

3) // program to find area and perimeter of rectangle.

```
#include<stdio.h>
#include<conio.h>
void main ()
{
int l, b;
float area, peri;
clrscr ();
printf (“enter the value of l and b :”);
scanf (“%d%d”, &l, &b);
area=l*b;
peri=2*(l+b);
printf (“area: =%f”, area);
printf (“\n perimeter: =%f”, peri);
getch ();
}
```

4) // program to find area and circumference of circle.

```
#include<stdio.h>
#include<conio.h>
void main ()
{
int r;
float area, cir;
clrscr ();
printf (“enter the value of r :”);
scanf (“%d”, &r);
area=3.142*r*r;
cir=2*3.142*r;
printf (“area: =%f”, area);
printf (“\n circumference: =%f”, cir);
getch ();
}
```

5) // program to find maximum of two no’s using conditional operator.

```
#include<stdio.h>
#include<conio.h>
void main ()
{
int a, b, max;
clrscr ();
printf (“enter the value of a and b :”);
scanf (“%d%d”, &a, &b);
max=(a>b) ? a: b;
printf (“%d= maximum of two no’s”, max);
getch ();
}
```

6) // program to find even or odd no’s.

```
#include<stdio.h>
#include<conio.h>
void main ()
{
int a;
clrscr ();
printf (“enter the value of a :”);
scanf (“%d”, &a);
if (a%2==0)
printf (“%d is even”, a);
if (a%2! =0)
printf (“%d is odd”, a);
getch ();
}
```

7)

```
#include<stdio.h>
#include<conio.h>
void main ()
{
int a, b;
clrscr ();
printf (“enter the value of a and b :”);
scanf (“%d%d”, &a, &b);
if (a>b)
printf (“%d is big”, a);
else
printf (“%d is big”, b);
getch ();
}
```

8) // program to find biggest of three no’s.

```
#include<stdio.h>
```

```
#include<conio.h>
void main ()
{
int a, b, c;
clrscr ();
printf (“enter the value of a, b and c :”);
scanf (“%d%d%d”, &a, &b, &c);
if (a>b)
{
if (a>b)
printf (“%d is big”, a);
else
printf (“%d is big”, c);
}
else
{
if (b>c)
printf (“%d is big”, b);
else
printf (“%d is big”, c);
}
getch ();
}
```

9)

```
// program to display n natural numbers using do
while.
#include<stdio.h>
#include<conio.h>
void main ()
{
int i=1 , n;
clrscr ();
printf (“enter the value of n:”);
scanf (“%d”, &n);
do
{
printf (“%d\n”, i);
i++;
} while (i<=10);
getch ();
}
```

10)

1) // program to display sum of n natural numbers using do while.

```
#include<stdio.h>
#include<conio.h>
void main ()
{
int i=1, n, sum=0;
clrscr ();
printf (“enter the value of n:”);
scanf (“%d”, &n);
do
{
printf (“%d\n”, i);
sum=sum+i;
i++;
} while (i<=10);
printf (“sum=%d”, sum);
getch ();
}
```

11)

// program to generate to print first n fibonacci number.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main ()
{
int fst=0, snd=1, n, count=2, next;
clrscr ();
printf (“enter the value of n :”);
scanf (“%d”, &n);
printf (“%d\n%d\n”, fst, snd);
while (count<n)
{
next=fst+ snd;
printf (“%d\n”, next);
count++;
fst=snd;
snd=next;
}
getch ();
}
```

12) // program to find sum & avg of array elements.

```
#include<stdio.h>
#include<conio.h>
void main ()
{
int a [100], i, n, sum=0, avg=0;
clrscr ();
printf (“enter the value of n :”);
scanf (“%d”, &n);
printf (“enter the elements of array :”);
for (i=1; i<=n; i++)
scanf (“%d”, &a[i]);
printf (“elements of array are\n”);
for (i=1; i<=5; i++)
{
sum=sum + a [i];
}
avg= sum/n;
printf (“\n sum=%d”, sum);
printf (“\n average=%d”, avg);
getch ();}
```

C++

What is C++:

C++ is an object-oriented programming language. It is an extension to C programming. C++ programming language was developed in 1980 by **BjarneStroustrup** at bell laboratories of AT&T (American Telephone & Telegraph), located in U.S.A. C++ runs on a variety of platforms, such as Windows, Mac OS, and the various versions of UNIX..

BjarneStroustrup is known as the **founder of C++ language.**

Object-Oriented Programming (OOPs)

C++ supports the object-oriented programming, the four major pillar of object oriented programming used in C++ are:

1. Inheritance 2.Polymorphism 3.Encapsulation 4.Abstraction

Usage of C++

By the help of C++ programming language, we can develop different types of secured and robust applications:

- ✓ Window application
- ✓ Client-Server application
- ✓ Device drivers
- ✓ Embedded firmware etc.

C vs C++

No.	C	C++
1)	C follows the **procedural style programming.**	C++ is multi-paradigm. It supports both **procedural and object oriented.**
2)	Data is less secured in C.	In C++, you can use modifiers for class members to make it inaccessible for outside users.
3)	C follows the **top-down approach.**	C++ follows the **bottom-up approach.**
4)	C does not support function overloading, Operator Overloading etc. OOP concepts.	C++ supports function overloading, Operator Overloading etc. OOP concepts..
5)	In C, you can't use functions in structure.	In C++, you can use functions in structure.
6)	In C, **scanf() and printf()** are mainly used for input/output.	C++ mainly uses stream **cin and cout** to perform input and output operations.

C++ Features:

C++ is object oriented programming language. It provides a lot of features that are given below.

- ➢ The main focus remains on data rather than procedures.
- ➢ Object-oriented programs are segmented into parts called objects.
- ➢ Data structures are designed to categorize the objects.
- ➢ Data member and functions are tied together as a data structure.
- ➢ Data can be hidden and cannot be accessed by external functions using access specifier .
- ➢ Objects can communicate among themselves using functions.
- ➢ New data and functions can be easily added anywhere within a program whenever required.
- ➢ Since this is an object-oriented programming language, it follows a bottom up approach, i.e. the execution of codes starts from the main which resides at the lower section and then based on the member function call the working is done from the classes.

C++ Program: Basically, a C++ program involves the following section:

```
Documentation
Pre-processor Statements
Global Declarations
The main () function{
Local Declarations
Program Statements & Expressions}
User Defined Functions
```

Example : //program to display a line of text.

```
#include<iostream.h>
#include<conio.h>
void main()
{
  clrscr();
 cout<<"welcome to c++ programming language";
 getch();
}
```

Standard output stream (cout): The **cout** is a predefined object of **ostream** class. It is connected with the standard output device, which is usually a display screen. The cout is used in conjunction with stream **insertion operator (<<)** to display the output on a console

Standard input stream (cin): The **cin** is a predefined object of **istream** class. It is connected with the standard input device, which is usually a keyboard. The cin is used in conjunction with stream **extraction operator (>>)** to read the input from a console.

Standard end line (endl): The **endl** is a predefined object of **ostream** class. It is used to insert a new line characters and flushes the stream.

C++ Variable: A variable is a name of memory location. It is used to store data. Its value can be changed and it can be reused many times. **Data_type variable list;**

The example of declaring variable is given below: **1) int x; 2) float y; 3) char z;**

Here, x, y, z are variables and int, float, char are data types.

We can also provide values while declaring the variables as given below:

1) int x=5,b=10; //declaring 2 variable of integer type 2)float f=30.8; 3)char c='A';

- ✓ A variable can have alphabets, digits and underscore.
- ✓ A variable name can start with alphabet and underscore only. It can't start with digit.
- ✓ No white space is allowed within variable name.
- ✓ A variable name must not be any reserved word or keyword e.g. chars, float etc.

C++ Data Types : There are 4 types of data types in C++ language.

Types	Data Types
Basic Data Type	int, char, float, double, etc
Derived Data Type	array, pointer, etc
User Defined Data Type	structure

C++ Keywords

A keyword is a reserved word. You cannot use it as a variable name, constant name etc.

Example: if, else,switch,case,do,while,for,class etc

C++ Operators: Operators are special type of functions that takes one or more arguments and produces a new value.

- Arithmetic Operators [+ ,- ,* ,/ ,%]
- Relational Operators]> ,>= ,< ,<= ,== ,!=]
- Logical Operators [&& , ||, !]
- Assignment Operator [=]
- Unary operator [++ ,--]
- Ternary or Conditional Operator [? , :]
- sizeof operator [sizeof(nt)]
- pointer to member operator [.* and ->*]
- **scope resolution** operator [::]
- **address** operator [&]
- **new o**perator (memory allocation operator)
- **delete** operator(memory release operator)

C++ Control Statement

if-else

In C++ programming, if statement is used to test the condition. There are various types of if statements in C++.

- **if statement**
- **if-else statement**
- **if-else-if ladder**

IF Statement: The C++ if statement tests the condition. It is executed if condition is true.

Syntax: **if(condition) {**
//code to be executed }

Example:
```
#include <iostream.h>
 #include<conio.h>
 void  main ()
{
      int num = 10;
    if (num % 2 == 0) {  cout<<"It is even number";  }
    getch();
 }
```

if-else Statement: The C++ if-else statement also tests the condition. It executes if block if condition is true otherwise else block is executed.

Syntax: if(condition) { //code if condition is true }
else { //code if condition is false }

Example:

```
#include <iostream.h>
#include<conio.h>
void main () {
int num;
cout<<"Enter a Number: ";
cin>>num;
if (num % 2 == 0) { cout<<"It is even number"<<endl; }
else { cout<<"It is odd number"<<endl; }
getch();
}
```

if-else-if ladder : statement executes one condition from multiple statements.

Syntax:

```
if(condition1){ //code to be executed if condition1 is true }
else if(condition2){ //code to be executed if condition2 is true }
else if(condition3){ //code to be executed if condition3 is true }
...
else{//code to be executed if all the conditions are false }
```

Example:

```
#include<iostream.h>
#include<conio.h>
void main()
{
    int avg;
    clrscr();
    cout<<"Enter average marks obtained in 5 subjects :";
    cin>>avg;
    cout<<"Your Grade is ";
    if(avg>80)
    { cout<<"A";}
    else if(avg>60 && avg<=80)
    { cout<<"B";}
    else if(avg>40 && avg<=60)
    { cout<<"C";}
    else
    { cout<<"D";}
    getch();
}
```

switch: The C++ switch statement executes one statement from multiple conditions. It is like if-else-if ladder statement in C++.

Syntax:

```
switch (expression)
  {   case label1: statements ;
                    break;
   case label2: statements;
                    break;
      ……
   default: staements;
              break;          }
```

Example

// Program to build a simple calculator using switch Statement

```
#include <iostream.h>
#include<conio.h>
void main()
{
   char op;
   float num1, num2;
   clrscr();
```

```
        cout << "Enter an operator (+, -, *, /): ";
        cin >> op;
        cout << "Enter two operands: ";
        cin >> num1 >> num2;
        switch (op)
        {
           case '+':
                        cout << num1 << " + " << num2 << " = " << num1+num2;
                        break;
           case '-':
                        cout << num1 << " - " << num2 << " = " << num1-num2;
                        break;
           case '*':
                        cout << num1 << " * " << num2 << " = " << num1*num2;
                        break;
           case '/':
                        cout << num1 << " / " << num2 << " = " << num1/num2;
                        break;
           default:
                        // operator is doesn't match any case constant (+, -, *, /)
                        cout << "Error! operator is not correct";
                        break;
        }
        getch();
    }
```

Looping:

Loops are used in programming to repeat a specific block until some end condition is met. There are three types of loops in C++ programming:

1) for loop
2) while loop
3) do while loop

While loop:

Syntax: **while(condition){**
//code to be executed }

Example:

```
// C++ Program to compute factorial of a number
// Factorial of n = 1*2*3...*n
#include <iostream.h>
#include<conio.h>
void  main()
{
   int number, i = 1, factorial = 1;
   clrscr();
   cout << "Enter a positive integer: ";
   cin >> number;
   while ( i <= number)
    {
      factorial *= i;      //factorial = factorial * i;
      ++i;
   }
   cout<<"Factorial of "<< number <<" = "<< factorial;
   getch();
}
```

Do-While Loop :

Syntax:

```
do
{ //code to be executed
}while(condition);
```

Example :

```
//C++ Program to display natural numbers up to 10.
#include <iostream>
```

```
#include<conio.h>
void  main()
 {
    int i = 1;
        do{
           cout<<i<<"\n";
           i++;
        } while (i <= 10) ;
   getch();
}
```

Example:

Syntax: for(initialization; condition; incr/decr) {
//code to be executed }

Example: //program to display your name for specified number of time

```
#include <iostream.h>
#include<conio.h>
void main()
{
  int  time,i;
   clrscr();
   cout << "how many times you want to display your name";
   cin >>time;
   for(i=0;i<time;i++)
   {
   0    Cout<<"\n KEONICS";
   }
   getch();
}
```

C++ Functions

A function is a group of statements that together perform a task. Every C++ program has at least one function, which is main().

Advantages of using functions in a program

- You can divide your program in logical blocks. ...
- Use of function avoids typing same pieces of code multiple times. ...
- Individual functions can be easily tested.
- In case of any modification in the code you can modify only the function without changing the structure of the program.

Types of Functions

There are two types of functions in C programming:

1. Library Functions: are the functions which are declared in the C++ header files such as ceil(x), floor(x), sqrt(x),sin(x) etc.

2. User-defined functions: are the functions which are created by the C++ programmer, so that he/she can use it many times. It reduces complexity of a big program and optimizes the code.

Declaration of a function:

Syntax:

return_type function_name(parameter list) {
body of the function}

Example:

```
#include<iostream.h>
#include<conio.h>
// function declaration
int max(int num1, int num2);//function Declaration
void main () {
  // local variable declaration:
  int a = 100;
  int b = 200;
  int ret;
  // calling a function to get max value.
  ret = max(a, b);
```

```
  cout << "Max value is : " << ret << endl;
  getch();
}
// function returning the max between two numbers
int max(int num1, int num2) {
  // local variable declaration
  int result;
  if (num1 > num2)
    result = num1;
  else
    result = num2;
  return (result);
}
```

Inline functions

When a function is declared as inline, the compiler places a copy of the code of that specific function at each point where the function is called at compile time.

Syntax:

```
inline return_type function_name(arguments...)
{
 //function_code
 //return_value;
}
```

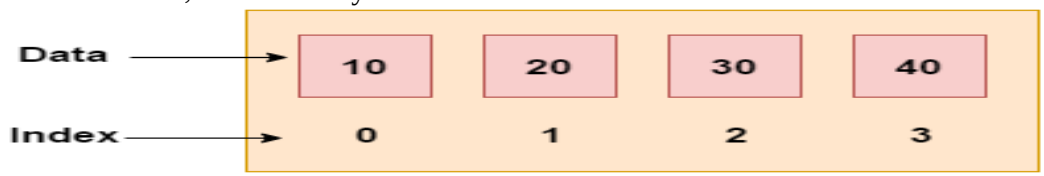
Example:

