

# AP PRACTICAL FILE

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# EXPERIMENT - 1

Problem Statement: Creating an HTML web page forms

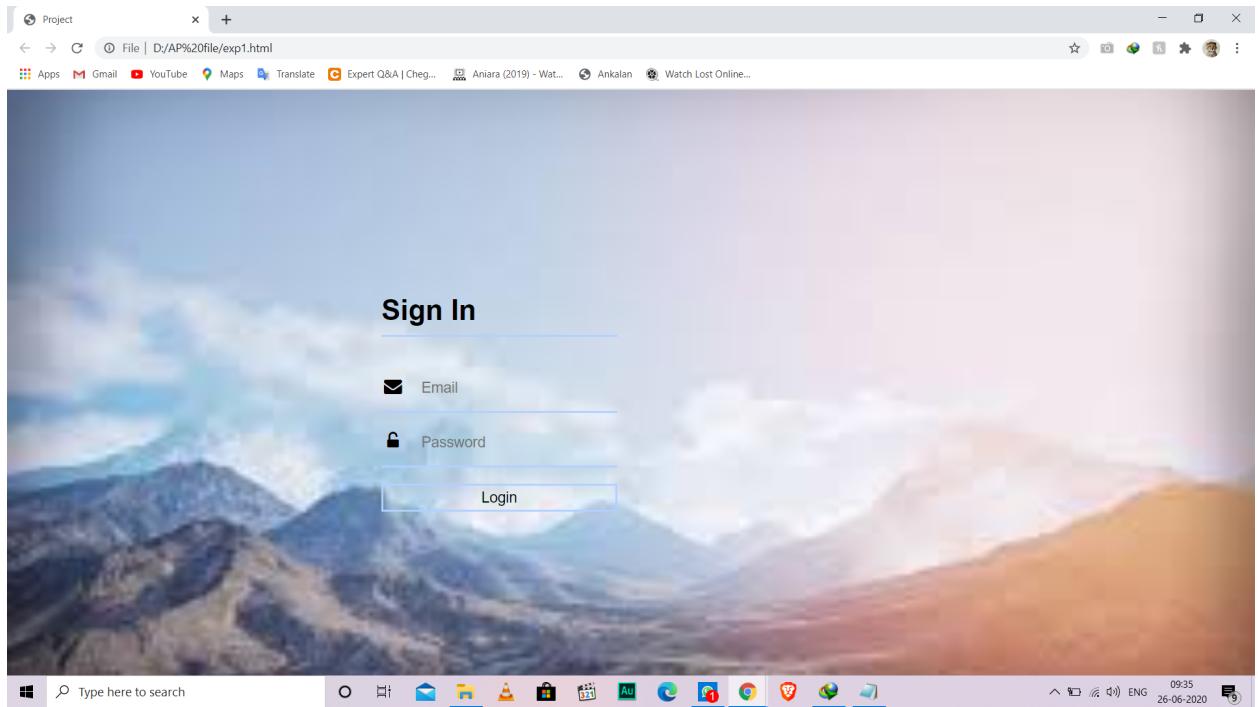
Procedure: Web page is created using form tag

Code :

```
<html>
<head>
<title>Project</title>
<link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/font-awesome/4.7.0/css/font-awesome.
min.css">
<style>
body
{
padding:0;
margin:0;
font-family:sans-serif;
background-image:url(exp1.jpg);
background-position:center;
background-size:cover;
}
.lb
{
width:290px;
position:absolute;
left:30%;
top:30%;
color:grey;
}
.lb h1
{
font-size:35px;
border-bottom: 2px solid #b3d1ff;
margin-bottom:35px;
padding:11px 0;
}
.tb
```

```
{  
width:100%;  
font-size:22px;  
padding:8px 0;  
margin:8px 0;  
border-bottom: 2px solid #b3d1ff;  
}  
.tb i  
{  
width:24px;  
padding:2px;  
text-align:center;  
}  
.tb input  
{  
padding:5px;  
background:none;  
border:none;  
outline:none;  
color:white;  
font-size:18px;  
width:80%;  
margin:5 10px;  
}  
.btn  
{  
width:100%;  
background:none;  
border:2px solid #b3d1ff;  
color:white;  
padding:5px;  
font-size:18px;  
cursor:pointer;  
margin:12px 0;  
}  
.btn:hover  
{  
background-color:#80bfff;  
}  
</style>  
<script>  
function validation()  
{
```

```
var result=true;
var e=document.getElementsByName("email")[0].value;
var p=document.getElementsByName("password")[0].value;
var atindex=e.indexOf('@');
var dotindex=e.lastIndexOf('.');
if(atindex<1 || dotindex >= e.length-2 || dotindex-atindex < 3 ||
p.length <6 )
result=false;
return(result);
}
</script>
</head>
<body>
<form action="target.php" method="get" onsubmit="return validation()" >
<div class="lb">
<h1>Sign In</h1>
<div class="tb">
<i class="fa fa-envelope"></i>
<input type="text" name="email" placeholder="Email" required >
</div>
<div class="tb">
<i class="fa fa-unlock-alt"></i>
<input type="password" name="password" placeholder="Password"
required >
</div>
<button class="btn">Login</button>
</div>
</form>
</body>
</html>
```



