

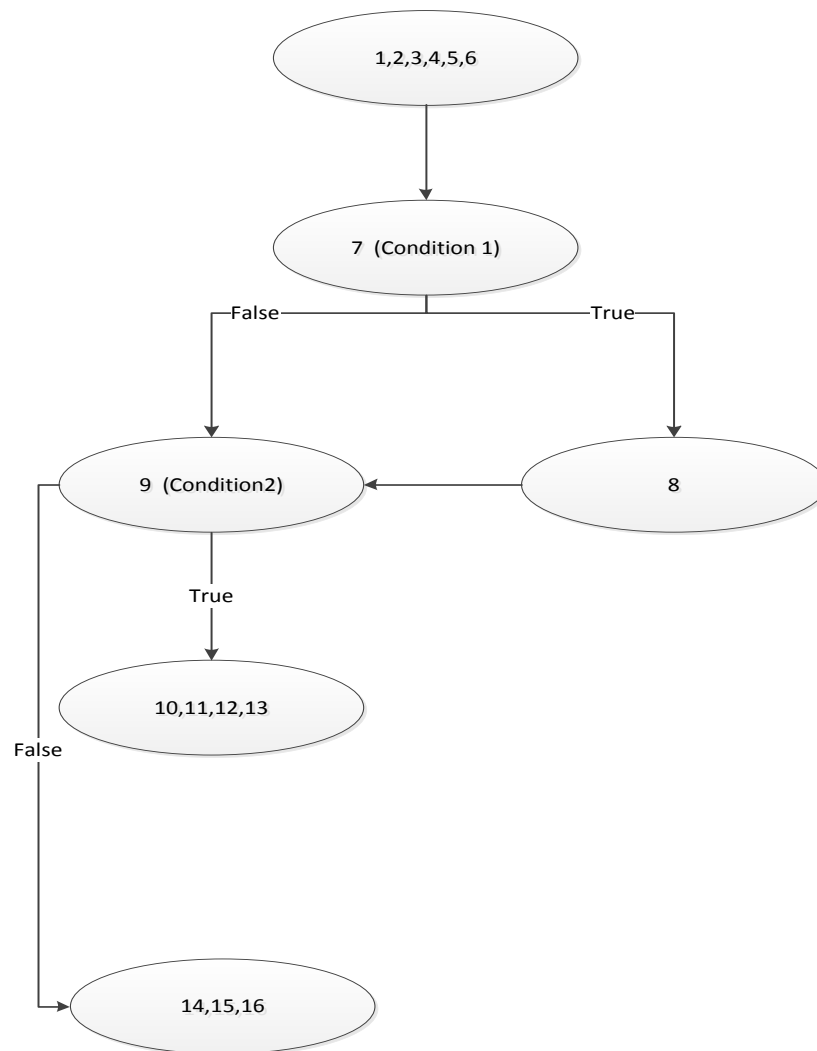
```

public partial class borrow : System.Web.UI.Page
{
    protected void Page_Load(object sender, EventArgs e)
    {
1         string start = DateTime.Now.ToShortDateString();
2         string end = DateTime.Now.AddDays(5).ToShortDateString();
3         OleDbConnection conn2 =
new OleDbConnection("Provider=Microsoft.Jet.OLEDB.4.0;Persist Security Info=True;Data
Source=" + Server.MapPath("App_Data/library.mdb"));

4         OleDbCommand comm = new OleDbCommand("SELECT * FROM BORROW WHERE
MEMBER_ID=@MEM and ITEM_ID=@ITEM", conn2);
        comm.Parameters.AddWithValue("@MEM",
Int32.Parse(Request.QueryString[0].ToString()));
        comm.Parameters.AddWithValue("@ITEM",
Int32.Parse(Request.QueryString[1].ToString()));
5         Boolean flag=false;
        try
        {
            conn2.Open();
6         object obj=comm.ExecuteScalar();
7         if (obj == null)
8             flag = true;
        }
        catch (Exception ex)
        {
            Response.Write(ex.Message.ToString());
        }
9         if (flag == true)
        {
10            OleDbCommand comm2 = new OleDbCommand("INSERT INTO
BORROW(MEMBER_ID,ITEM_ID,START_DATE,END_DATE) VALUES(@MEM,@ITEM,@START,@END)", conn2);
            comm2.Parameters.AddWithValue("@MEM",
Int32.Parse(Request.QueryString[0].ToString()));
            comm2.Parameters.AddWithValue("@ITEM",
Int32.Parse(Request.QueryString[1].ToString()));
            comm2.Parameters.AddWithValue("@START", start);
            comm2.Parameters.AddWithValue("@END", end);
            try
            {
11                comm2.ExecuteNonQuery();//conn2.Open();
12                Response.Redirect("default.aspx?BID=0");
            }
            catch (Exception ex)
            {
                Response.Write(ex.Message.ToString());
            }
            finally
            {
13                conn2.Close();
            }
        }
14        else
        {
15            conn2.Close();
16            Response.Redirect("default.aspx?BID=1");
        }
    }
}

```

Control Flow Graph



Statement Testing

Condition 1 is true and condition 2 is true

- Executes Statements 8, 10, 11, 12, 13

Condition 1 is true and condition 2 is false

- Executes Statements 8, 14, 15, 16

Condition 1 is false and condition 2 is true

- Executes Statements 10, 11, 12, 13

Condition 1 is false and condition 2 is false

- Executes Statements 14, 15, 16

Branch Testing

<i>Decision</i>	<i>Possible Outcomes</i>	<i>Test Cases</i>			
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>Obj is null</i>	<i>True</i>	<i>x</i>	<i>x</i>		
	<i>False</i>			<i>x</i>	<i>x</i>
<i>Flag is true</i>	<i>True</i>	<i>x</i>		<i>x</i>	
	<i>False</i>		<i>x</i>		<i>x</i>