```
//Simple Inline Function Example Program in C++
#include<iostream.h>
#include<conio.h>
inline int square(int x);
void main() {
  int a = 100, b = 200;
  cout << "Simple Inline Function Example Program in C++\n";
  cout << "\nSquare value for " << a << " is        :" << square(a);
  cout << "\nSquare value for " << b << " is        :" << square(b);
  getch();
}
// Inline square function
inline int square(int x) {
  return (x * x);}
```

C++ Arrays

Array is a group of similar types of elements that have contiguous memory location.

In C++, array index starts from **0** **to** **(n-1)**



Advantages of C++ Array

- Code Optimization (less code)
- Random Access
- Easy to traverse data
- Easy to manipulate data
- Easy to sort data etc.

Disadvantages of C++ Array -> Fixed size

Array Types :

There are 2 types of arrays in C++ programming:

1. Single Dimensional Array
2. Multidimensional Array

Single Dimensional Array:

A one-dimensional array is a group of elements having the same data type and same name.

Declaration: **data_type array_name[array_size];**
Initialization: data_type array_name[array_size]=comma_separated_element_list};

Example : // C++ One Dimensional Array

```
#include<iostream.h>
#include<conio.h>
void main()
{
    clrscr();
    int arr[5] = {1, 2, 3, 4, 5};
    int i;
    for(i=0; i<5; i++)
    { cout<<"arr["<<i<<"] = "<<arr[i]<<"\n";}
    getch();
}
```

C++ Passing Array to Function

functionname(arrayname); //passing array to function

Example:

```
#include <iostream.h>
#include<conio.h>
void printArray(int arr[5]);
void main()
{
    int arr1[5] = { 10, 20, 30, 40, 50 };
    int arr2[5] = { 5, 15, 25, 35, 45 };
    printArray(arr1); //passing array to function
    printArray(arr2);
}
void printArray(int arr[5])
{
   cout << "Printing array elements:"<< endl;
   for (int i = 0; i < 5; i++)
   {
        cout<<arr[i]<<"\n";
   }
getch();
}
```

C++ Multidimensional Arrays:

Declare Two Dimensional Array-> data_type array_name[row_size][column_size];

Initialization:

data_type array_name[row_size][column_size] = { comma_separated_value_list} };

Example :

```
// C++ Two Dimensional Array
#include<iostream.h>
#include<conio.h>
void main()
{
    clrscr();
    int arr[5][2] = { {1, 2}, {1, 3}, {1, 4}, {1, 5}, {1, 6} };
    int i, j;
    for(i=0; i<5; i++)
    {
        for(j=0; j<2; j++)
        {
            cout<<"arr["<<i<<"]["<<j<<"] = "<<arr[i][j]<<"\n";
        }
    }
    getch();
}
```

C++ OOPs Concepts

The major purpose of C++ programming is to introduce the concept of object orientation to the C programming language. Object Oriented Programming is a paradigm that provides many concepts such as **inheritance, data binding, polymorphism etc.**

The programming paradigm where everything is represented as an object is known as truly object-oriented programming language.

OOPs (Object Oriented Programming System):

Object means a real word entity such as pen, chair, table etc. **Object-Oriented Programming** is a methodology or paradigm to design a program using classes and objects. It simplifies the software development and maintenance by providing some concepts:

Object

Any entity that has state and behaviour is known as an object.

For example: chair, pen, table, keyboard, bike etc. It can be physical and logical.

Class

Collection of objects is called class. It is a logical entity.

Inheritance

When one object acquires all the properties and behaviours of parent object i.e. known as inheritance. It provides code reusability. It is used to achieve runtime polymorphism.

Polymorphism

When **one task is performed by different ways** i.e. known as polymorphism. For example: to convince the customer differently, to draw something e.g. shape or rectangle etc.In C++, we use Function overloading and Function overriding to achieve polymorphism.

Abstraction

Hiding internal details and showing functionality is known as abstraction. For example: phone call, we don't know the internal processing.In C++, we use abstract class and interface to achieve abstraction.

Encapsulation

Binding (or wrapping) code and data together into a single unit is known as encapsulation.

For example: capsule, it is wrapped with different medicines.

Advantage of OOPs over Procedure-oriented programming language

- OOPs makes development and maintenance easier where as in Procedure-oriented programming language it is not easy to manage if code grows as project size grows.
- OOPs provide data hiding whereas in Procedure-oriented programming language a global data can be accessed from anywhere.
- OOPs provide ability to simulate real-world event much more effectively. We can provide the solution of real word problem if we are using the Object-Oriented Programming language.

C++ Object and Class

Since C++ is an object-oriented language, program is designed using objects and classes in C++.

C++ Object:

Object is a runtime entity, it is created at runtime. Object is an instance of a class. All the members of the class can be accessed through object.

C++ Class

In C++, object is a group of similar objects.

Syntax to create class:

```
Class class_name
{
   Data Members;
   Methods;
}
```

Where class-|>keyword

Class Name->any valid identifies

Example:

```
class A
{
   public:
   double length; // Length of a box
   double breadth; // Breadth of a box
   double height; // Height of a box
 }
```

- ✓ **Private**, **Protected**, **Public** is called visibility labels.

- ✓ The members that are declared private can be accessed only from within the class.
- ✓ Public members can be accessed from outside the class also.
- ✓ In C++, data can be hidden by making it private.

C++ Object and Class Example

Let's see an example of class that has two fields: id and name. It creates instance of the class, initializes the object and prints the object value.

```
#include <iostream.h>
#include <conio.h>
class Student {
  public:
    int id;//data member (also instance variable)
    string name;//data member(also instance variable)
};
void main() {
   Student s1; //creating an object of Student
   s1.id = 201;
   s1.name = "Sonoo Jaiswal";
   cout<<s1.id<<endl;
   cout<<s1.name<<endl;
   getch();
}
```

C++ Class Example: Store and Display Employee Information

```
#include <iostream.h>
#include <conio.h>
class Employee {
  public:
     int id;//data member (also instance variable)
     float salary; //data member(also instance variable)
     void insert(int i, float s)
      {
        id = i;
        salary = s;
      }
     void display()
      {
        cout<<"id="<<id<<"\nsalary= "<<salary<<endl;
      }
};
void main() {
   Employee e1; //creating an object of Employee
   Employee e2; //creating an object of Employee
   e1.insert(201,15000);
   e2.insert(202, 29000);
   e1.display();
   e2.display();
   getch();  }
```

C++ Constructor

In C++, constructor is a special method which is invoked automatically at the time of object creation. It is used to initialize the data members of new object generally. The constructor in C++ has the same name as class or structure.

There can be two types of constructors in C++.

1. Default constructor
2. Parameterized constructor

C++ Default Constructor :A constructor which has no argument is known as default constructor. It is invoked at the time of creating object.

Example:

```
#include <iostream.h>
#include <conio.h>
   class Employee
```

```
{   public:   Employee()   {
    cout<<"Default Constructor Invoked"<<endl;   }
};
void main()
  {
    Employee e1; //creating an object of Employee
    Employee e2;
    getch();   }
```

C++ Destructor

A destructor works opposite to constructor; it destructs the objects of classes. It can be defined only once in a class. Like constructors, it is invoked automatically.

A destructor is defined like constructor. It must have same name as class. But it is prefixed with a **tilde sign (~).**

C++ friend function

If a function is defined as a friend function in C++ then the protected and private data of a class can be accessed using the function. By using the keyword **friend** compiler knows the given function is a friend function .For accessing the data, the declaration of a friend function should be done inside the body of a class starting with the keyword **friend.**

Declaration of friend function in C++

Syntax:

```
class class_name
{
  friend data_type function_name(arguments);
};
```

Example:

```
#include<iostream.h>
#include<conio.h>
class base {
  int val1, val2;
public:
  void get() {
    cout << "Enter two values:";
    cin >> val1>>val2;   }
  friend float mean(base ob);
};
float mean(base ob) {
  return float(ob.val1 + ob.val2) / 2;}
void main() {
  clrscr();
  base obj;
  obj.get();
  cout << "\n Mean value is : " << mean(obj);
  getch();  }
```

C++ Inheritance

In C++, inheritance is a process in which one object acquires all the properties and behaviours of its parent object automatically. In such way, you can reuse, extend or modify the attributes and behaviours which are defined in other class.

In C++, the class which inherits the members of another class is called derived class and the class whose members are inherited is called base class. The derived class is the specialized class for the base class.

Forms of inheritance in c++:

Single inheritance	When one class inherits another class, it is known as single level inheritance
Multiple inheritance	One derived class with several base classes is called multiple inheritance
Hierarchical inheritance	One class inherits more than one derived class is known as hierarchical inheritance
Multilevel inheritance	When one class inherits another class which is further inherited by another class, it is known as multi-level inheritance in C++. Inheritance is transitive so the last derived class acquires all the members of all its base classes.
Hybrid inheritance	Combination of all forms of inheritance is known as hybrid inheritance.

Creation of derived class:

Syntax: class derived-class: visibility-mode base-class

```
{
   Class body
}
```

C++ Single Inheritance Example:

```
#include<iostream.h>
#include<conio.h>
class emp {
                public:
                   int eno;
                   char name[20], des[20];
                   void get() {
                      cout << "Enter the employee number:";
                      cin>>eno;
                      cout << "Enter the employee name:";
                      cin>>name;
                      cout << "Enter the designation:";
                      cin>>des;
                            }
              };
class salary : public emp
{
   float bp, hra, da, pf, np;
                        public:
                           void get1() {
                              cout << "Enter the basic pay:";
                              cin>>bp;
                              cout << "Enter the HRA:";
                              cin>>hra;
                              cout << "Enter the DA :";
                              cin>>da;
                              cout << "Enter the PF";
                              cin>>pf;
                                    }
                            void calculate() {     np = bp + hra + da - pf;       }
                           void display() {
      cout << eno << "\t" << name << "\t" << des << "\t" << bp << "\t" << hra << "\t" << da << "\t" <<
pf << "\t" << np << "\n";
                                                  }
};
void  main()
 {
                int i, n;
                char ch;
                salary s[10];
                clrscr();
                cout << "Enter the number of employee:";
                        cin>>n;
                        for (i = 0; i < n; i++)
                         {   s[i].get();
                            s[i].get1();
                            s[i].calculate();
                        }
             cout << "\ne_no \t e_name\t des \t bp \t hra \t da \t pf \t np \n";
            for (i = 0; i < n; i++)
                    { s[i].display();    }
              getch();
}
```

C++ Multiple Inheritance Example

```
#include<iostream.h>
#include<conio.h>
class student {
                    private:
                       int rno, m1, m2;
                    public:
                       void get() {
                          cout << "Enter the Roll no :";
                          cin>>rno;
                          cout << "Enter the two marks   :";
                          cin >> m1>>m2;
                    }
                };
class sports
 {
                   private:
                        int sm; // sm = Sports mark
                     public:
                          void getsm() {
                          cout << "\nEnter the sports mark :";
                         cin>>sm;
                          }
};
class statement : public student, public sports
{
                int tot, avg;
              public:
                    void display() {
                    tot = (m1 + m2 + sm);
                    avg = tot / 3;
                    cout << "\n\n\tRoll No    : " << rno << "\n\tTotal      : " << tot;
                    cout << "\n\tAverage    : " << avg;
   }
};
void  main() {
                        clrscr();
                        statement obj;
                        obj.get();
                        obj.getsm();
                        obj.display();
                        getch();
                 }
```

C++ Hierarchical Inheritance

Syntax:

```
Class A{              public void methodA()
                    {//Do Something  }
              }
Class B : public A     {
                  public void methodB()
                 {//Do Something          }
           }
Class C : public A        {
                   public void methodC()
                    {//Do Something     }          }
```

C++ Multi Level Inheritance

Syntax:

```
class A{ ... .. ... };
class B: public A{... .. ...};
class C: public B{... ... ...};
```

C++ Polymorphism

The term "Polymorphism" is the combination of "poly" + "morphs" which means many forms. It is a Greek word.

- **There are two types of polymorphism in C++:**
- ✓ **Compile time polymorphism:** It is achieved by function overloading and operator overloading which is also known as static binding or early binding.
- ✓ **Runtime polymorphism:** It is achieved by method overriding which is also known as dynamic binding or late binding.

C++ Overloading (Function and Operator)

If we create two or more members having same name but different in number or type of parameter, it is known as C++ overloading.

Types of overloading in C++ are:

- ✓ **Function overloading**
- ✓ **Operators overloading**

- **Function Overloading**

Having two or more function with same name but different in parameters, is known as function overloading in C++.The **advantage** of Function overloading is that it increases the readability of the program because you don't need to use different names for same action.

Example:

- ✓ int test() { }
- ✓ int test(int a) { }
- ✓ float test(double a) { }
- ✓ int test(int a, double b) { }

Function Overloading Example