# Experiment- 2

Problem Statement: Creating a Home page using HTML

Procedure: Using various tag and some important CSS property

Code:-

```
<html>
<head>
<title>Project1</title>
<link href=
"exp23.css" rel=
"stylesheet"
type=
"text/css">
<link
href=
"https://stackpath.bootstrapcdn.com/font-awesome/
4.7.0/css/font-awesome.min.css" rel=
"stylesheet" >
</head>
<body>
<div class=
"menu-bar">
<ul>
<li class=
"active" ><a href=
#"><i class=
"fa
fa-home"></i>Home</a></li>
<li><a href=
#"><i class=
"fa fa-user"></i>About
Us</a>
<div class=
"sub-menu-1">
<ul>
<li><a href=
#">Mission</a></li>
```

```
<li><a href="#>Vision</a></li>
<li><a href="#>Team</a></li>
</ul>
</div>
</li>
<li><a href="#><i class="fa fa-clone"></i>Services</a>
<div class="sub-menu-1">
<ul>
<li><a href="#>Web Designing</a></li>
<li class="hover-me"><a href="#>Marketing</a><i class="fa fa-angle-right"></i>
<div class="sub-menu-2">
<ul>
<li><a href="#>SEO</a></li>
<li><a href="#>Social Media</a></li>
<li><a href="#>Email Marketing</a></li>
</ul>
</div>
</li>
<li class="hover-me"><a href="#>Mobile App</a><i class="fa fa-angle-right"></i>
<div class="sub-menu-2">
<ul>
<li><a href="#>Android App</a></li>
```

```

<li><a href=
#">iOS App</a></li>
<li><a href=
#">Iconic App</a></li>
<li><a href=
#">Flutter App</a></li>
<li><a href=
#">Unity App</a></li>
</ul>
</div>
</li>
</ul>
</div>
</li>
<li><a href=
#"><i class=
"fa
fa-edit"></i>Training</a></li>
<li><a href=
#"><i class=
"fa fa-phone"></i>Contact
Us
</a></li>
</ul>
</div>
</body>
</html>

```

CSS-

```

*
{
padding:0;
margin:0;
box-sizing:border-box;
}
body
{
background-image:url(exp2.jpg);
background-position:center;
background-size:cover;
font-family:sans-serif;
}

```

```
.menu-bar
{
background-color:rgba(23, 7, 2, 0.356);
text-align:center;
}
.menu-bar ul
{
display:inline-flex;
list-style:none;
color:grey;
}
.menu-bar li
{
width:130px;
margin:18px;
padding:18px;
float:left;
}
.menu-bar ul li a
{
text-decoration:none;
color:white;
}
.active, .menu-bar ul li:hover
{
background-color:rgba(14, 13, 13, 0.356);
border-radius: 3px;
}
.menu-bar .fa
{
margin-right:8px;
}
.sub-menu-1
{
display:none;
}
.menu-bar ul li:hover .sub-menu-1
{
display:block;
position:absolute;
background-color:rgba(235, 133, 11, 0.356);
margin-top:14px;
margin-left: -14px;
```

```
}

.menu-bar ul li:hover .sub-menu-1 ul
{
display:block;
margin:12px;
}

.menu-bar ul li:hover .sub-menu-1 ul li
{
width:130px;
padding:12px;
border-bottom:1px dotted white;
background:transparent;
border-radius:0;
text-align:left;
}

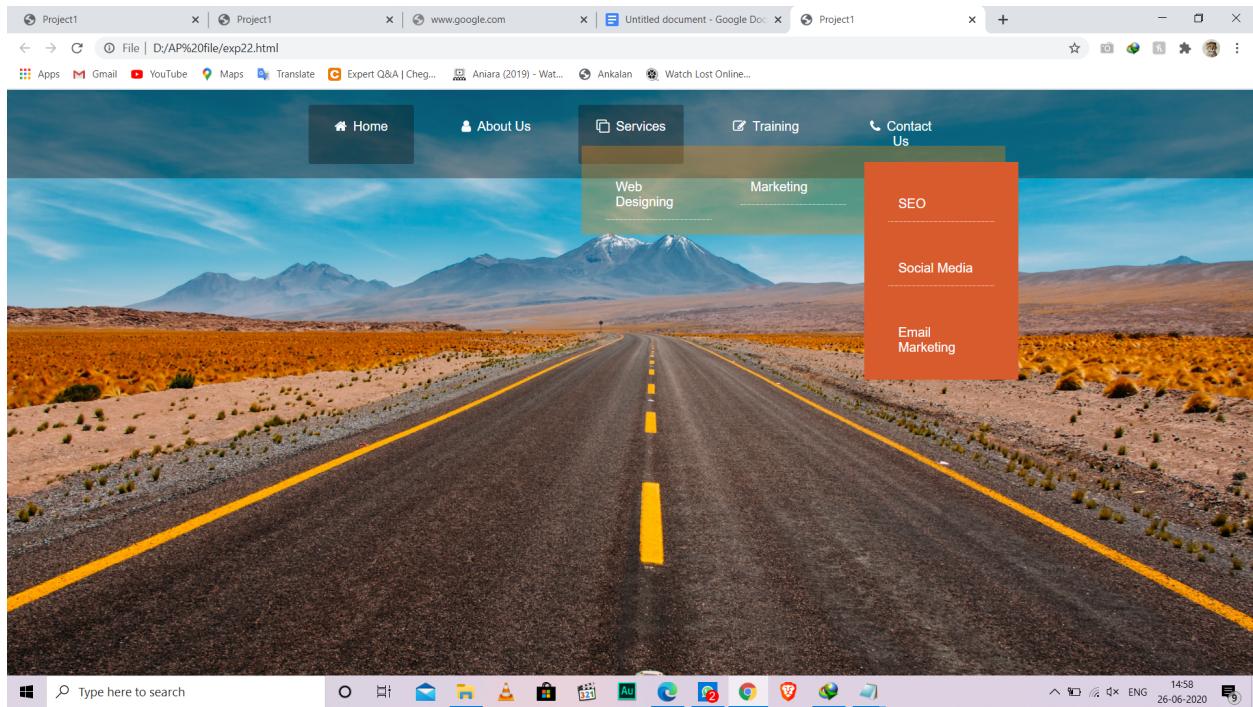
.menu-bar ul li:hover .sub-menu-1 ul li:last-child
{
border-bottom:none;
}

.menu-bar ul li:hover .sub-menu-1 ul li a:hover
{
color:rgb(27, 21, 16);
}

.fa-angle-right
{
float:right;
}

.sub-menu-2
{
display:none;
}

.hover-me:hover .sub-menu-2
{
position:absolute;
display:block;
margin-top: -40px;
margin-left:140px;
background-color:rgb(216, 91, 45);
}
```



# Experiment- 3

Problem Statement: Creating XHTML and CSS and understanding its use in creating web pages.

Procedure: Using the HTML tags and required CSS.

Code :

```
<html>
<head>
<style>
.id{
}
.main{
float: left;
width: 33%;
background-color: rgb(152, 164, 175);
}
.main:hover{
position: relative;
background-color: rgb(238, 176, 118);
width: 300px;
height: 700px;
border: 2px solid red;
}
span {
font-weight: bold;
color: rgb(27, 27, 90);
font-size:36px;
}
h1 {
background-color: Black;
font-weight: 120;
color: rgb(245, 237, 237);
font-size: 80px;
text-align: center;
}
body{
background-color:rgb(152, 164, 175);
```

```
bottom: 0px;  
}  
img{  
position: absolute;  
top:430px;  
right:50px;  
}  
</style>  
<title>Web page</title>  
</head>  
<body>  
<img src=  
"06.png">  
<h1>Electronic Computer</h1>  
<div class=  
"id">  
<div class=  
"main">  
<span>Smart Phone</span><br/>  
a mobile phone that performs many of the functions of a computer, typically having a  
touchscreen interface, Internet access, and an operating system capable of running  
downloaded apps.  
</div>  
<div class=  
"main">  
<span>Tablets</span><br/>  
A tablet computer, commonly shortened to tablet, is a mobile device, typically with a mobile  
operating system and touchscreen display processing circuitry, and a rechargeable battery in a  
single, thin and flat package.  
</div>  
<div class=  
"main">  
<span>Laptop</span><br/>  
A computer is a machine that accepts data as input, processes that data using programs, and  
outputs the processed data as information. Computers can be connected together to form  
network.  
</div>  
</div>  
</body>  
</html>
```

Web page

File | D:/AP%20file/exp3.html

Apps Gmail YouTube Maps Translate Expert Q&A | Cheg... Aniara (2019) - Wat... Ankalan Watch Lost Online...

# Electronic Computer

**Smart Phone**  
a mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, Internet access, and an operating system capable of running downloaded apps.

**Tablets**  
A tablet computer, commonly shortened to tablet, is a mobile device, typically with a mobile operating system and touchscreen display processing circuitry, and a rechargeable battery in a single, thin and flat package.

**Laptop**  
A computer is a machine that accepts data as input, processes that data using programs, and outputs the processed data as information. Computers can be connected together to form network.

Type here to search

15:11 26-06-2020

# Experiment- 4

**Problem Statement :Setting up and understanding of Apache Tomcat server.**

Procedure :

Step 1

Download and Install Tomcat

1. Go to <http://tomcat.apache.org/download-70.cgi> then go to the Binary Distribution/Core/ and download the "zip" package (for example "apache-tomcat-7.0.40.zip")
2. Now unzip the downloaded file into a directory of our choice.

Step 2

Check the installed directory to ensure it contains the following sub-directories:

- a. bin folder
- b. logs folder
- c. webapps folder
- d. work folder
- e. temp folder
- f. conf folder
- g. lib folder

Step 3

Create Environment variable JAVA\_HOME.

Configure Tomcat Server

The configuration files of the Apache Tomcat Server are located in the "conf" sub-directory of our Tomcat installed directory, for example "E:\myserver\tomcat7.0.40\conf". There are 4 Configuration XML files:

1. context.xml file
2. tomcat-users.xml file
3. server.xml file
4. web.xml file

Before proceeding, make a BACKUP of the configuration files.

Step 4(a) "conf\web.xml"; Enabling a Directory Listing Open the configuration file "web.xml". We shall enable the directory listing by changing "listings" from "false" to "true" for the "default" servlet.

<param-value>true</param-value> like:

Step 4(b) "conf\server.xml file"; set the TCP Port Number

Open the file "server.xml" in a text editor.

The default port number of Tomcat is 8080. We can change it according to our need.

Step 4(c) "conf\context.xml"; Enabling Automatic Reload

In that we set reloadable="true" to the <Context> element to enable automatic reload after code

Step 4(d) (Optional) "conf\tomcat-users.xml"

It is used to manage Tomcat by adding the highlighted lines, inside the <tomcat-users> elements.

In that we can add a password and username as an optional step.

Step 5

Now, start the tomcat server

Executable programs and scripts are kept in the "bin" sub-directory of the Tomcat installed directory