```
#include <iostream>
class Cal {
        public:   int add(int a,int b)
                  {    return (a + b);     }
                   int add(int a, int b, int c)
                   {     return (a + b + c);    }
   };
void  main(void)
{
          Cal C;
          cout<<C.add(10, 20)<<endl;
          cout<<C.add(12, 20, 23);
          getch();
}
```

- **Operators Overloading**

Operator overloading is used to overload or redefine most of the operators available in C++. It is used to perform operation on user define data type.

The advantage of Operators overloading is to perform different operations on the same operand.

Following are list of operators, which cannot be overloaded:

:: Scope resolution operator
.* Pointer to member operator
. Dot member5ship operator
?: conditional operator
Sizeof() operator

Java

Java was developed by James Gosling and his team , from Sun Microsystems in 1995 as an object-oriented language for general-purpose business applications and for interactive, Web-based Internet applications

Features of JAVA:

- **Object Oriented** − In Java, everything is an Object. Java can be easily extended since it is based on the Object model.
- **Platform Independent** − Unlike many other programming languages including C and C++, when Java is compiled, it is not compiled into platform specific machine, rather into platform independent byte code. This byte code is distributed over the web and interpreted by the Virtual Machine (JVM) on whichever platform it is being run on.

- **Simple** − Java is designed to be easy to learn. If you understand the basic concept of OOP Java, it would be easy to master.
- **Secure** − With Java's secure feature it enables to develop virus-free, tamper-free systems. Authentication techniques are based on public-key encryption.
- **Architecture-neutral** − Java compiler generates an architecture-neutral object file format, which makes the compiled code executable on many processors, with the presence of Java runtime system.
- **Portable** − Being architecture-neutral and having no implementation dependent aspects of the specification makes Java portable. Compiler in Java is written in ANSI C with a clean portability boundary, which is a POSIX subset.
- **Robust** − Java makes an effort to eliminate error prone situations by emphasizing mainly on compile time error checking and runtime checking.
- **Multithreaded** − With Java's multithreaded feature it is possible to write programs that can perform many tasks simultaneously. This design feature allows the developers to construct interactive applications that can run smoothly.
- **Interpreted** − Java byte code is translated on the fly to native machine instructions and is not stored anywhere. The development process is more rapid and analytical since the linking is an incremental and light-weight process.
- **High Performance** − With the use of Just-In-Time compilers, Java enables high performance.
- **Distributed** − Java is designed for the distributed environment of the internet.
- **Dynamic** − Java is considered to be more dynamic than C or C++ since it is designed to adapt to an evolving environment. Java programs can carry extensive amount of run-time information that can be used to verify and resolve accesses to objects on run-time.

Tools Need:

Computer with a minimum of 64 MB of RAM (128 MB of RAM recommended).

also need the following software −

- Linux 7.1 or Windows xp/7/8 operating system
- Java JDK 8
- Microsoft Notepad or any other text editor

Comparison Between c++ and Java	
C++	**Java**
C++ is platform-dependent.	Java is platform-independent.
C++ is mainly used for system programming.	Java is mainly used for application programming. It is widely used in window, web-based, enterprise and mobile applications.
C++ supports multiple inheritance.	Java doesn't support multiple inheritance through class. It can be achieved by interfaces in java.
C++ supports operator overloading.	Java doesn't support operator overloading.
C++ supports pointers. You can write pointer program in C++.	Java supports pointer internally. But you can't write the pointer program in java. It means java has restricted pointer support in java.
C++ uses compiler only.	Java uses compiler and interpreter both.
C++ supports both call by value and call by reference.	Java supports call by value only. There is no call by reference in java.
C++ supports structures and unions.	Java doesn't support structures and unions.

How to write the simple program of java. We can write a simple hello java program easily after installing the JDK.

To create a simple java program, you need to create a class that contains main method **in any text editor (notepad,notepad++,wordpad etc)**

Creating hello java example

```
class Simple{
   public static void main(String args[ ]){
    System.out.println("Hello Java");     } }
```

Program Execution:

Save the above Program as **Simple.java,** To compile and run this program, you need to open command prompt by **start menu -> All Programs -> Accessories -> command prompt**.

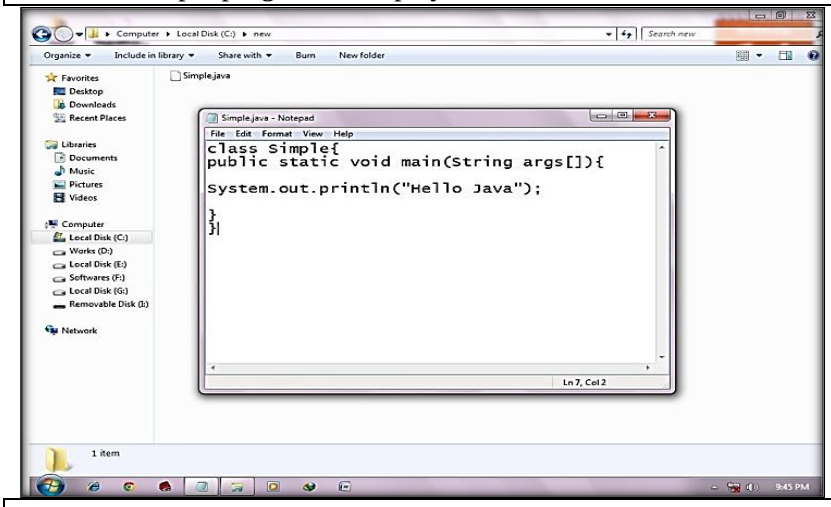
To compile: javac Simple.java

To execute: java Simple

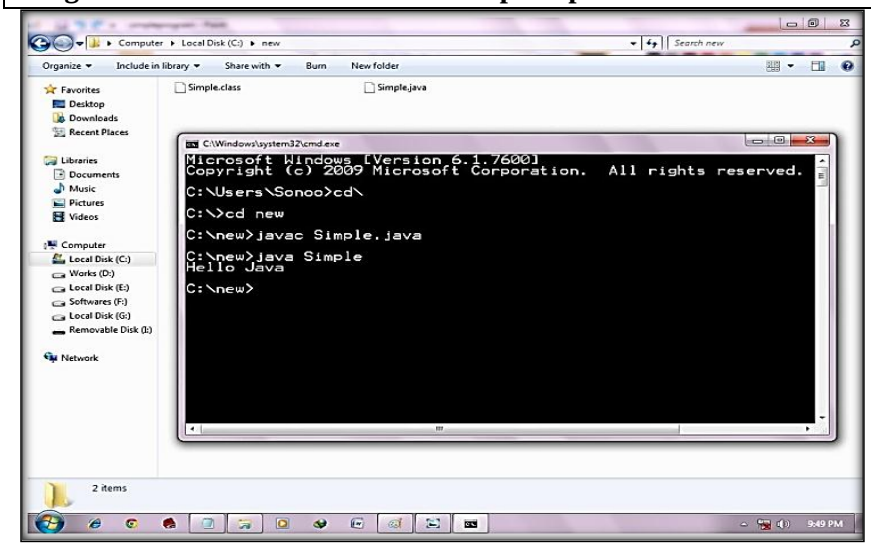
Parameters used in first java program

- **class** keyword is used to declare a class in java.
- **public** keyword is an access modifier which represents visibility, it means it is visible to all.
- **static** is a keyword, if we declare any method as static, it is known as static method. The core advantage of static method is that there is no need to create object to invoke the static method. The main method is executed by the JVM, so it doesn't require creating object to invoke the main method. So it saves memory.
- **void** is the return type of the method, it means it doesn't return any value.
- **main** represents the starting point of the program.
- **String[ ] args** is used for command line argument.
- **System.out.println()** is used print statement.

To write the simple program, open notepad by **start menu -> All Programs -> Accessories -> notepad** and write simple program as displayed below:



As displayed in the above diagram, write the simple program of java in notepad and saved it as Simple.java. To compile and run this program, you need to open command prompt by **start menu -> All Programs -> Accessories -> command prompt**.



Basic Structure of JAVA Program:

A Java program involves the following sections:

- ✓ Documentation Section
- ✓ Package Statement
- ✓ Import Statements
- ✓ Interface Statement
- ✓ Class Definition
- ✓ Main Method Class
  - o Main Method Definition

How to set path in Java:

To set the temporary path of JDK, you need to follow following steps:

- Open command prompt
- Copy the path of jdk/bin directory
- Write in command prompt: set path=copied_path

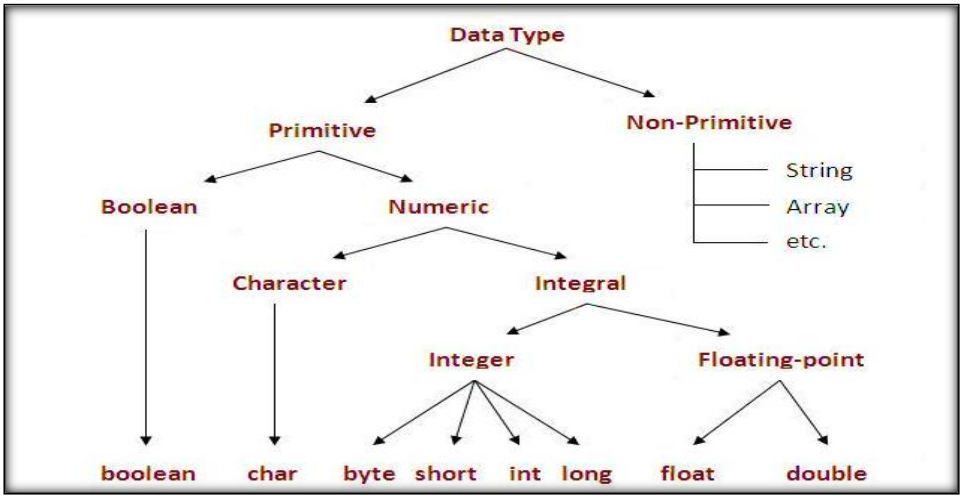
For Example:

set path=C:\Program Files\Java\jdk1.6.0_23\bin

Variables and Data Types in Java

A variable is a container which holds the value while the java program is executed. A variable is assigned with a datatype.

There are two types of data types in java: **primitive and non-primitive.**



Operators in java:

Operator in java is a symbol that is used to perform operations.

There are many types of operators in java which are given below:

- Unary Operator [++, --]
- Arithmetic Operator, [+, - , * , /, %]
- Relational Operator [>, >=, <, <=, = =,! =]
- Logical Operator [&& , || , !]
- Ternary Operator [? :]
- Assignment Operator [=]

Java If-else Statement

The Java *if statement* is used to test the condition. It checks Boolean condition: *true* or *false*. There are various types of if statement in java.

- if statement
- if-else statement
- if-else-if ladder
- nested if statement

Java if Statement: The Java if statement tests the condition. It executes the if block if condition is true.

Syntax: **if(condition) { //code to be executed }**

Example:

```
public class IfExample
                { public static void main(String[] args)
{   int age=20;
    if(age>18){   System.out.print("Eligible to VOTE");   }
} }
```

Java if-else Statement: The Java if-else statement also tests the condition. It executes the *if block* if condition is true otherwise *else block* is executed.

Syntax: **if(condition){ //code if condition is true }**

```
else{  //code if condition is false  }
```

Example:

```
public class IfElseExample {
 public static void main(String[] args) {
    int number=13;
    if(number%2==0){     System.out.println("even number");      }
 else{         System.out.println("odd number");      }
 }  }
```

Java if-else-if ladder Statement: The if-else-if ladder statement executes one condition from multiple statements.

Syntax:

```
if(condition1)
{  //code to be executed if condition1 is true
}else if(condition2){
//code to be executed if condition2 is true
}
else if(condition3){
//code to be executed if condition3 is true
}
...
else{
//code to be executed if all the conditions are false
}
```

Example:

```
public class Test {
   public static void main(String args[]) {
      int x = 30;
      if( x == 10 ) {
         System.out.print("Value of X is 10");
      }else if( x == 20 ) {
         System.out.print("Value of X is 20");
      }else if( x == 30 ) {
         System.out.print("Value of X is 30");
      }else {
         System.out.print("This is else statement");
      }
   }
}
```

Java Switch Statement

Syntax:

```
switch(expression){
case value1:
        //code to be executed;
        break;
case value2:
         //code to be executed;
        break;
.....
   default:
         code to be executed if all cases are not matched;
}
```

Example:

```
public class Test {
   public static void main(String args[]) {
      char grade = 'C';

      switch(grade) {
         case 'A' :
            System.out.println("Excellent!");
                  break;
         case 'B' :
         case 'C' :
            System.out.println("Well done");
```

```
                    break;
                case 'D' :
                   System.out.println("You passed");
                case 'F' :
                   System.out.println("Better try again");
                   break;
                default :
                   System.out.println("Invalid grade");
             }
                    System.out.println("Your grade is " + grade);
          }}
```

Loops in Java

In programming languages, loops are used to execute a set of instructions/functions repeatedly when some conditions become true. There are three types of loops in java.

- for loop
- while loop
- do-while loop

Java For Loop

Syntax:

```
for(initialization;condition;incr/decr){
//code to be executed
}
```

Example:

```
public class ForExample {
    public static void main(String[] args) {
            for(int i=1;i<=10;i++){
                    System.out.println(i);
            }
} }
```

Java While Loop

Syntax:

```
while(condition){
//code to be executed  }
```

Example:

```
public class WhileExample {
public static void main(String[] args) {
   int i=1;
   while(i<=10){
      System.out.println(i);
   i++;
   } } }
```

Java Do While Loop

Syntax:

```
do{
//code to be executed
}while(condition);
```

Example:

```
public class DoWhileExample {
public static void main(String[] args) {
   int i=1;
   do{
      System.out.println(i);
   i++;
   }while(i<=10);
}
}
```

Java Comments

The java comments are statements that are not executed by the compiler and interpreter. The comments can be used to provide information or explanation about the variable, method, class or any statement. It can also be used to hide program code for specific time.

Types of Java Comments: There are 3 types of comments in java.

1. Single Line Comment //This is single line comment

2. Multi Line Comment

```
/* This  is
multi line  comment */
```

3. Documentation Comment

```
/**
This
is  documentation
comment
*/
```

***Example Programs:**

1. // Fibonacci series program in java without using recursion

```
class FibonacciExample{
public static void main(String args[])
{   int n1=0,n2=1,n3,i,count=10;
 System.out.print(n1+" "+n2);//printing 0 and 1
 for(i=2;i<count;++i)//loop starts from 2 because 0 and 1 are already printed
 {    n3=n1+n2;
  System.out.print(" "+n3);
  n1=n2;
  n2=n3;
 }  }}
```

2./* prime number program in java. In this java program, we will take a number variable and check whether the number is prime or not.*/

```
public class PrimeExample{
 public static void main(String args[]){
  int i,m=0,flag=0;
  int n=3;//it is the number to be checked
  m=n/2;
  if(n==0||n==1){
   System.out.println(n+" is not prime number");
  }else{
   for(i=2;i<=m;i++){
    if(n%i==0){
     System.out.println(n+" is not prime number");
     flag=1;
     break;       }       }
   if(flag==0)  { System.out.println(n+" is prime number"); }
  }//end of else
 }  }
```

3.// factorial Program using loop in java.

```
class FactorialExample{
 public static void main(String args[]){
  int i,fact=1;
  int number=5;//It is the number to calculate factorial
  for(i=1;i<=number;i++){
      fact=fact*i;
  }
  System.out.println("Factorial of "+number+" is: "+fact);
 }
}
```

OOPs (Object Oriented Programming System)

Object means a real word entity such as pen, chair, table etc. **Object-Oriented Programming** is a methodology or paradigm to design a program using classes and objects. It simplifies the software development and maintenance by providing some concepts:

- Object
- Class
- Inheritance
- Polymorphism
- Abstraction

- Encapsulation

Object: Any entity that has state and behavior is known as an object. For example: chair, pen, table, keyboard, bike etc. It can be physical and logical.
Class: Collection of objects is called class. It is a logical entity.
Inheritance: When one object acquires all the properties and behaviors of parent object i.e. known as inheritance. It provides code reusability. It is used to achieve runtime polymorphism.
Polymorphism: When **one task is performed by different ways** i.e. known as polymorphism. For example: to convince the customer differently, to draw something e.g. shape or rectangle etc.
In java, we use method overloading and method overriding to achieve polymorphism.

Abstraction: Hiding internal details and showing functionality is known as abstraction. For example: phone call, we don't know the internal processing. In java, we use abstract class and interface to achieve abstraction.
Encapsulation: Binding (or wrapping) code and data together into a single unit is known as encapsulation. For example: capsule, it is wrapped with different medicines.

Class in Java

A class is a group of objects which have common properties. It is a template or blueprint from which objects are created.

Syntax to declare a class:

```
class <class_name>{
   field;
   method;
}
```

Example: 1)

```
class Student{
        int id =100;//field or data member or instance variable
        String name;

 public static void main(String args[]){
  Student s1=new Student();//creating an object of Student
  System.out.println(s1.id);//accessing member through reference variable
  System.out.println(s1.name);   }  }
```

Object and Class

Example: Rectangle

```
class Rectangle{
 int length;
 int width;
 void insert(int l, int w){
  length=l;
  width=w;
 }
 void calculateArea(){System.out.println(length*width);}
}
class TestRectangle1{
 public static void main(String args[]){
  Rectangle r1=new Rectangle();
  Rectangle r2=new Rectangle();
  r1.insert(11,5);
  r2.insert(3,15);
  r1.calculateArea();
  r2.calculateArea();  }  }
```

Inheritance in Java

Inheritance in java is a mechanism in which one object acquires all the properties and behaviors of parent object. It is an important part of OPPs(Object Oriented programming system).

Terms used in Inheritence

- **Class:** A class is a group of objects which have common properties. It is a template or blueprint from which objects are created.
- **Sub Class/Child Class:** Subclass is a class which inherits the other class. It is also called a derived class, extended class, or child class.

- **Super Class/Parent Class:** Superclass is the class from where a subclass inherits the features. It is also called a base class or a parent class.
- **Reusability:** As the name specifies, reusability is a mechanism which facilitates you to reuse the fields and methods of the existing class when you create a new class. You can use the same fields and methods already defined in previous class.

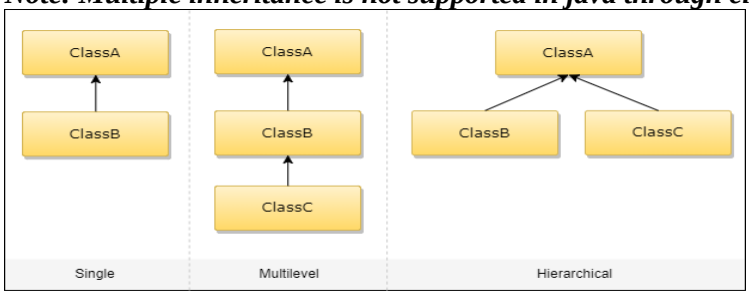
Syntax of Deriving a new class:

```
class Subclass-name extends Superclass-name
{
  //methods and fields
}
```

Types of inheritance in java

On the basis of class, there can be three types of inheritance in java: single, multilevel and hierarchical.[In java programming, multiple and hybrid inheritance is supported through interface only.]

Note: Multiple inheritance is not supported in java through class.



Java Inheritance

1. **Single Inheritance**

   When a single class gets derived from its base class, then this type of inheritance is termed as single inheritance.

Example:

```
class Teacher {
 void teach() {
  System.out.println("Teaching subjects");
 }
}
class Students extends Teacher {
 void listen() {
  System.out.println("Listening to teacher");
 }
}
class CheckForInheritance {
 public static void main(String args[]) {
  Students s1 = new Students();
  s1.teach();
  s1.listen();
 }
}
```

2. **Multi-Level Inheritance:** In this type of inheritance, a derived class gets created from another derived class and can have any number of levels.

Example :

```
class Shape {
   public void display() {
      System.out.println("Inside display");   }}
class Rectangle extends Shape {
   public void area() {
      System.out.println("Inside area");   }}
class Cube extends Rectangle {   public void volume() {
      System.out.println("Inside volume");   }}
public class Tester {   public static void main(String[] arguments) {
      Cube cube = new Cube();
      cube.display();
      cube.area();
      cube.volume();   }}
```

3. **Hierarchical Inheritance:** In this type of inheritance, there are more than one derived classes which get created from one single base class.

Example:

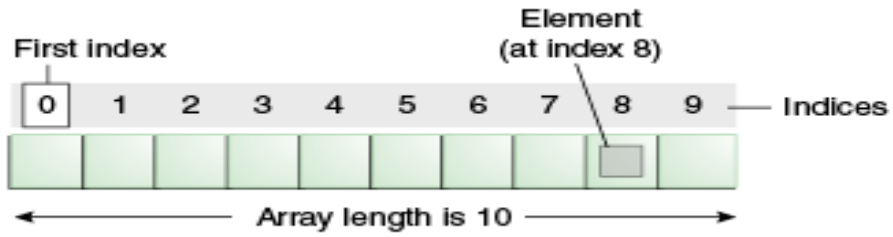
```
class A
{   public void methodA()
 {      System.out.println("method of Class A");   }}
class B extends A{   public void methodB()
  {    System.out.println("method of Class B");   } }
class C extends A
{  public void methodC()  {    System.out.println("method of Class C");  }}
class D extends A
{  public void methodD()  {     System.out.println("method of Class D");  }}
class JavaExample
{  public static void main(String args[])  {
    B obj1 = new B();
    C obj2 = new C();
    D obj3 = new D();     //All classes can access the method of class A
    obj1.methodA();
    obj2.methodA();
    obj3.methodA();  }}
```

Java Package

A **java package** is a group of similar types of classes, interfaces and sub-packages.
Package in java can be categorized in two form, built-in package and user-defined package.
There are many built-in packages such as java, lang, awt, javax, swing, net, io, util, sql etc.

Simple example of java package

The **package keyword** is used to create a package in java.




```
//save as Simple.java
package mypack;
public class Simple{
 public static void main(String args[]){
   System.out.println("Welcome to package");     }  }
```

Access Modifiers in java

There are 4 types of java access modifiers:

1. **private:** The private access modifier is accessible only within class.
2. **default:** If you don't use any modifier, it is treated as **default** bydefault. The default modifier is accessible only within package.
3. **protected:** The **protected access modifier** is accessible within package and outside the package but through inheritance only. The protected access modifier can be applied on the data member, method and constructor. It can't be applied on the class.
4. **public:** The **public access modifier** is accessible everywhere. It has the widest scope among all other modifiers.

Java Array

Java array is an object the contains elements of similar data type. It is a data structure where we store similar elements. We can store only fixed set of elements in a java array.
Array in java is index based, first element of the array is stored at 0 index.

Advantage of Java Array

- **Code Optimization:** It makes the code optimized, we can retrieve or sort the data easily.
- **Random access:** We can get any data located at any index position.

Types of Array in java

There are two types of array.

- Single Dimensional Array
- Multidimensional Array

Single dimensional array in java

Syntax to Declare an Array in java

```
dataType[ ]   arr;   ( or)
dataType      []arr; (or)
dataType     arr[];
```

Instantiation of an Array in java

```
arrayRefVar=new datatype[size];
```

Example:

```
class Testarray{ public static void main(String args[]){
int a[]=new int[5];//declaration and instantiation
a[0]=10;//initialization
a[1]=20;
a[2]=70;
a[3]=40;
a[4]=50;
//printing array
for(int i=0;i<a.length;i++)//length is the property of array
System.out.println(a[i]);
}}
```

Declaration, Instantiation and Initialization of Java Array

```
class Testarray1{ public static void main(String args[]){
int a[]={33,3,4,5};//declaration, instantiation and initialization
//printing array
for(int i=0;i<a.length;i++)//length is the property of array
System.out.println(a[i]);
}}
```

Multidimensional array in java

Syntax to Declare Multidimensional Array in java

```
dataType[ ][ ]      arrayRefVar; (or)
dataType      [ ][ ]arrayRefVar; (or)
dataType      arrayRefVar[][]; (or)
```

Instantiation of an Multi Dimensional Array in java

```
int[][] arr=new int[3][3];//3 row and 3 column
```

Example:

```
class Testarray3{
public static void main(String args[]){
//declaring and initializing 2D array
int arr[][]={{1,2,3},{2,4,5},{4,4,5}};
//printing 2D array
for(int i=0;i<3;i++){
 for(int j=0;j<3;j++){
   System.out.print(arr[i][j]+" ");
 } System.out.println();}}}
```

Java String

Generally, string is a sequence of characters. But in java, string is an object that represents a sequence of characters. The java.lang.String class is used to create string object.

Example:

```
1. char[] ch={'j','a','v','a','t','p','o','i','n','t'};
2. String s=new String(ch);
```

Java String class provides a lot of methods to perform operations on string such as compare(), concat(), equals(), split(), length(), replace(), compareTo(), intern(), substring() etc.

There are two ways to create String object:

1. By string literal→ String s="welcome";
2. By new keyword→ String s=new String("Welcome");

Example:

```
public class StringExample{
```

```
public static void main(String args[ ]){
String s1="java";
char ch[ ]={'s','t','r','i','n','g','s'};
String s2=new String(ch);
String s3=new String("example");
System.out.println(s1);
System.out.println(s2);
System.out.println(s3);
}}
```

Exception Handling in Java

The **exception handling** in java is one of the powerful mechanism to handle the runtime errors so that normal flow of the application can be maintained.

Exception Handling is a mechanism to handle runtime errors such as ClassNotFound, IO etc.

Java try block

Java try block is used to enclose the code that might throw an exception. It must be used within the method.Java try block must be followed by either catch .

Syntax of java try-catch

```
try{
//code that may throw exception
}catch(Exception_class_Name ref){    }
```

Example:

```
public class Testtrycatch2{
  public static void main(String args[]){
   try{
      int data=50/0;
   }catch(ArithmeticException e){System.out.println(e);}
   System.out.println("rest of the code...");
}}
```

Compile by: javac Testtrycatch2.java

Run by: java Testtrycatch2

```
java.lang.ArithmeticException: / by zero
rest of the code...
```

PHP

What is PHP

- PHP stands for Hypertext Preprocessor.
- PHP is an interpreted language, i.e., there is no need for compilation.
- PHP is a server-side scripting language.
- PHP is faster than other scripting languages, for example, ASP and JSP.

Web Development

PHP is widely used in web development nowadays. PHP can develop dynamic websites easily. But you must have the basic the knowledge of following technologies for web development as well.

- HTML
- CSS
- JavaScript

Characteristics of PHP

Five important characteristics make PHP's practical nature possible −

- Simplicity
- Efficiency
- Security
- Flexibility
- Familiarity

PHP Features

There are given many features of PHP.

- **Performance**: Script written in PHP executes much faster then those scripts written in other languages such as JSP & ASP.
- **Open Source Software**: PHP source code is free available on the web, you can developed all the version of PHP according to your requirement without paying any cost.
- **Platform Independent**: PHP are available for WINDOWS, MAC, LINUX & UNIX operating system. A PHP application developed in one OS can be easily executed in other OS also.
- **Compatibility**: PHP is compatible with almost all local servers used today like Apache, IIS etc.
- **Embedded**: PHP code can be easily embedded within HTML tags and script.

Install PHP

To install PHP, we will suggest you to install AMP (Apache, MySQL, PHP) software stack. It is available for all operating systems. There are many AMP options available in the market that are given below:

- **WAMP** for Windows
- **LAMP** for Linux
- **MAMP** for Mac
- **SAMP** for Solaris
- **XAMPP** (Cross, Apache, MySQL, PHP, Perl) for Cross Platform: It includes some other components too such as FileZilla, OpenSSL, Webalizer, Mercury Mail etc.

PHP Example

It is very easy to create a simple PHP example. To do so, create a file and write HTML tags + PHP code and save this file with .php extension.

All PHP code goes between php tag. A syntax of PHP tag is given below:

```
<?php
//your code here
?>
```

Example:

```
<html>
<body>
<?php
echo "<h2>Hello First PHP</h2>";
?>
```

```
</body>
</html>
```

PHP echo: printing string

```
<?php
echo "Hello by PHP echo";
?>
```

Run a PHP program in XAMPP Server

PHP program can be run under various like WAMP, XAMPP etc.

- **WAMP Server**: this server is a web development platform which helps in creating dynamic web applications.
- **XAMPP Server**: It is a free open source cross-platfrom web server package.

I am using XamppServer to run my program, you can download it . After downloading, just follow the following step to start xampp server:

Step1

Install XAMPP

Step2

Assume you installed xampp in C Drive.

Go to: **C:\xampp\htdocs**

Create your own folder, name it for example as **tutorialspoint**.

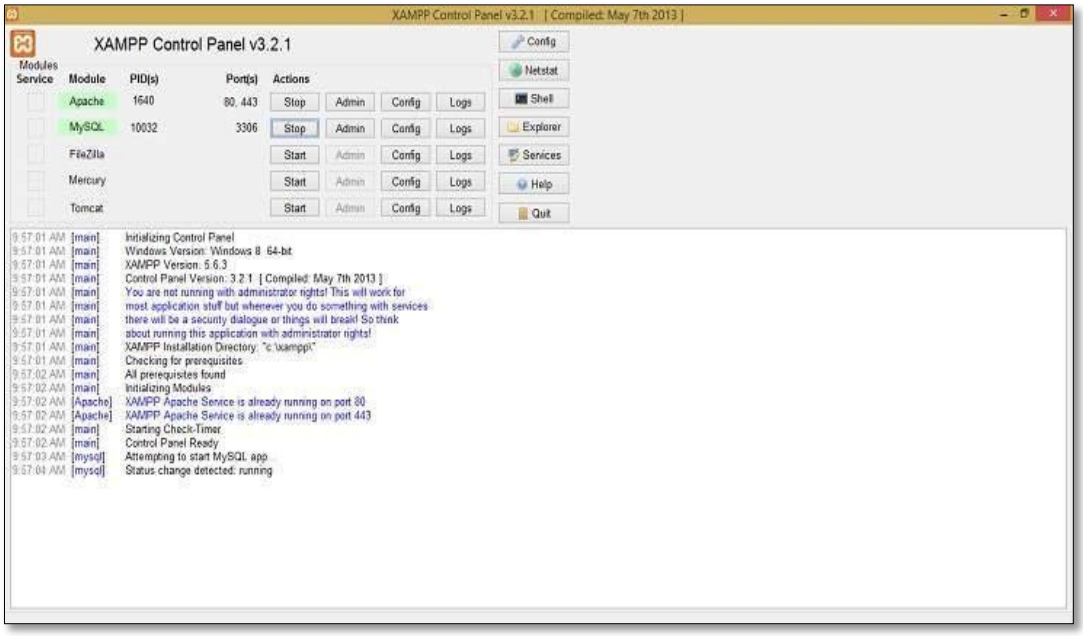
Step3

Now create your first php program in xampp and name it as **"add.php"**:

Step4