Step 5(a) Start Server

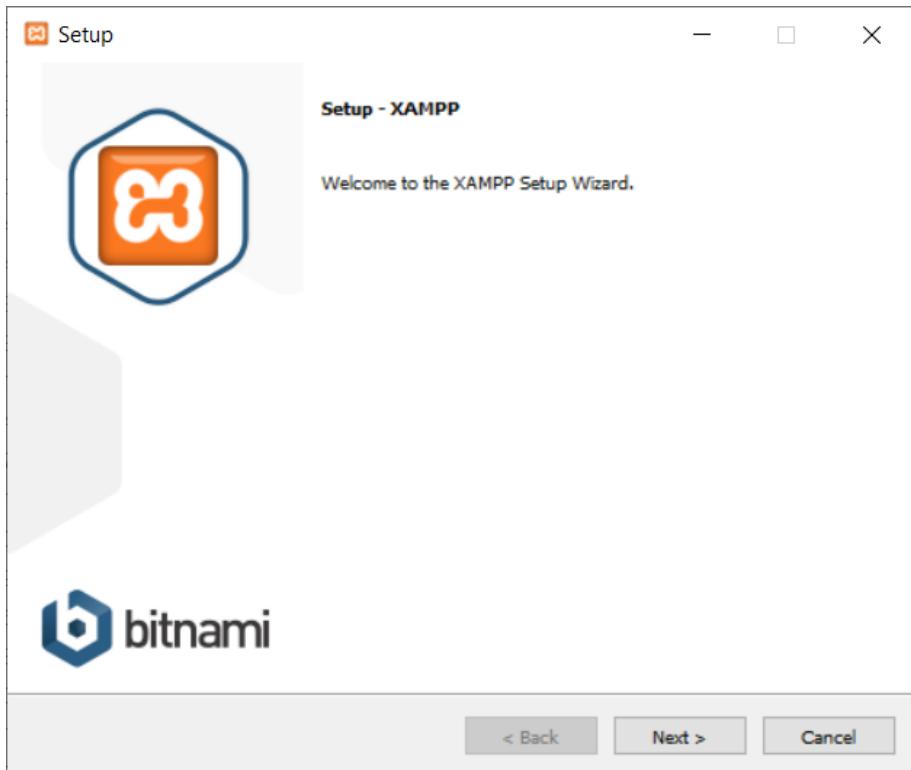
Step 5(b) Access the Server

Open a browser then enter the URL

"<http://localhost:8080>" to access the Tomcat

server's welcome

page.





### Completing the XAMPP Setup Wizard

Setup has finished installing XAMPP on your computer.

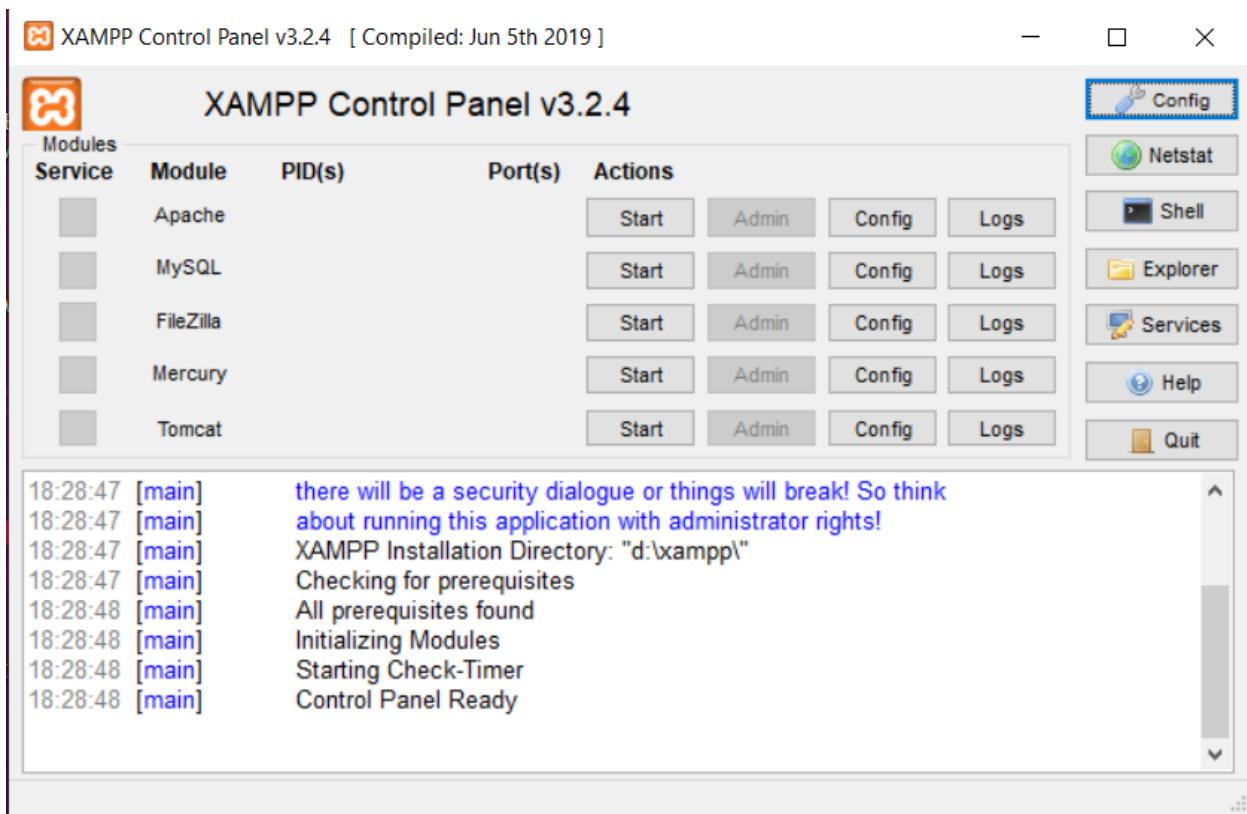
Do you want to start the Control Panel now?



< Back

Finish

Cancel



# Experiment- 5

## Understanding modifications of Web.XML

Java web applications use a deployment descriptor file to determine how URLs map to servlets, which URLs require authentication, and other information. This file is named web.xml and resides in the app's WAR under the WEB-INF/ directory. web.xml is part of the servlet standard for web applications.

A web application's deployment descriptor describes the classes, resources and configuration of the application and how the web server uses them to serve web requests.

web.xml defines mappings between URL paths and the servlets that handle requests with those paths. The web server uses this configuration to identify the servlet to handle a given request and call the class The method that corresponds to the request method. To map a URL to a servlet, you declare the servlet with the <servlet> element, then define a mapping from a URL path to a servlet declaration with the <servlet-mapping> element.