```
<html>
<head><title>Addition php</title></head>
<body>

<?php
      print "<h2>php program to add two numbers...</h2><br />";
    $val1 = 20;
    $val2 = 20;
    $sum = $val2 + $val2;  /* Assignment operator */
    echo "Result(SUM): $sum";
?>

</body>
</html>
```

Now double click on "**XAAMP CONTROL PANEL**" on desktop and START "**Apache**" (icon also appears on the bottom)



Step5

Type **localhost** on your browser and press enter:

It will show the following:

Step6

Now type the following on browser:

http://localhost/

Step7

Click on "**add.php**" and it will show the following:

The RESULT is 40 by adding both the values.

This way you can run your php program in XAMPP server…

1) **table of a number**

```
<?php
define('a', 7);
for($i=1; $i<=10; $i++)
{
  echo $i*a;
  echo '<br>';
}
?>
```

2) even odd number check

```
<?php
$number=1233456;
if($number%2==0)
{
echo "$number is Even Number";
}
else  {
echo "$number is Odd Number";  }
?>
```

3) even odd program using form using php

```
<html>
<body>
<form method="post">
   Enter a number:
   <input type="number" name="number">

   <input type="submit" value="Submit">
</form>
</body>
</html>
<?php
   if($_POST){
      $number = $_POST['number'];
      //divide entered number by 2
      //if the reminder is 0 then the number is
 even otherwise the number is odd
      if(($number % 2) == 0){
         echo "$number is an Even number";
      }else{
         echo "$number is Odd number";
      }     }  ?>
```

4) swap two numbers

```
<?php
$a = 45;
$b = 78;
// Swapping Logic
$third = $a;
$a = $b;
$b = $third;
echo "After swapping:<br><br>";
echo "a =".$a."  b=".$b;
?>
```

5) adding two numbers using form in php

```
<html>
<body>
<form method="post">
Enter First Number:
<input type="number" name="number1" />
<br><br>
Enter Second Number:
<input type="number" name="number2" />
<br><br>
<input  type="submit" name="submit" value
="Add">
</form>
<?php
   if(isset($_POST['submit']))
   {
      $number1 = $_POST['number1'];
      $number2 = $_POST['number2'];
      $sum =  $number1+$number2;
echo "The sum of $number1 and $number2
is: ".$sum;
}
?>
</body>
</html>
```

6) Area of triangle

```
<?php
$base = 10;
 $height = 15;
 echo "area with base $base and height $hei
ght= " . ($base * $height) / 2;
 ?>
```

7) pattern printing

```
<?php
for($i=0;$i<=5;$i++){
for($j=5-$i;$j>=1;$j--){
echo "* ";
}
echo "<br>";
}
?>
```

8) pattern printing

```
<?php
for($i=0;$i<=5;$i++){
for($j=1;$j<=$i;$j++){
echo "* ";
}
echo "<br>";
}
?>
```

1

❖ **What is SQL?**

SQL is Structured Query Language, which is a computer language for storing, manipulating
and retrieving data stored in relational database.
SQL is the standard language for Relation Database System. All relational database
management systems like MySQL, MS Access, Oracle, Sybase, Informix, postgres and SQL
Server use SQL as standard database language.

❖ **Why SQL?**

- Allows users to access data in relational database management systems.
- Allows users to describe the data.
- Allows users to define the data in database and manipulate that data.
- Allows to embed within other languages using SQL modules, libraries & pre
compilers.
- Allows users to create and drop databases and tables.
- Allows users to create view, stored procedure, functions in a database.
- Allows users to set permissions on tables, procedures, and views

❖ **History:**

- 1970 -- Dr. Edgar F. "Ted" Codd of IBM is known as the father of relational
databases. He described a relational model for databases.
- 1974 -- Structured Query Language appeared.
- 1978 -- IBM worked to develop Codd's ideas and released a product named System/R.
- 1986 -- IBM developed the first prototype of relational database and standardized by
ANSI. The first relational database was released by Relational Software and its later
becoming Oracle.

❖ **SQL Process:**

When you are executing an SQL command for any RDBMS, the system determines the best
way to carry out your request and SQL engine figures out how to interpret the task.
There are various components included in the process. These components are Query
Dispatcher, Optimization Engines, Classic Query Engine and SQL Query Engine, etc. Classic
query engine handles all non-SQL queries but SQL query engine won't handle logical files.
Following is a simple diagram showing SQL Architecture:

2

❖ **SQL Commands:**

The standard SQL commands to interact with relational databases are CREATE, SELECT,
INSERT, UPDATE, DELETE and DROP. These commands can be classified into groups
based on their nature:

❖ **DDL - Data Definition Language:**

❖ **DML - Data Manipulation Language:**

Command	Description
CREATE	Creates a new table, a view of a table, or other object in database
ALTER	Modifies an existing database object, such as a table.
DROP	Deletes an entire table, a view of a table or other object in the database.

Command	Description
SELECT	Retrieves certain records from one or more tables
INSERT	Creates a record
UPDATE	Modifies records
DELETE	Deletes records

3

❖ **DCL - Data Control Language:**

❖ **What is RDBMS?**

RDBMS stands for Relational Database Management System.
RDBMS is the basis for SQL,
and for all modern database systems like MS SQL Server, IBM DB2, Oracle, MySQL, and
Microsoft Access.
A Relational database management system (RDBMS) is a database management system
(DBMS) that is based on the relational model as introduced by E. F. Codd.

❖ **What is table?**

The data in RDBMS is stored in database objects called tables. The table is a collection of
related data entries and it consists of columns and rows.
Remember, a table is the most common and simplest form of data storage in a relational
database. Following is the example of a CUSTOMERS table:

```
+----+----------+-----+-----------+----------+
| ID | NAME | AGE | ADDRESS | SALARY |
+----+----------+-----+-----------+----------+
| 1 | Ramesh | 32 | Ahmedabad | 2000.00 |
| 2 | Khilan | 25 | Delhi | 1500.00 |
| 3 | kaushik | 23 | Kota | 2000.00 |
+----+----------+-----+-----------+----------+
```

❖ **What is field?**

Every table is broken up into smaller entities called fields. The fields in the CUSTOMERS
table consist of ID, NAME, AGE, ADDRESS and SALARY.
A field is a column in a table that is designed to maintain specific information about every
record in the table.

❖ **What is record or row?**

A record, also called a row of data, is each individual entry that exists in a table.

Command	Description
GRANT	Gives a privilege to user
REVOKE	Takes back privileges granted from user

4

For example there are 7 records in the above CUSTOMERS table. Following is a single row
of data or record in the CUSTOMERS table:

```
+----+----------+-----+-----------+----------+
| 1 | Ramesh | 32 | Ahmedabad | 2000.00 |
+----+----------+-----+-----------+----------+
```

A record is a horizontal entity in a table.

❖ **What is column?**

A column is a vertical entity in a table that contains all information associated with a specific
field in a table.
For example, a column in the CUSTOMERS table is ADDRESS, which represents location
description and would consist of the following:

```
+-----------+
| ADDRESS |
+-----------+
| Ahmedabad |
| Delhi |
| Kota |
| Mumbai |
+----+------+
```

❖ **What is NULL value?**

A NULL value in a table is a value in a field that appears to be blank, which means a field
with a NULL value is a field with no value.
It is very important to understand that a NULL value is different than a zero value or a field
that contains spaces. A field with a NULL value is one that has been left blank during record
creation.

❖ **SQL Constraints:**

Constraints are the rules enforced on data columns on table. These are used to limit the type
of data that can go into a table. This ensures the accuracy and reliability of the data in the
database.

Constraints could be column level or table level. Column level constraints are applied only to
one column where as table level constraints are applied to the whole table.

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Following are commonly used constraints available in SQL:

- NOT NULL Constraint: Ensures that a column cannot have NULL value.
- DEFAULT Constraint: Provides a default value for a column when none is specified.
- UNIQUE Constraint: Ensures that all values in a column are different.
- PRIMARY Key: Uniquely identified each rows/records in a database table.
- FOREIGN Key: Uniquely identified a rows/records in any another database table.
- CHECK Constraint: The CHECK constraint ensures that all values in a column satisfy
certain conditions.
- INDEX: Use to create and retrieve data from the database very quickly.

❖ **ORACLE**

It is a very large and multi-user database management system.

Oracle is a relational database
management system developed by 'Oracle Corporation'.

Oracle works to efficiently manage its resource, a database of information, among the
multiple clients requesting and sending data in the network.

It is an excellent database server choice for client/server computing. Oracle supports all major
operating systems for both clients and servers, including MSDOS, NetWare, UnixWare, OS/2
and most UNIX flavors.

❖ **History:**

Oracle began in 1977 and celebrating its 32 wonderful years in the industry (from 1977 to
2009).

- 1977 - Larry Ellison, Bob Miner and Ed Oates founded Software Development
Laboratories to undertake development work.
- 1979 - Version 2.0 of Oracle was released and it became first commercial relational
database and first SQL database. The company changed its name to Relational
Software Inc. (RSI).
- 1981 - RSI started developing tools for Oracle.
- 1982 - RSI was renamed to Oracle Corporation.
- 1983 - Oracle released version 3.0, rewritten in C language and ran on multiple
platforms.
- 1984 - Oracle version 4.0 was released. It contained features like concurrency control
- multi-version read consistency, etc.
- 1985 - Oracle version 4.0 was released. It contained features like concurrency control
- multi-version read consistency, etc.

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- 2007 - Oracle has released Oracle11g. The new version focused on better partitioning,
easy migration etc.

❖ **Features:**

- Concurrency
- Read Consistency
- Locking Mechanisms
- Quiesce Database
- Portability
- Self-managing database
- SQL*Plus
- ASM
- Scheduler
- Resource Manager
- Data Warehousing
- Materialized views
- Bitmap indexes
- Table compression
- Parallel Execution
- Analytic SQL
- Data mining
- Partitioning

❖ **The CL SCR Command:**

The CL SCR Command is used to clear the screen.

Ex:

```
SQL> CL SCR
```

❖ **Displaying all the tables:**

To display all the tables use the below statement

```
SQL> SELECT * FROM TAB;
```

❖ **Displaying all the tables, views, index:**

```
SQL> SELECT * FROM CAT;
```

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❖ **The SQL CREATE TABLE Statement**

The CREATE TABLE statement is used to create a table in a database.

Tables are organized into rows and columns; and each table must have a name.

Syntax

```
CREATE TABLE table_name
(
column_name1 data_type(size),
column_name2 data_type(size),
column_name3 data_type(size),
....
);
```

The column_name parameters specify the names of the columns of the table.

The data_type parameter specifies what type of data the column can hold (e.g. varchar,
integer, decimal, date, etc.).

The size parameter specifies the maximum length of the column of the table.

❖ **SQL CREATE TABLE Example**

```
SQL> CREATE TABLE STUDENT(ROLLNO NUMBER(6),
2 NAME VARCHAR2(10),
3 DOA DATE,
4 FEES NUMBER(6));
```

❖ **Displaying structure of the table:**

```
SQL> DESC STUDENT;
Or
SQL> DESCRIBE STUDENT;
```

❖ **The SQL INSERT INTO Statement**

The INSERT INTO statement is used to insert new records in a table.

❖ **SQL INSERT INTO Syntax**

```
INSERT INTO table_name
VALUES (value1,value2,value3,...);
```

It is possible to write the INSERT INTO statement in four forms.

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❖ **Insert all fields one record method:**

```
SQL> INSERT INTO STUDENT VALUES(1,'AMIT','01-JUN-14',6500);
```

❖ **Insert few fields one record:**

```
SQL> INSERT INTO STUDENT(ROLLNO,NAME)VALUES(2,'ANIL');
```

❖ **Displaying records of student table:**