Example:

```
1.<web-app>
2. <servlet>
3 <servlet-name>HelloWorld</servlet-name>
4<servlet-class>servletemplate.createHelloWorldExample</servletclass>
5 </servlet>
6 <servlet-mapping>
7 <servlet-name>HelloWorld</servlet-name>
8 <url-pattern>/HelloWorldExample/*</url-pattern>
9 </servlet-mapping>
10 </web-app>
```

### Elements in Web.xml

Description of elements Used in web.xml file:

1. <web-aap>: This element represents the whole application of web.xml fil
2. <servlet>: This is the sub-element of and represents the servlet
3. <servlet-name>: This is the sub-element of servlet and used to represents the name of the servlet
4. <servlet-class>: This is the sub-element of servlet and used to represents the class of servlet
5. <servlet-mapping>: This is the sub-element of and used to map the servlet
6. <url-pattern>: This is the sub-element of servlet-mapping and used to client-side to invoke the servlet Web.xml Tags

### Tags used in web.xml file are:

1. Welcome-file-list tag; This tag is used to specify the default page of the web application if none is specified.

Example:

```
1 <welcome-file-list>
2 <welcome-file>index.jsp</welcome-file>
3 </welcome-file-list>
```

In the above example index.jsp used as web page for web application

2.Session config tag: This tag is used to specify the session configuration parameter

Example:

```
1 <session-config>
2 <session-timeout>
3 15
4 </session-timeout>
5 </session-config>
```

In the above example session-config tag contains another tag sessiontimeout which specifies the http session timeout. The time specify in minutes.

3. Error page tag: This tag is used to specify the error occurred in the while WebLogic server is responding to an HTTP request, returns an HTML page that displays either the HTTP error code.

```
1 <error-page>
2 <error-code>105</error-code>
3 <location>/jsp/error/PageNotFound.jsp</location>
4 </error page>
```

In the above example error-page tag specify the error code as 105 and location describes the location of the jsp page.

### **Advantages of web.xml file**

The first benefit of the XML is we can write it in our own markup language. There is no restriction on limited sets of tags.

By defining our own tag we can create a markup language in terms of specific problems.

Searching the data is easy and efficient.

Completely compatible with Java™ and 100% portable.

\*web - Notepad

File Edit Format View Help

```
<param-name>debug</param-name>
<param-value>0</param-value>
</init-param>
<init-param>
<param-name>listings</param-name>
<param-value>true</param-value>
</init-param>
<load-on-startup>1</load-on-startup>
</servlet>
```

# Experiment- 6

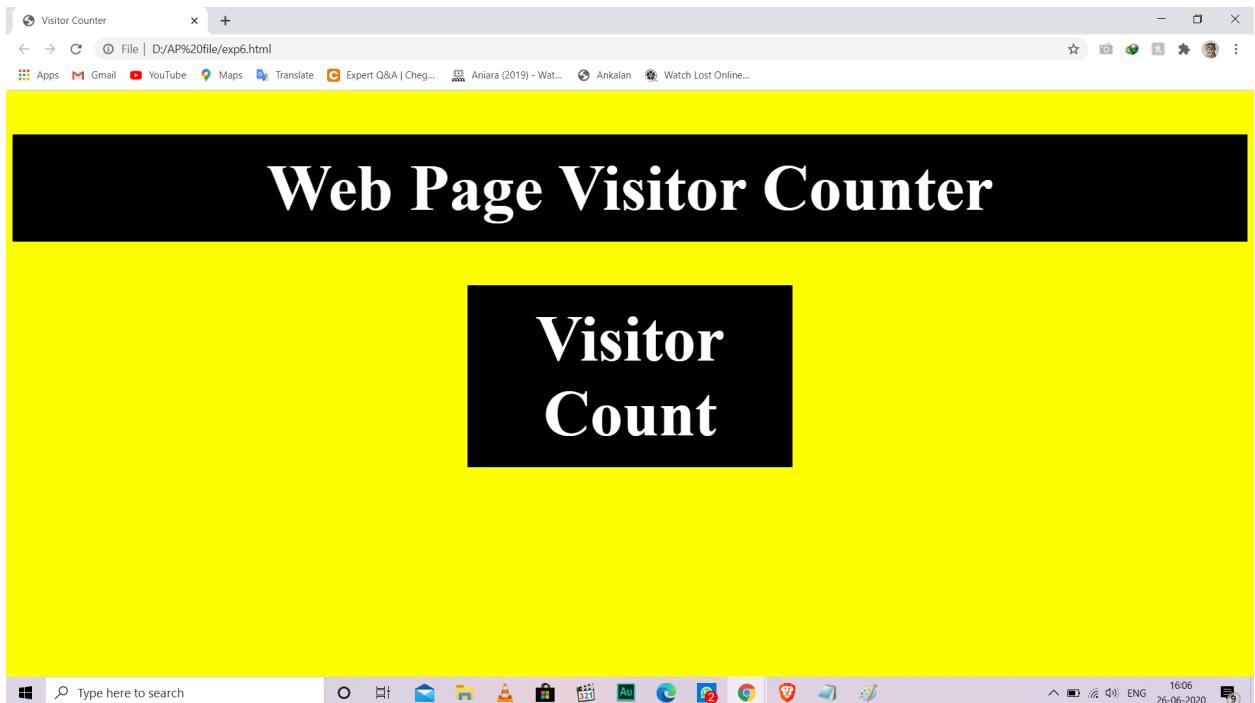
## Problem Statement:- Creating Websites using PHP.