```
SQL> SELECT * FROM STUDENT;
```

❖ **Insert all fields many records:**

```
SQL> INSERT INTO STUDENT
VALUES(&ROLLNO,'&NAME','&DOA',&FEES);
Enter value for rollno: 3
Enter value for name: MAHESH
Enter value for doa: 01-DEC-14
Enter value for fees: 98500
old 1: INSERT INTO STUDENT
VALUES(&ROLLNO,'&NAME','&DOA',&FEES)
new 1: INSERT INTO STUDENT VALUES(3,'MAHESH','01-DEC-
14',98500)
1 row created.
```

SQL> /
Enter value for rollno: 4
Enter value for name: VIJAY
Enter value for doa: 01-JUN-13
Enter value for fees: 9700
old 1: INSERT INTO STUDENT
VALUES(&ROLLNO,'&NAME','&DOA',&FEES)
new 1: INSERT INTO STUDENT VALUES(4,'VIJAY','01-JUN-13',9700)
1 row created.

❖ **Insert few fields many records:**

SQL> INSERT INTO
STUDENT(ROLLNO,NAME)VALUES(&ROLLNO,'&NAME');
Enter value for rollno: 6
Enter value for name: JAY
old 1: INSERT INTO
STUDENT(ROLLNO,NAME)VALUES(&ROLLNO,'&NAME')
new 1: INSERT INTO STUDENT(ROLLNO,NAME)VALUES(6,'JAY')
1 row created.

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❖ **Displaying all records:**

SQL> SELECT * FROM STUDENT;
ROLLNO NAME DOA FEES
---------- ---------- --------- ----------
1 AMIT 01-JUN-14 6500
2 ANIL
3 MAHESH 01-DEC-14 98500
4 VIJAY 01-JUN-13 9700
5 AJAY 05-JUL-14 8500
6 JAY
7 AKASH
8 BASU

❖ **The COMMIT Command:**

The COMMIT command is the transactional command used to save changes invoked by a
transaction to the database.
The COMMIT command saves all transactions to the database since the last COMMIT or

❖ **The syntax for COMMIT command is as follows:**

COMMIT;
SQL> COMMIT;
Commit complete.

❖ **The Update Command:**

SQL - UPDATE Query
The SQL UPDATE Query is used to modify the existing records in a table.
You can use WHERE clause with UPDATE query to update selected rows otherwise all the
rows would be affected.

Syntax:

The basic syntax of UPDATE query with WHERE clause is as follows:
UPDATE table_name
SET column1 = value1, column2 = value2...., columnN = valueN
WHERE [condition];

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Ex: Updating One Record:

SQL> UPDATE STUDENT SET DOA='01-JUN-14',FEES=11000 WHERE ROLLNO=8;
1 row updated.

Ex: Updating few Records:

SQL> UPDATE STUDENT SET DOA='01-JUN-14',FEES=12000 WHERE ROLLNO>=4
AND ROLLNO<=7;
4 rows updated.

❖ **Updating all records:**

SQL> UPDATE STUDENT SET DOA='01-JUN-13',FEES=15000;
8 rows updated.

SQL - ALTER TABLE Command

The SQL ALTER TABLE command is used to add, delete or modify columns in an existing
table.
You would also use ALTER TABLE command to add and drop various constraints on a an
existing table.

Syntax:

The basic syntax of ALTER TABLE to add a new column in an existing table is as follows:
ALTER TABLE table_name ADD column_name datatype;
SQL> ALTER TABLE STUDENT ADD(CITY VARCHAR2(10),PHNO VARCHAR2(10));
Table altered.
SQL> DESC STUDENT;
Name Null? Type
--- -------- ----------------------------
ROLLNO NUMBER(6)
NAME VARCHAR2(10)
DOA DATE
FEES NUMBER(6)
CITY VARCHAR2(10)
PHNO VARCHAR2(10)

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The basic syntax of ALTER TABLE to DROP COLUMN in an existing table is as follows:
ALTER TABLE table_name DROP COLUMN column_name;
SQL> ALTER TABLE STUDENT DROP COLUMN CITY;
Table altered.
SQL> DESC STUDENT;
Name Null? Type
--- -------- ----------------------------
ROLLNO NUMBER(6)
NAME VARCHAR2(10)
DOA DATE
FEES NUMBER(6)
PHNO VARCHAR2(10)

The basic syntax of ALTER TABLE to change the DATA TYPE of a column in a table is as
follows:

ALTER TABLE table_name MODIFY COLUMN column_name datatype;

SQL> ALTER TABLE STUDENT MODIFY(NAME VARCHAR2(12));
Table altered.
SQL> DESC STUDENT;
Name Null? Type
--- -------- ----------------------------
ROLLNO NUMBER(6)
NAME VARCHAR2(12)
DOA DATE
FEES NUMBER(6)
CITY VARCHAR2(10)
PHNO VARCHAR2(10)

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❖ **The Delete command:**

SQL - DELETE Query

The SQL DELETE Query is used to delete the existing records from a table.
You can use WHERE clause with DELETE query to delete selected rows, otherwise all the
records would be deleted.

Syntax:

The basic syntax of DELETE query with WHERE clause is as follows:
DELETE FROM table_name
WHERE [condition];

❖ **Deleting one record:**

SQL> DELETE FROM STUDENT WHERE ROLLNO=8;
1 row deleted.

❖ **Deleting few records:**

SQL> DELETE FROM STUDENT WHERE ROLLNO>=3 AND ROLLNO<=7;
5 rows deleted.

❖ **Deleting all records:**

SQL> DELETE FROM STUDENT;
SQL> SELECT * FROM STUDENT;
no rows selected

❖ **Retrieving records / restoring records**

SQL> ROLLBACK;
Rollback complete.
SQL> SELECT * FROM STUDENT;
ROLLNO NAME DOA FEES CITY PHNO
---------- ---------- --------- ---------- ---------- ----------
1 AMIT 01-JUN-13 15000 HUBLI 9845457585
2 ANIL 01-JUN-13 15000 HUBLI

3 MAHESH 01-JUN-13 15000 HUBLI
7 AKASH 01-JUN-13 15000 HUBLI
8 BASU 01-JUN-13 15000 HUBLI 9844444444

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❖ **The SAVEPOINT Command:**

A SAVEPOINT is a point in a transaction when you can roll the transaction back to a certain
point without rolling back the entire transaction.
The syntax for SAVEPOINT command is as follows:
SAVEPOINT SAVEPOINT_NAME;
This command serves only in the creation of a SAVEPOINT among transactional statements.

❖ **Rollback**

The ROLLBACK command is used to undo a group of transactions.
The syntax for rolling back to a SAVEPOINT is as follows:
ROLLBACK TO SAVEPOINT_NAME;

```
SQL> SAVEPOINT SP1;
Savepoint created.
SQL> DELETE FROM STUDENT WHERE ROLLNO=8;
1 row deleted.
SQL> SELECT * FROM STUDENT;
ROLLNO NAME DOA FEES
---------- ---------- --------- ----------
1 AMIT 01-JUN-13 15000
2 ANIL 01-JUN-13 15000
3 MAHESH 01-JUN-13 15000
4 VIJAY 01-JUN-13 15000
5 AJAY 01-JUN-13 15000
6 JAY 01-JUN-13 15000
7 AKASH 01-JUN-13 15000
7 rows selected.
SQL> SAVEPOINT SP2;
Savepoint created.
SQL> DELETE FROM STUDENT WHERE ROLLNO>=3 AND
ROLLNO<=7;
5 rows deleted.
```

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```
SQL> SAVEPOINT SP3;
Savepoint created.
SQL> DELETE FROM STUDENT;
2 rows deleted.
SQL> ROLLBACK TO SP2;
Rollback complete.
```

❖ **The RELEASE SAVEPOINT Command:**

The RELEASE SAVEPOINT command is used to remove a SAVEPOINT that you have
created.

The syntax for RELEASE SAVEPOINT is as follows:

RELEASE SAVEPOINT SAVEPOINT_NAME;
Once a SAVEPOINT has been released, you can no longer use the ROLLBACK command to
undo transactions performed since the SAVEPOINT.

```
SQL>RELEASE SAVEPOINT SP1;
```

❖ **Deleting records permenently:**

SQL - TRUNCATE TABLE Command

The SQL TRUNCATE TABLE command is used to delete complete data from an existing
table.
You can also use DROP TABLE command to delete complete table but it would remove
complete table structure form the database and you would need to re-create this table once
again if you wish you store some data.
Syntax:
The basic syntax of TRUNCATE TABLE is as follows:
TRUNCATE TABLE table_name;

```
SQL> TRUNCATE TABLE STUDENT;
Table truncated.
```

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```
SQL> SELECT * FROM STUDENT;
no rows selected
```

❖ **SQL - DROP or DELETE Table**

The SQL DROP TABLE statement is used to remove a table definition and all data, indexes,
triggers, constraints, and permission specifications for that table.
NOTE: You have to be careful while using this command because once a table is deleted then
all the information available in the table would also be lost forever.

Syntax:

Basic syntax of DROP TABLE statement is as follows:
DROP TABLE table_name;

```
SQL> DROP TABLE STUDENT;
Table dropped.
```

❖ **Example for linking table or setting relationship for student and result tables**

```
SQL> CREATE TABLE STUD(ROLLNO NUMBER(3)PRIMARY KEY,
2 NAME VARCHAR2(10),
3 ADDRESS VARCHAR2(10));
Table created.
SQL> DESC STUD;
Name Null? Type
----------------------------------------- -------- ----------------------------
ROLLNO NOT NULL NUMBER(3)
NAME VARCHAR2(10)
ADDRESS VARCHAR2(10)
SQL> INSERT INTO STUD VALUES(&ROLLNO,'&NAME','&ADDRESS');
Enter value for rollno: 1
Enter value for name: AJAY
Enter value for address: HOSUR
old 1: INSERT INTO STUD VALUES(&ROLLNO,'&NAME','&ADDRESS')
new 1: INSERT INTO STUD VALUES(1,'AJAY','HOSUR')
1 row created.
```

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```
SQL> /
Enter value for rollno: 2
Enter value for name: CHETAN
Enter value for address: MADURA
old 1: INSERT INTO STUD VALUES(&ROLLNO,'&NAME','&ADDRESS')
new 1: INSERT INTO STUD VALUES(2,'CHETAN','MADURA')
1 row created.
SQL> /
Enter value for rollno: 3
Enter value for name: DEEPAK
Enter value for address: GADAG
old 1: INSERT INTO STUD VALUES(&ROLLNO,'&NAME','&ADDRESS')
new 1: INSERT INTO STUD VALUES(3,'DEEPAK','GADAG')
1 row created.
SQL> /
Enter value for rollno: 4
Enter value for name: GANESH
Enter value for address: JSS
old 1: INSERT INTO STUD VALUES(&ROLLNO,'&NAME','&ADDRESS')
new 1: INSERT INTO STUD VALUES(4,'GANESH','JSS')
1 row created.
SQL> /
Enter value for rollno: 5
Enter value for name: JAY
Enter value for address: ARTS COLL
old 1: INSERT INTO STUD VALUES(&ROLLNO,'&NAME','&ADDRESS')
new 1: INSERT INTO STUD VALUES(5,'JAY','ARTS COLL')
1 row created.
SQL> SELECT * FROM STUD;
```

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```
ROLLNO NAME ADDRESS
---------- ---------- ----------
1 AJAY HOSUR
2 CHETAN MADURA
3 DEEPAK GADAG
4 GANESH JSS
5 JAY ARTS COLL
SQL> CREATE TABLE RES(ROLLNO NUMBER(3)PRIMARY KEY,
2 S1 NUMBER(3),
3 S2 NUMBER(3),
4 TOT NUMBER(3),
5 PER NUMBER(3));
Table created.
SQL> DESC RES;
Name Null? Type
----------------------------------------- -------- ----------------------------
ROLLNO NUMBER(3)
```

```
S1 NUMBER(3)
S2 NUMBER(3)
TOT NUMBER(3)
PER NUMBER(3)
SQL> INSERT INTO
RES(ROLLNO,S1,S2)VALUES(&ROLLNO,&S1,&S2);
Enter value for rollno: 1
Enter value for s1: 50
Enter value for s2: 60
old 1: INSERT INTO
RES(ROLLNO,S1,S2)VALUES(&ROLLNO,&S1,&S2)
new 1: INSERT INTO RES(ROLLNO,S1,S2)VALUES(1,50,60)
1 row created.
SQL> /
Enter value for rollno: 2
Enter value for s1: 70
```

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```
Enter value for s2: 80
old 1: INSERT INTO
RES(ROLLNO,S1,S2)VALUES(&ROLLNO,&S1,&S2)
new 1: INSERT INTO RES(ROLLNO,S1,S2)VALUES(2,70,80)
1 row created.
SQL> /
Enter value for rollno: 3
Enter value for s1: 60
Enter value for s2: 80
old 1: INSERT INTO
RES(ROLLNO,S1,S2)VALUES(&ROLLNO,&S1,&S2)
new 1: INSERT INTO RES(ROLLNO,S1,S2)VALUES(3,60,80)
1 row created.
SQL> /
Enter value for rollno: 4
Enter value for s1: 80
Enter value for s2: 70
old 1: INSERT INTO
RES(ROLLNO,S1,S2)VALUES(&ROLLNO,&S1,&S2)
new 1: INSERT INTO RES(ROLLNO,S1,S2)VALUES(4,80,70)
1 row created.
SQL> /
Enter value for rollno: 5
Enter value for s1: 90
Enter value for s2: 70
old 1: INSERT INTO
RES(ROLLNO,S1,S2)VALUES(&ROLLNO,&S1,&S2)
new 1: INSERT INTO RES(ROLLNO,S1,S2)VALUES(5,90,70)
1 row created.
SQL> SELECT * FROM RES;
ROLLNO S1 S2 TOT PER
---------- ---------- ---------- ---------- ----------
1 50 60
2 70 80
3 60 80
```

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```
4 80 70
5 90 70
SQL> UPDATE RES SET TOT=S1+S2;
5 rows updated.
SQL> SELECT * FROM RES;
ROLLNO S1 S2 TOT PER
---------- ---------- ---------- ---------- ----------
1 50 60 110
2 70 80 150
3 60 80 140
4 80 70 150
5 90 70 160
SQL> UPDATE RES SET PER=TOT/2;
5 rows updated.
SQL> SELECT * FROM RES;
ROLLNO S1 S2 TOT PER
---------- ---------- ---------- ---------- ----------
1 50 60 110 55
2 70 80 150 75
3 60 80 140 70
4 80 70 150 75
5 90 70 160 80
```

```
SQL> COMMIT;
Commit complete.
SQL> SELECT STUD.ROLLNO,NAME,S1,S2,TOT,PER FROM STUD,RES
2 WHERE STUD.ROLLNO=RES.ROLLNO;
```

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```
2 CHETAN 70 80 150 75
3 DEEPAK 60 80 140 70
4 GANESH 80 70 150 75
5 JAY 90 70 160 80
SQL> COMMIT;
Commit complete.
```

❖ **Example for linking table or setting relationship for staff and salary tables**

```
SQL>CREATE TABLE STAFF10(STNO NUMBER(3)PRIMARY KEY,
2 STNAME VARCHAR2(10)NOT NULL,
3 DESIG VARCHAR2(10));
Table created.
SQL> DESC STAFF10;
Name Null? Type
----------------------------------------- -------- ----------------------------
STNO NOT NULL NUMBER(3)
STNAME NOT NULL VARCHAR2(10)
DESIG VARCHAR2(10)
SQL> CREATE TABLE SAL(STNO NUMBER(3)PRIMARY KEY,
2 BASIC NUMBER(5),
3 HRA NUMBER(5),
4 DA NUMBER(5),
5 GROSS NUMBER(5),
6 PF NUMBER(5),
7 NETSAL NUMBER(5),
8 FOREIGN KEY (STNO)REFERENCES STAFF10);
Table created.
SQL> DESC SAL;
ROLLNO NAME S1 S2 TOT PER
---------- ---------- ---------- ---------- ---------- ----------
1 AJAY 50 60 110 55
```

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```
Name Null? Type
----------------------------------------- -------- ----------------------------
STNO NOT NULL NUMBER(3)
BASIC NUMBER(5)
HRA NUMBER(5)
DA NUMBER(5)
GROSS NUMBER(5)
PF NUMBER(5)
NETSAL NUMBER(5)
SQL> DESC STAFF10;
Name Null? Type
----------------------------------------- -------- ----------------------------
STNO NOT NULL NUMBER(3)
STNAME NOT NULL VARCHAR2(10)
DESIG VARCHAR2(10)
SQL> INSERT INTO STAFF10 VALUES(1,'AMIT','ACCT');
1 row created.
SQL> INSERT INTO STAFF10 VALUES(2,'BABU','CLERK');
1 row created.
SQL> INSERT INTO STAFF10 VALUES(3,'CHETAN','MANAGER');
1 row created.
SQL> SELECT * FROM STAFF10;
STNO STNAME DESIG
---------- ---------- ----------
1 AMIT ACCT
2 BABU CLERK
3 CHETAN MANAGER
SQL> COMMIT;
Commit complete.
```

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```
SQL> INSERT INTO SAL(STNO,BASIC)VALUES(1,10000);
1 row created.
SQL> INSERT INTO SAL(STNO,BASIC)VALUES(2,12000);
1 row created.
SQL> INSERT INTO SAL(STNO,BASIC)VALUES(3,15000);
1 row created.
SQL> SELECT * FROM SAL;
```

```
STNO BASIC HRA DA GROSS PF NETSAL
---------- ---------- ---------- ---------- ---------- ---------- ----------
1 10000
2 12000
3 15000
SQL> UPDATE SAL SET HRA=BASIC*20/100;
3 rows updated.
SQL> SELECT * FROM SAL;
STNO BASIC HRA DA GROSS PF NETSAL
---------- ---------- ---------- ---------- ---------- ---------- ----------
1 10000 2000
2 12000 2400
3 15000 3000
SQL> UPDATE SAL SET DA=BASIC*20/100;
3 rows updated.
SQL> SELECT * FROM SAL;
STNO BASIC HRA DA GROSS PF NETSAL
---------- ---------- ---------- ---------- ---------- ---------- ----------
1 10000 2000 2000
2 12000 2400 2400
```