Code:-

```
<!DOCTYPE html>
<html>
<head>
<title>Visitor Counter</title>
<link href="css/bootstrap.min.css" rel="stylesheet">
<style type="text/css">
.wrapper{
height:300px;
width:400px;
background-color: yellow;
margin:auto;
text-align: center;
}
h1
{
background-color: Black;
color: white;
border-bottom: 0px solid white;
text-align: center;
}
h1,h3
{
padding: 20px;
font-size: 5em;
}
body
{
background-color: yellow;
}
</style>
</head>
<body>
<div class="heading">
```

```
<h1>Web Page Visitor Counter</h1>
</div>
<div class="wrapper">
<h1 >
Visitor Count
</h1>
<h3>
<?php
session_start();
$counter_name = "counter.txt";
// Check if a text file exists.
//If not create one and initialize it to zero.
if (!file_exists($counter_name)) {
$f = fopen($counter_name, "w");
fwrite($f,"0");
fclose($f);
}
$f = fopen($counter_name,"r");
$counterVal = fread($f, filesize($counter_name));
fclose($f);
if(!isset($_SESSION['hasVisited'])){
$_SESSION['hasVisited']="yes";
$counterVal++;
$f = fopen($counter_name, "w");
fwrite($f, $counterVal);
fclose($f);
echo $counterVal;
}
echo $counterVal;
?>
</h3>
</div>
</body>
</html>
```

**Output:-**



# Experiment- 7

Problem Statement:- Understanding Javascript

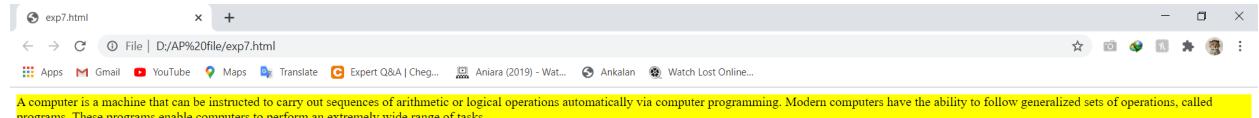
Procedure:- Using Event handling and Javascript function

Code:-

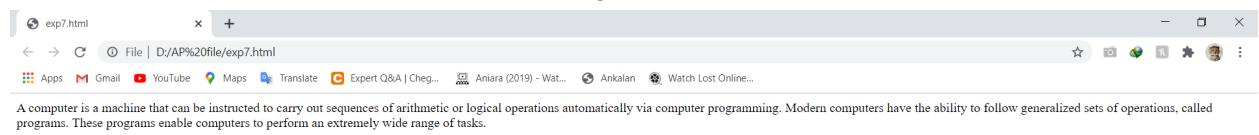
```
<html>
<head>
<script>
function effect()
{
var x=document.getElementById("para1");
x.style.backgroundColor="yellow";
}
function effectback()
{
var x=document.getElementById("para1");
x.style.backgroundColor="white";
}
</script>
</head>
<body>
<p id="para1" onmouseover="effect()"
onmouseout="effectback()" >
A computer is a machine that can be instructed to carry out sequences of arithmetic or logical operations automatically via computer programming. Modern computers have the ability to follow generalized sets of operations, called programs. These programs enable computers to perform an extremely wide range of tasks.
</p>
</body>
</html>
```

Result:-

1. When mouseover is on action, background becomes green



## 2. When mouse out is on the action, the background becomes white



# Experiment- 8

Problem Statement: Creating a web page end in PHP and front end in JS and hosting it on XAMPP server