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```
3 15000 3000 3000
SQL> UPDATE SAL SET GROSS=BASIC+HRA+DA;
3 rows updated.
SQL> SELECT * FROM SAL;
STNO BASIC HRA DA GROSS PF NETSAL
---------- ---------- ---------- ---------- ---------- ---------- ----------
1 10000 2000 2000 14000
2 12000 2400 2400 16800
3 15000 3000 3000 21000
SQL> UPDATE SAL SET PF=BASIC*12/100;
3 rows updated.
SQL> SELECT * FROM SAL;
STNO BASIC HRA DA GROSS PF NETSAL
---------- ---------- ---------- ---------- ---------- ---------- ----------
1 10000 2000 2000 14000 1200
2 12000 2400 2400 16800 1440
3 15000 3000 3000 21000 1800
SQL> UPDATE SAL SET NETSAL=GROSS-PF;
3 rows updated.
SQL> SELECT * FROM SAL;
STNO BASIC HRA DA GROSS PF NETSAL
---------- ---------- ---------- ---------- ---------- ---------- ----------
1 10000 2000 2000 14000 1200 12800
```

❖ **Create table emp with the following fields:**

```
SQL>CREATE TABLE EMP(
EMPNO NUMBER(4)PRIMARY KEY,
ENAME VARCHAR2(10),
JOB VARCHAR2(9),
MGR NUMBER(4),
```

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```
HIREDATE DATE,
SAL NUMBER(7,2),
COMM NUMBER(7,2),
DEPTNO NUMBER(2));
SQL> DESC EMP;
Name Null? Type
----------------------------------------- -------- ----------------------------
EMPNO NOT NULL NUMBER(4)
ENAME VARCHAR2(10)
JOB VARCHAR2(9)
MGR NUMBER(4)
HIREDATE DATE
SAL NUMBER(7,2)
COMM NUMBER(7,2)
DEPTNO NUMBER(2)
```

Add 14 records to employee table (data is shown below)

```
SQL> SELECT * FROM EMP;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
7369 SMITH CLERK 7902 17-DEC-80 900 20
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7566 JONES MANAGER 7839 02-APR-81 2975 20
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7788 SCOTT ANALYST 7566 19-APR-87 3000 20
7839 KING PRESIDENT 17-NOV-81 5000 10
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
7876 ADAMS CLERK 7788 23-MAY-87 1100 20
7900 JAMES CLERK 7698 03-DEC-81 950 30
7902 FORD ANALYST 7566 03-DEC-81 3000 20
7934 MILLER CLERK 7782 23-JAN-82 1300 10
101 MATHEW CLERK 7777 01-JUN-10 6000 500 10
15 rows selected.
SQL> SET PAGESIZE 100;
```

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```
SQL> SET LINESIZE 100;
SQL> /
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17-DEC-80 900 20
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7566 JONES MANAGER 7839 02-APR-81 2975 20
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7788 SCOTT ANALYST 7566 19-APR-87 3000 20
7839 KING PRESIDENT 17-NOV-81 5000 10
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
7876 ADAMS CLERK 7788 23-MAY-87 1100 20
7900 JAMES CLERK 7698 03-DEC-81 950 30
7902 FORD ANALYST 7566 03-DEC-81 3000 20
7934 MILLER CLERK 7782 23-JAN-82 1300 10
101 MATHEW CLERK 7777 01-JUN-10 6000 500 10
15 rows selected.
SQL> SELECT EMPNO,ENAME,SAL FROM EMP;
EMPNO ENAME SAL
---------- ---------- ----------
7369 SMITH 900
7499 ALLEN 1600
7521 WARD 1250
7566 JONES 2975
7654 MARTIN 1250
7698 BLAKE 2850
7782 CLARK 2450
7788 SCOTT 3000
7839 KING 5000
7844 TURNER 1500
7876 ADAMS 1100
7900 JAMES 950
7902 FORD 3000
7934 MILLER 1300
```

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```
101 MATHEW 6000
15 rows selected.
SQL> SELECT EMPNO,ENAME,JOB FROM EMP;
EMPNO ENAME JOB
---------- ---------- ---------
7369 SMITH CLERK
7499 ALLEN SALESMAN
7521 WARD SALESMAN
7566 JONES MANAGER
7654 MARTIN SALESMAN
7698 BLAKE MANAGER
7782 CLARK MANAGER
7788 SCOTT ANALYST
7839 KING PRESIDENT
7844 TURNER SALESMAN
7876 ADAMS CLERK
7900 JAMES CLERK
7902 FORD ANALYST
7934 MILLER CLERK
101 MATHEW CLERK
15 rows selected.
SQL> SELECT * FROM EMP WHERE SAL>=1000 AND SAL<=3000;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7566 JONES MANAGER 7839 02-APR-81 2975 20
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7788 SCOTT ANALYST 7566 19-APR-87 3000 20
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
7876 ADAMS CLERK 7788 23-MAY-87 1100 20
7902 FORD ANALYST 7566 03-DEC-81 3000 20
7934 MILLER CLERK 7782 23-JAN-82 1300 10
11 rows selected.
```

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```
SQL> SELECT * FROM EMP WHERE SAL>=3000;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7788 SCOTT ANALYST 7566 19-APR-87 3000 20
7839 KING PRESIDENT 17-NOV-81 5000 10
7902 FORD ANALYST 7566 03-DEC-81 3000 20
101 MATHEW CLERK 7777 01-JUN-10 6000 500 10
SQL> SELECT * FROM EMP WHERE SAL<3000;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17-DEC-80 900 20
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7566 JONES MANAGER 7839 02-APR-81 2975 20
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
7876 ADAMS CLERK 7788 23-MAY-87 1100 20
7934 MILLER CLERK 7782 23-JAN-82 1300 10
11 rows selected.
SQL> SELECT * FROM EMP WHERE DEPTNO=10;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7839 KING PRESIDENT 17-NOV-81 5000 10
7934 MILLER CLERK 7782 23-JAN-82 1300 10
101 MATHEW CLERK 7777 01-JUN-10 6000 500 10
SQL> SELECT * FROM EMP WHERE DEPTNO=30;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
7900 JAMES CLERK 7698 03-DEC-81 950 30
6 rows selected.
```

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```
SQL> SELECT * FROM EMP WHERE JOB='CLERK';
7876 ADAMS CLERK 7788 23-MAY-87 1100 20
7900 JAMES CLERK 7698 03-DEC-81 950 30
7934 MILLER CLERK 7782 23-JAN-82 1300 10
101 MATHEW CLERK 7777 01-JUN-10 6000 500 10
SQL> SELECT * FROM EMP WHERE JOB='SALESMAN';
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
SQL> SELECT * FROM EMP WHERE JOB='SALESMAN' AND
SAL>=1500;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
SQL> SELECT * FROM EMP WHERE JOB='CLERK' AND DEPTNO=10;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7934 MILLER CLERK 7782 23-JAN-82 1300 10
101 MATHEW CLERK 7777 01-JUN-10 6000 500 10
SQL> SELECT * FROM EMP WHERE DEPTNO=10 OR DEPTNO=30;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
10 rows selected.
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17-DEC-80 900 20
```

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```
SQL> SELECT * FROM EMP WHERE SAL BETWEEN 2000 AND 5000;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7566 JONES MANAGER 7839 02-APR-81 2975 20
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7788 SCOTT ANALYST 7566 19-APR-87 3000 20
7839 KING PRESIDENT 17-NOV-81 5000 10
7902 FORD ANALYST 7566 03-DEC-81 3000 20
6 rows selected.
SQL> SELECT * FROM EMP WHERE COMM IS NULL;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17-DEC-80 900 20
7566 JONES MANAGER 7839 02-APR-81 2975 20
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7788 SCOTT ANALYST 7566 19-APR-87 3000 20
7839 KING PRESIDENT 17-NOV-81 5000 10
7876 ADAMS CLERK 7788 23-MAY-87 1100 20
10 rows selected.
SQL> SELECT * FROM EMP WHERE NOT JOB='CLERK';
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7566 JONES MANAGER 7839 02-APR-81 2975 20
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7788 SCOTT ANALYST 7566 19-APR-87 3000 20
7839 KING PRESIDENT 17-NOV-81 5000 10
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
7902 FORD ANALYST 7566 03-DEC-81 3000 20
10 rows selected.
SQL> SELECT * FROM EMP WHERE JOB!='CLERK';
```

30

```
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7566 JONES MANAGER 7839 02-APR-81 2975 20
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7788 SCOTT ANALYST 7566 19-APR-87 3000 20
7839 KING PRESIDENT 17-NOV-81 5000 10
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
7902 FORD ANALYST 7566 03-DEC-81 3000 20
10 rows selected.
SQL> SELECT * FROM EMP WHERE EMPNO IN(7499,7654,7902);
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7902 FORD ANALYST 7566 03-DEC-81 3000 20
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
SQL> SELECT * FROM EMP WHERE ENAME IN('ALLEN','FORD');
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7902 FORD ANALYST 7566 03-DEC-81 3000 20
SQL> SELECT * FROM EMP WHERE JOB IN('CLERK','SALESMAN');
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17-DEC-80 900 20
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7844 TURNER SALESMAN 7698 08-SEP-81 1500 0 30
9 rows selected.
SQL> SELECT * FROM EMP WHERE ENAME LIKE 'S%';
```

31

```
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17-DEC-80 900 20
7788 SCOTT ANALYST 7566 19-APR-87 3000 20
SQL> SELECT * FROM EMP WHERE ENAME LIKE '%S';
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7566 JONES MANAGER 7839 02-APR-81 2975 20
7876 ADAMS CLERK 7788 23-MAY-87 1100 20
7900 JAMES CLERK 7698 03-DEC-81 950 30
SQL> SELECT * FROM EMP WHERE ENAME LIKE'%A%';
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
7521 WARD SALESMAN 7698 22-FEB-81 1250 500 30
7654 MARTIN SALESMAN 7698 28-SEP-81 1250 1400 30
7698 BLAKE MANAGER 7839 01-MAY-81 2850 30
7782 CLARK MANAGER 7839 09-JUN-81 2450 10
7876 ADAMS CLERK 7788 23-MAY-87 1100 20
7900 JAMES CLERK 7698 03-DEC-81 950 30
101 MATHEW CLERK 7777 01-JUN-10 6000 500 10
8 rows selected.
SQL> SELECT * FROM EMP WHERE ENAME LIKE 'K%' AND SAL LIKE
'5%';
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7839 KING PRESIDENT 17-NOV-81 5000 10
SQL> SELECT * FROM EMP WHERE ENAME='ALLEN';
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20-FEB-81 1600 300 30
SQL> SELECT EMPNO,ENAME,JOB,SAL,COMM FROM EMP WHERE
ENAME='JAMES';
```

32

```
EMPNO ENAME JOB SAL COMM
---------- ---------- --------- ---------- ----------
7900 JAMES CLERK 950
SQL> COMMIT;
Commit complete.
```

```
SQL> SELECT EMPNO,ENAME,SAL,COMM FROM EMP;
EMPNO ENAME SAL COMM
---------- ---------- ---------- ----------
7369 SMITH 900
7499 ALLEN 1600 300
7521 WARD 1250 500
7566 JONES 2975
7654 MARTIN 1250 1400
7698 BLAKE 2850
7782 CLARK 2450
7788 SCOTT 3000
7839 KING 5000
7844 TURNER 1500 0
7876 ADAMS 1100
15 rows selected.
SQL> SELECT EMPNO,ENAME,SAL,SAL*12 "ANNUAL SALARY"
FROM EMP;
EMPNO ENAME SAL ANNUAL SALARY
---------- ---------- ---------- -------------
7369 SMITH 900 10800
7499 ALLEN 1600 19200
7521 WARD 1250 15000
7566 JONES 2975 35700
7654 MARTIN 1250 15000
15 rows selected.
SQL> SELECT
EMPNO,ENAME,SAL,COMM,SAL+NVL(COMM,0)"MONTHLY SAL"
FROM EMP;
```

33

```
EMPNO ENAME SAL COMM MONTHLY SAL
---------- ---------- ---------- ---------- ------------
7369 SMITH 900 900
7499 ALLEN 1600 300 1900
7521 WARD 1250 500 1750
7566 JONES 2975 2975
7654 MARTIN 1250 1400 2650
7698 BLAKE 2850 2850
7782 CLARK 2450 2450
15 rows selected.
```

❖ **Example for Aggregate functions**

```
SQL> SELECT MAX(SAL)FROM EMP;
MAX(SAL)
----------
6000
SQL> SELECT MIN(SAL)FROM EMP;
MIN(SAL)
----------
900
SQL> SELECT AVG(SAL)FROM EMP;
AVG(SAL)
----------
2341.66667
SQL> SELECT SUM(SAL)FROM EMP;
SUM(SAL)
----------
35125
SQL> SELECT COUNT(*)FROM EMP;
COUNT(*)
----------
```

34

```
15
SQL> SELECT COUNT(COMM)FROM EMP;
COUNT(COMM)
-----------
5
```

❖ **Dual is a system level table**

```
SQL> DESC DUAL;
Name Null? Type
----------------------------------------------------- -------- ------------------------
------------
DUMMY VARCHAR2(1)
SQL> SELECT * FROM DUAL;
D
-
X
```

```
SQL> SELECT ENAME,LOWER(ENAME)FROM EMP;
ENAME LOWER(ENAM
---------- ----------
SMITH smith
ALLEN allen
WARD ward
JONES jones
MARTIN martin
BLAKE blake
CLARK clark
SCOTT scott
KING king
TURNER turner
ADAMS adams
JAMES james
FORD ford
```

35

```
MILLER miller
MATHEW mathew
15 rows selected.
```

❖ **Example for String functions**

```
SQL> SELECT LOWER('KEONICS')FROM DUAL;
LOWER('
-------
keonics
SQL> SELECT ENAME,UPPER(ENAME)FROM EMP;
ENAME UPPER(ENAM
---------- ----------
SMITH SMITH
ALLEN ALLEN
WARD WARD
JONES JONES
MARTIN MARTIN
BLAKE BLAKE
CLARK CLARK
SCOTT SCOTT
KING KING
TURNER TURNER
ADAMS ADAMS
JAMES JAMES
FORD FORD
MILLER MILLER
MATHEW MATHEW
15 rows selected.
SQL> SELECT UPPER('keonics')FROM DUAL;
UPPER('
-------
KEONICS
```

36

```
SQL> SELECT ENAME,INITCAP(ENAME)FROM EMP;
ENAME INITCAP(EN
---------- ----------
SMITH Smith
ALLEN Allen
WARD Ward
JONES Jones
MARTIN Martin
BLAKE Blake
CLARK Clark
SCOTT Scott
KING King
TURNER Turner
ADAMS Adams
JAMES James
FORD Ford
MILLER Miller
MATHEW Mathew
15 rows selected.
SQL> SELECT INITCAP('KEONICS')FROM DUAL;
INITCAP
-------
Keonics
SQL> SELECT ENAME,LENGTH(ENAME)FROM EMP;
ENAME LENGTH(ENAME)
---------- ------------
```

```
SMITH 5
ALLEN 5
WARD 4
JONES 5
MARTIN 6
BLAKE 5
CLARK 5
```

```
37
SCOTT 5
KING 4
TURNER 6
ADAMS 5
JAMES 5
FORD 4
MILLER 6
MATHEW 6
15 rows selected.
SQL> SELECT LENGTH('KEONICS')FROM DUAL;
LENGTH('KEONICS')
-----------------
7
SQL> SELECT JOB,REPLACE(JOB,'SALESMAN','MKTG')FROM EMP;
JOB REPLACE(JOB,'SALESMAN','MKTG')
--------- -------------------------------------
CLERK CLERK
SALESMAN MKTG
SALESMAN MKTG
MANAGER MANAGER
SALESMAN MKTG
MANAGER MANAGER
MANAGER MANAGER
ANALYST ANALYST
PRESIDENT PRESIDENT
SALESMAN MKTG
CLERK CLERK
CLERK CLERK
ANALYST ANALYST
CLERK CLERK
CLERK CLERK
15 rows selected.
```

```
38
SQL> SELECT SAL,RPAD(SAL,10,'*')FROM EMP;
SAL RPAD(SAL,1
---------- ----------
900 900*******
1600 1600******
1250 1250******
SQL> SELECT SAL,LPAD(SAL,10,'?')FROM EMP;
SAL LPAD(SAL,1
---------- ----------
???????900
??????1600
??????1250
SQL> SELECT SUBSTR('INDIA',3,5)FROM DUAL;
SUB
---
DIA
```

❖ **Example for Numerical/mathematical functions**

```
SQL> SELECT ROUND(12.5866656,2)FROM DUAL;
ROUND(12.5866656,2)
-------------------
12.59
SQL> SELECT ROUND(12.50)FROM DUAL;
ROUND(12.50)
------------
13
SQL> SELECT ROUND(12.49)FROM DUAL;
ROUND(12.49)
------------
12
```

```
39
SQL> SELECT CEIL(12.99)FROM DUAL;
CEIL(12.99)
-----------
13
SQL> SELECT CEIL(12.1)FROM DUAL;
CEIL(12.1)
----------
13
SQL> SELECT FLOOR(12.99)FROM DUAL;
FLOOR(12.99)
------------
12
SQL> SELECT SQRT(16)FROM DUAL;
SQRT(16)
----------
4
SQL> SELECT POWER(2,3)FROM DUAL;
POWER(2,3)
----------
8
SQL> SELECT SIN(90)FROM DUAL;
SIN(90)
----------
.893996664
SQL> SELECT COS(60)FROM DUAL;
COS(60)
----------
-.95241298
```

```
40
SQL> SELECT TAN(45)FROM DUAL;
TAN(45)
----------
1.61977519
```

❖ **Example for Date functions**

```
SQL> SELECT SYSDATE FROM DUAL;
SYSDATE
---------
24-NOV-15
SQL> ALTER SESSION SET NLS_DATE_FORMAT='DD/MM/YYYY';
Session altered.
SQL> SELECT * FROM EMP;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- ---------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17/12/1980 900 20
7499 ALLEN SALESMAN 7698 20/02/1981 1600 300 30
7521 WARD SALESMAN 7698 22/02/1981 1250 500 30
7566 JONES MANAGER 7839 02/04/1981 2975 20
7654 MARTIN SALESMAN 7698 28/09/1981 1250 1400 30
7698 BLAKE MANAGER 7839 01/05/1981 2850 30
15 rows selected.
SQL> SELECT TO_CHAR(SYSDATE,'DD/MM/YY')FROM DUAL;
TO_CHAR(
--------
24/11/15
SQL> SELECT TO_CHAR(SYSDATE,'DD-MON-YY')FROM DUAL;
TO_CHAR(S
---------
24-NOV-15
```

```
41
SQL> SELECT TO_CHAR(SYSDATE,'DAY-MONTH-YEAR')FROM
DUAL;
TO_CHAR(SYSDATE,'DAY-MONTH-YEAR')
---------------------------------------------------------------
TUESDAY -NOVEMBER -TWENTY FIFTEEN
SQL> SELECT TO_CHAR(SYSDATE,'DY-MON-YY')FROM DUAL;
TO_CHAR(SY
----------
TUE-NOV-15
SQL> SELECT TO_CHAR(SYSDATE,'YEAR')FROM DUAL;
TO_CHAR(SYSDATE,'YEAR')
-----------------------------------------
TWENTY FIFTEEN
SQL> SELECT TO_CHAR(SYSDATE,'YY')FROM DUAL;
TO
--
15
SQL> SELECT TO_CHAR(SYSDATE,'MONTH')FROM DUAL;
TO_CHAR(S
---------
```

```
NOVEMBER
SQL> SELECT TO_CHAR(SYSDATE,'DAY')FROM DUAL;
TO_CHAR(S
---------
TUESDAY
SQL> SELECT TO_CHAR(SYSDATE,'DY')FROM DUAL;
TO_
---
TUE
```

```
42
SQL> SELECT TO_CHAR(SYSDATE,'HH:MM:SS')FROM DUAL;
TO_CHAR(
--------
04:11:03
SQL> COMMIT;
Commit complete.
SQL> CREATE TABLE EMP_NEW AS SELECT * FROM EMP;
Table created.
SQL> DESC EMP_NEW;
Name Null? Type
----------------------------------------------------- -------- ------------------------
------------
EMPNO NUMBER(4)
ENAME VARCHAR2(10)
JOB VARCHAR2(9)
MGR NUMBER(4)
HIREDATE DATE
SAL NUMBER(7,2)
COMM NUMBER(7,2)
DEPTNO NUMBER(2)
SQL> SELECT * FROM EMP_NEW;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- ---------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17/12/1980 900 20
7499 ALLEN SALESMAN 7698 20/02/1981 1600 300 30
7521 WARD SALESMAN 7698 22/02/1981 1250 500 30
7566 JONES MANAGER 7839 02/04/1981 2975 20
7654 MARTIN SALESMAN 7698 28/09/1981 1250 1400 30
7698 BLAKE MANAGER 7839 01/05/1981 2850 30
7782 CLARK MANAGER 7839 09/06/1981 2450 10
7788 SCOTT ANALYST 7566 19/04/1987 3000 20
15 rows selected.
```

```
43
SQL> CREATE TABLE EMP5 AS SELECT * FROM EMP WHERE
EMPNO=0;
Table created.
SQL> DESC EMP5
Name Null? Type
----------------------------------------------------- -------- ------------------------
------------
EMPNO NUMBER(4)
ENAME VARCHAR2(10)
JOB VARCHAR2(9)
MGR NUMBER(4)
HIREDATE DATE
SAL NUMBER(7,2)
COMM NUMBER(7,2)
DEPTNO NUMBER(2)
SQL> SELECT * FROM EMP5;
no rows selected
❖ Creating duplicate table
SQL> CREATE TABLE EMP6 AS SELECT * FROM EMP WHERE
JOB='CLERK';
Table created.
SQL> SELECT * FROM EMP6;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- ---------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17/12/1980 900 20
7876 ADAMS CLERK 7788 23/05/1987 1100 20
7900 JAMES CLERK 7698 03/12/1981 950 30
7934 MILLER CLERK 7782 23/01/1982 1300 10
101 MATHEW CLERK 7777 01/06/2010 6000 500 10
❖ Creating duplicate table
SQL> CREATE TABLE EMP7 AS SELECT * FROM EMP WHERE
DEPTNO=20;
```

```
Table created.
```

```
44
SQL> DESC EMP7
Name Null? Type
----------------------------------------------------- -------- ------------------------
------------
EMPNO NUMBER(4)
ENAME VARCHAR2(10)
JOB VARCHAR2(9)
MGR NUMBER(4)
HIREDATE DATE
SAL NUMBER(7,2)
COMM NUMBER(7,2)
DEPTNO NUMBER(2)
SQL> SELECT * FROM EMP7;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- ---------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17/12/1980 900 20
7566 JONES MANAGER 7839 02/04/1981 2975 20
7788 SCOTT ANALYST 7566 19/04/1987 3000 20
7876 ADAMS CLERK 7788 23/05/1987 1100 20
7902 FORD ANALYST 7566 03/12/1981 3000 20
❖ Creating duplicate table with few fields of the old table
SQL> CREATE TABLE EMP8 AS SELECT EMPNO,ENAME,JOB,SAL
FROM EMP;
Table created.
SQL> DESC EMP8
Name Null? Type
----------------------------------------------------- -------- ------------------------
------------
EMPNO NUMBER(4)
ENAME VARCHAR2(10)
JOB VARCHAR2(9)
SAL NUMBER(7,2)
SQL> SELECT * FROM EMP8;
```

```
45
EMPNO ENAME JOB SAL
---------- ---------- --------- ----------
7369 SMITH CLERK 900
7499 ALLEN SALESMAN 1600
7521 WARD SALESMAN 1250
7566 JONES MANAGER 2975
7654 MARTIN SALESMAN 1250
7698 BLAKE MANAGER 2850
15 rows selected.
❖ Creating duplicate table with few fields of the old table
SQL> CREATE TABLE EMP9 AS SELECT EMPNO,ENAME,JOB,SAL
FROM EMP
WHERE DEPTNO=30;
Table created.
SQL> DESC EMP9
Name Null? Type
----------------------------------------------------- -------- ------------------------
------------
EMPNO NUMBER(4)
ENAME VARCHAR2(10)
JOB VARCHAR2(9)
SAL NUMBER(7,2)
SQL> SELECT * FROM EMP9;
EMPNO ENAME JOB SAL
---------- ---------- --------- ----------
7499 ALLEN SALESMAN 1600
7521 WARD SALESMAN 1250
7654 MARTIN SALESMAN 1250
7698 BLAKE MANAGER 2850
7844 TURNER SALESMAN 1500
7900 JAMES CLERK 950
6 rows selected.
```

```
46
❖ Creating view
SQL> CREATE VIEW EMP10 AS SELECT * FROM EMP;
View created.
SQL> DESC EMP10
Name Null? Type
----------------------------------------------------- -------- ------------------------
```

```
------------
EMPNO NOT NULL NUMBER(4)
ENAME VARCHAR2(10)
JOB VARCHAR2(9)
MGR NUMBER(4)
HIREDATE DATE
SAL NUMBER(7,2)
COMM NUMBER(7,2)
DEPTNO NUMBER(2)
SQL> SELECT * FROM EMP10;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- ---------- ---------- ---------- ----------
7369 SMITH CLERK 7902 17/12/1980 900 20
7499 ALLEN SALESMAN 7698 20/02/1981 1600 300 30
7521 WARD SALESMAN 7698 22/02/1981 1250 500 30
7566 JONES MANAGER 7839 02/04/1981 2975 20
7654 MARTIN SALESMAN 7698 28/09/1981 1250 1400 30
7698 BLAKE MANAGER 7839 01/05/1981 2850 30
7782 CLARK MANAGER 7839 09/06/1981 2450 10
7788 SCOTT ANALYST 7566 19/04/1987 3000 20
7839 KING PRESIDENT 17/11/1981 5000 10
15 rows selected.
```

❖ **Creating view**

```
SQL> CREATE VIEW EMP11 AS SELECT * FROM EMP WHERE
JOB='SALESMAN';
View created.
```

47

```
SQL> SELECT * FROM EMP11;
EMPNO ENAME JOB MGR HIREDATE SAL COMM DEPTNO
---------- ---------- --------- ---------- ---------- ---------- ---------- ----------
7499 ALLEN SALESMAN 7698 20/02/1981 1600 300 30
7521 WARD SALESMAN 7698 22/02/1981 1250 500 30
7654 MARTIN SALESMAN 7698 28/09/1981 1250 1400 30
7844 TURNER SALESMAN 7698 08/09/1981 1500 0 30
```

❖ **Creating view**

```
SQL> CREATE VIEW EMP12 AS SELECT * FROM EMP WHERE
EMPNO=0;
View created.
SQL> DESC EMP12;
Name Null? Type
----------------------------------------------------- -------- ------------------------
------------
EMPNO NOT NULL NUMBER(4)
ENAME VARCHAR2(10)
JOB VARCHAR2(9)
MGR NUMBER(4)
HIREDATE DATE
SAL NUMBER(7,2)
COMM NUMBER(7,2)
DEPTNO NUMBER(2)
SQL> SELECT * FROM EMP12;
no rows selected
```

❖ **Connecting to admin accout and Creating user accounts**

```
SQL> CONNECT SYSTEM/MANAGER;
Connected.
SQL> CREATE USER KEONICS IDENTIFIED BY WELCOME;
User created.
```

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```
SQL> GRANT CREATE ANY TABLE TO KEONICS;
Grant succeeded.
SQL> GRANT CREATE SESSION TO KEONICS;
Grant succeeded.
SQL> GRANT DROP ANY TABLE TO KEONICS;
Grant succeeded.
SQL> GRANT RESOURCE TO KEONICS;
Grant succeeded.
SQL> COMMIT;
Commit complete.
```

❖ **Login to user account**

```
SQL> CONNECT KEONICS/WELCOME;
Connected.
SQL> CREATE TABLE STUD(ROLLNO NUMBER(6),
2 NAME VARCHAR2(10));
Table created.
SQL> DESC STUD;
Name Null? Type
----------------------------------------------------- -------- ------------------------
------------
ROLLNO NUMBER(6)
NAME VARCHAR2(10)
SQL> INSERT INTO STUD VALUES(1,'MAHESH');
1 row created.
SQL> DELETE FROM STUD;
1 row deleted.
SQL> DROP TABLE STUD;
Table dropped.
```

❖ **Connecting to admin accout**

```
SQL> CONNECT SYSTEM/MANAGER;
Connected.
```

❖ **Deleting user accout**

```
SQL> DROP USER KEONICS;
User dropped.
SQL> COMMIT;
Commit complete.
```