Procedure: Using basic HTML,CSS,JS and PHP

Code

```
<html>
<head>
<meta name="viewport" content="width=800,
initial-scale=1" />
<meta http-equiv="Content-Type" content="text/html;
charset=utf-8" />
<style type="text/css">
@import
url(https://fonts.googleapis.com/css?family=Nobile:400itali
c,700italic);
@import
url(https://fonts.googleapis.com/css?family=Dancing+Script);
*
{
  box-sizing: border-box;
  -moz-box-sizing: border-box;
  -webkit-box-sizing: border-box;
}
body {
  background: #E5E5E5;
  background-image: url("hbd12.jpg");
  padding: 80px;
  background-size:cover;
  background-position:center;
}
#card-front {
  color: #FFDFDF;
}
#card, #card-front, #card-inside {
  height: 500px;
}
```

```
.wrap {  
padding: 1.5em 2.5em;  
height: 100%;  
}  
#card-front, #card-inside {  
width: 60%;  
-webkit-box-shadow: 2px 2px 30px rgba(0, 0, 0, .25), 0 0  
1px rgba(0, 0, 0, .5);  
-moz-box-shadow: 2px 2px 30px rgba(0, 0, 0, .25), 0 0  
1px rgba(0, 0, 0, .5);  
box-shadow: 2px 2px 30px rgba(0, 0, 0, .25), 0 0 1px  
rgba(0, 0, 0, .5);  
position: absolute;  
left: 50%;  
}  
#card-inside .wrap {  
background: lightgreen;  
-webkit-box-shadow: inset 2px 0 1px rgba(0, 0, 0, .05);  
-moz-box-shadow: inset 2px 0 1px rgba(0, 0, 0, .05);  
box-shadow: inset 2px 0 1px rgba(0, 0, 0, .05);  
}  
#card {  
max-width: 860px;  
margin: 0 auto;  
transform-style: preserve-3d;  
-moz-transform-style: preserve-3d;  
-webkit-transform-style: preserve-3d;  
perspective: 5000px;  
-moz-perspective: 5000px;  
-webkit-perspective: 5000px;  
position: relative;  
}  
#card h1 {  
text-align: center;  
font-family: 'Nobile', sans-serif;  
font-style: italic;  
font-size: 70px;  
text-shadow:  
4px 4px 0px rgba(0, 0, 0, .15),  
1px 1px 0 rgba(255, 200, 200, 255),  
2px 2px 0 rgba(255, 150, 150, 255),  
3px 3px 0 rgba(255, 125, 125, 255);  
color: #FFF;
```

```
}

#card-inside {
    font-size: 1.1em;
    line-height: 1.4;
    font-family: 'Nobile';
    color: #331711;
    font-style: italic;
}

p {
    margin-top: 1em;
}

p:first-child {
    margin-top: 0;
}

p.signed {
    margin-top: 1.5em;
    text-align: center;
    font-family: 'Dancing Script', sans-serif;
    font-size: 1.5em;
}

#card-front {
    background-color: #FF5555;
    background-image: linear-gradient(top, #FF5555 0%,
#FF7777 100%);
    background-image: -moz-linear-gradient(top, #FF5555
0%, #FF7777 100%);
    background-image: -webkit-linear-gradient(top,
#FF5555 0%, #FF7777 100%);
    transform-origin: left;
    -moz-transform-origin: left;
    -webkit-transform-origin: left;
    transition: transform 1s linear;
    -moz-transition: -moz-transform 1s linear;
    -webkit-transition: -webkit-transform 1s linear;
    position: relative;
}

#card-front .wrap {
    transition: background 1s linear;
    -moz-transition: background 1s linear;
    -webkit-transition: background 1s linear;
}

#card-front button {
    position: absolute;
```

```
bottom: 1em;
right: -12px;
background: #F44;
color: #FFF;
font-family: 'Nobile', sans-serif;
font-style: italic;
font-weight: bold;
font-size: 1.5em;
padding: .5em;
border: none;
cursor: pointer;
box-shadow: 2px 2px 3px rgba(0, 0, 0, .25), 0 0 1px
rgba(0, 0, 0, .4);
-moz-box-shadow: 2px 2px 3px rgba(0, 0, 0, .25), 0 0
1px rgba(0, 0, 0, .4);
-webkit-box-shadow: 2px 2px 3px rgba(0, 0, 0, .25), 0 0
1px rgba(0, 0, 0, .4);
}
#card-front button:hover,
#card-front button:focus {
background: rgb(233, 5, 5);
}
#close {
display: none;
}
#card.open-fully #close,
#card-open-half #close {
display: inline;
}
#card.open-fully #open {
display: none;
}
#card.open-half #card-front,
#card.close-half #card-front {
transform: rotateY(-90deg);
-moz-transform: rotateY(-90deg);
-webkit-transform: rotateY(-90deg);
}
#card.open-half #card-front .wrap {
background-color: rgba(0, 0, 0, .5);
}
#card.open-fully #card-front,
#card.close-half #card-front {
```

```
background: #FFFFFF;
}

#card.open-fully #card-front {
    transform: rotateY(-180deg);
    -moz-transform: rotateY(-180deg);
    -webkit-transform: rotateY(-180deg);
}
#card.open-fully #card-front .wrap {
    background-color: rgba(0, 0, 0, 0);
}
#card.open-fully #card-front .wrap *,
#card.close-half #card-front .wrap * {
    display: none;
}
footer {
    max-width: 500px;
    margin: 40px auto;
    font-family: 'Nobile', sans-serif;
    font-size: 14px;
    line-height: 1.6;
    color: #888;
    text-align: center;
}
</style>
</head>
<body>
<div id="card">
<div id="card-inside">
<div class="wrap">
<p>" On your Birthday, I wish you the following:
Be active like the heart.
Let your mind be strong, like the soldiers in the barracks.
Be like the kidneys, distinguishing between the good and bad.
Soar higher, like the eagles in the sky,
Reach out and protect people in need, like the white corpuscles.
Take decisions with a clear vision.
And enjoy every love that comes with your day. Happy birthday!</p>
<p>I will be there with you forever .
</p>
<center><h4>from</h4></center>
<p class="signed">Aryan Kharinta</p>
</div>
</div>
```

```
<div id="card-front">
<div class="wrap">
<h1> Happy Birthday !</h1>
</div>
<button id="open">&gt;</button>
<button id="close">&lt;</button>
</div>
</div>
<script>
(function() {
function $(id) {
return document.getElementById(id);
}
var card = $('#card'),
openB = $('#open'),
closeB = $('#close'),
timer = null;
console.log('wat', card);
openB.addEventListener('click', function () {
card.setAttribute('class', 'open-half');
if (timer) clearTimeout(timer);
timer = setTimeout(function () {
card.setAttribute('class', 'open-fully');
timer = null;
}, 1000);
});
closeB.addEventListener('click', function () {
card.setAttribute('class', 'close-half');
if (timer) clearTimeout(timer);
timer = setTimeout(function () {
card.setAttribute('class', "");
timer = null;
}, 1000);
});
}());
$(());
</script>
<div style="visibility: hidden;">
<embed src="bdy.mp3" autostart="true" loop="true">
</div>
<div style="visibility: hidden;">
<embed src="bdy.mp3" autostart="true" loop="true">
</div>
</body>
```

```
</html>
PHP Code
<html>
<head>
<meta name="viewport" content="width=300,
initial-scale=1" />
<meta http-equiv="Content-Type" content="text/html;
charset=utf-8" />
</head>
<style type="text/css">
body
{
overflow-x: hidden;
overflow-y: scroll;
}
body {
background: #000;
margin: 0;
}
canvas {
cursor: crosshair;
display: block;
}
</style>
<body>
<div style="visibility: hidden;">
<embed src="fireworks.mp3" autostart="true" loop="true">
</div>
<canvas id="canvas">Canvas is not supported in your
browser.</canvas>
<script>
setTimeout("location.href = 'Birthday.html';",20000);
</script>
<script type="text/javascript">
window.requestAnimFrame = ( function() {
return window.requestAnimationFrame ||
window.webkitRequestAnimationFrame
||
window.mozRequestAnimationFrame ||
function( callback ) {
window.setTimeout( callback, 1000
/ 60 );
};
});
```

```
)());  
var canvas = document.getElementById( 'canvas' ),  
ctx = canvas.getContext( '2d' ),  
cw = window.innerWidth,  
ch = window.innerHeight,  
fireworks = [],  
particles = [],  
hue = 120,  
limiterTotal = 5,  
limiterTick = 0,  
timerTotal = 80,  
timerTick = 0,  
mousedown = false,  
mx,  
my;  
canvas.width = cw;  
canvas.height = ch;  
function random( min, max ) {  
    return Math.random() * ( max - min ) + min;  
}  
calculateDistance( p1x, p1y, p2x, p2y ) {  
    var xDistance = p1x - p2x,  
        yDistance = p1y - p2y;  
    return Math.sqrt( Math.pow( xDistance, 2 ) +  
        Math.pow( yDistance, 2 ) );  
}  
function Firework( sx, sy, tx, ty ) {  
    this.x = sx;  
    this.y = sy;  
    this.sx = sx;  
    this.sy = sy;  
    this.tx = tx;  
    this.ty = ty;  
    this.distanceToTarget = calculateDistance( sx, sy, tx,  
        ty );  
    this.distanceTraveled = 0;  
    this.coordinates = [];  
    this.coordinateCount = 3;  
    while( this.coordinateCount-- ) {  
        this.coordinates.push( [ this.x, this.y ] );  
    }  
    this.angle = Math.atan2( ty - sy, tx - sx );  
    this.speed = 2;
```

```

this.acceleration = 1.05;
this.brightness = random( 50, 70 );
this.targetRadius = 1;
}
Firework.prototype.update = function( index ) {
this.coordinates.pop();
this.coordinates.unshift( [ this.x, this.y ] );
if( this.targetRadius < 8 ) {
this.targetRadius += 0.3;
} else {
this.targetRadius = 1;
}
this.speed *= this.acceleration;
var vx = Math.cos( this.angle ) * this.speed,
vy = Math.sin( this.angle ) * this.speed;
this.distanceTraveled = calculateDistance( this.sx,
this.sy, this.x + vx, this.y + vy );
if( this.distanceTraveled >= this.distanceToTarget ) {
createParticles( this.tx, this.ty );
fireworks.splice( index, 1 );
} else {
this.x += vx;
this.y += vy;
}
}
Firework.prototype.draw = function() {
ctx.beginPath();
ctx.moveTo( this.coordinates[ this.coordinates.length -
1 ][ 0 ], this.coordinates[ this.coordinates.length - 1 ][ 1 ] );
ctx.lineTo( this.x, this.y );
ctx.strokeStyle = 'hsl(' + hue + ', 100%, ' +
this.brightness + '%)';
ctx.stroke();
ctx.beginPath();
ctx.arc( this.tx, this.ty, this.targetRadius, 0, Math.PI *
2 );
ctx.stroke();
}
function Particle( x, y ) {
this.x = x;
this.y = y;
this.coordinates = [];
this.coordinateCount = 5;
}

```

```
while( this.coordinateCount-- ) {
  this.coordinates.push( [ this.x, this.y ] );
}
this.angle = random( 0, Math.PI * 2 );
this.speed = random( 1, 10 );
this.friction = 0.95;
this.gravity = 1;
this.hue = random( hue - 50, hue + 50 );
this.brightness = random( 50, 80 );
this.alpha = 1;
this.decay = random( 0.015, 0.03 );
}
Particle.prototype.update = function( index ) {
  this.coordinates.pop();
  this.coordinates.unshift( [ this.x, this.y ] );
  this.speed *= this.friction;
  this.x += Math.cos( this.angle ) * this.speed;
  this.y += Math.sin( this.angle ) * this.speed +
  this.gravity;
  this.alpha -= this.decay;
  if( this.alpha <= this.decay ) {
    particles.splice( index, 1 );
  }
}
Particle.prototype.draw = function() {
  ctx.beginPath();
  ctx.moveTo( this.coordinates[
    this.coordinates.length - 1 ][ 0 ], this.coordinates[
    this.coordinates.length - 1 ][ 1 ] );
  ctx.lineTo( this.x, this.y );
  ctx.strokeStyle = 'hsla(' + this.hue + ', 100%, ' +
  this.brightness + '%, ' + this.alpha + ')';
  ctx.stroke();
}
group/explosion
function createParticles( x, y ) {
  var particleCount = 30;
  while( particleCount-- ) {
    particles.push( new Particle( x, y ) );
  }
}
function loop() {
  requestAnimationFrame
```

```
requestAnimationFrame( loop );
hue += 0.5;
hue= random(0, 360 );
ctx.globalCompositeOperation = 'destination-out';
ctx.fillStyle = 'rgba(0, 0, 0, 0.5)';
ctx.fillRect( 0, 0, cw, ch );
ctx.globalCompositeOperation = 'lighter';
fireworks.length;
while( i-- ) {
fireworks[ i ].draw();
fireworks[ i ].update( i );
}
// loop over each particle, draw it, update it
var i = particles.length;
while( i-- ) {
particles[ i ].draw();
particles[ i ].update( i );
}
// launch fireworks automatically to random
coordinates, when the mouse isn't down
if( timerTick >= timerTotal ) {
if( !mousedown ) {
fireworks.push( new Firework( cw /
2, ch, random( 0, cw ), random( 0, ch / 2 ) ) );
timerTick = 0;
}
} else {
timerTick++;
}
if( limiterTick >= limiterTotal ) {
if( mousedown ) {
fireworks.push( new Firework( cw / 2, ch,
mx, my ) );
limiterTick = 0;
}
} else {
limiterTick++;
}
}
canvas.addEventListener( 'mousemove', function( e ) {
mx = e.pageX - canvas.offsetLeft;
my = e.pageY - canvas.offsetTop;
});
```

```
canvas.addEventListener( 'mousedown', function( e ) {  
e.preventDefault();  
mousedown = true;  
});  
canvas.addEventListener( 'mouseup', function( e ) {  
e.preventDefault();  
mousedown = false;  
});  
window.onload = loop;  
</script>  
</body>  
<html>
```

## Result