Test cases

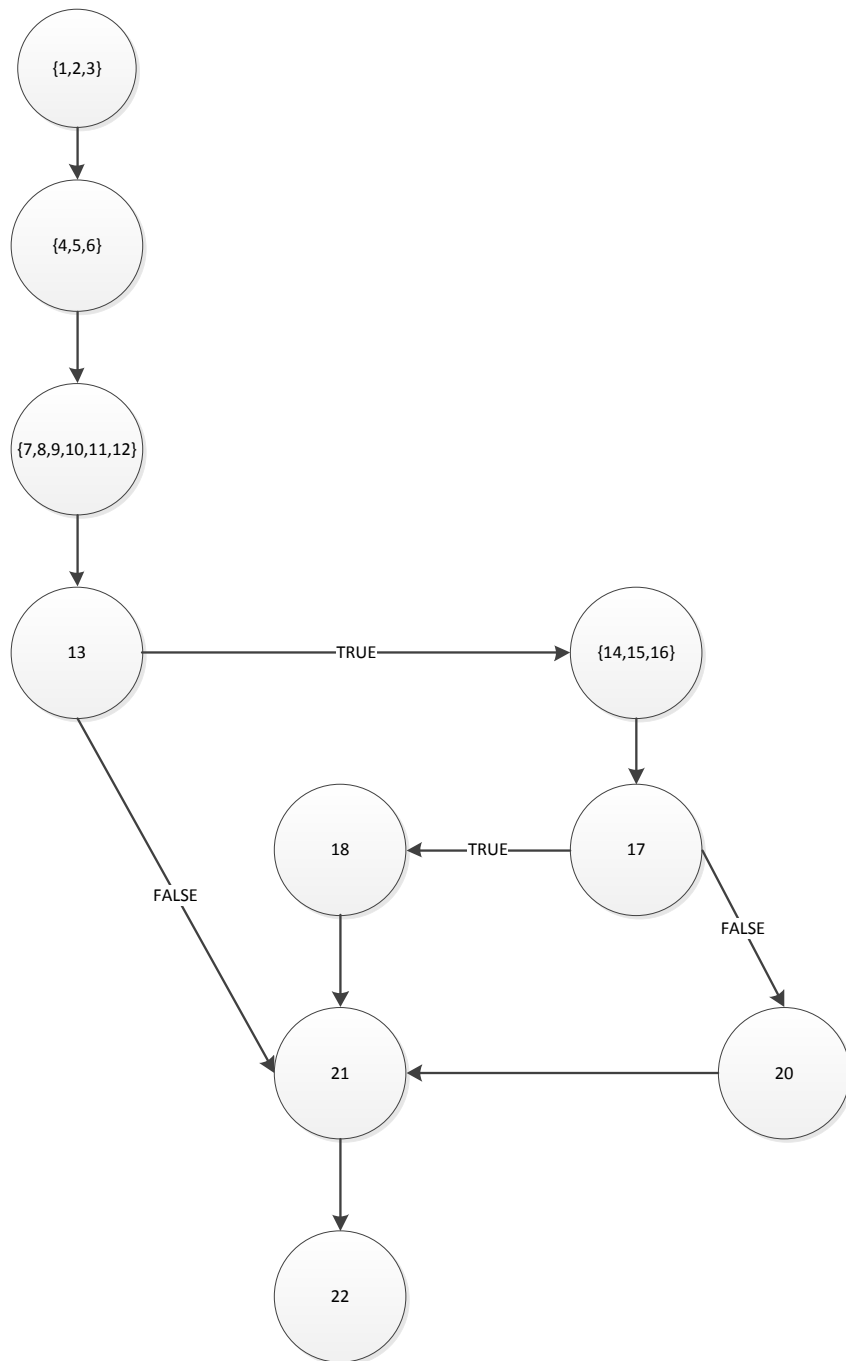
Cases	Input Values		Expected outcomes	Real outcomes
	Obj	flag		
1	Null	True	Request accepted	Request accepted
2	Null	false	Request accepted	Request accepted
3	Not null	True	Request accepted	Request accepted
4	Not null	false	Request not accepted	Request not accepted

Test Result:

No defect has found.

Path Testing

```
namespace Library_Management_System
{
    public partial class Login : System.Web.UI.Page
    {
        protected void Page_Load(object sender, EventArgs e)
        {
            1     NameValueCollection nvc = Request.Form;
            2     string user = nvc[0];
            3     string pass = nvc[1];
            4     //Response.Write(user.ToString());
            5     OleDbConnection conn = new
OleDbConnection("Provider=Microsoft.Jet.OLEDB.4.0;Data Source=" +
Server.MapPath("App_Data/library.mdb"));
            6     OleDbCommand comm = new OleDbCommand("Select * from MEMBER where
USERNAME=@USER and PASSWORD=@PASS", conn);
            7     OleDbCommand comm2 = new OleDbCommand("Select * from MEMBER where
USERNAME=@USER and PASSWORD=@PASS and IS_POWER=-1", conn);
            8     comm.Parameters.AddWithValue("USER",user);
            9     comm.Parameters.AddWithValue("PASS", pass);
            10    comm2.Parameters.AddWithValue("USER", user);
            11    comm2.Parameters.AddWithValue("PASS", pass);
            try
            {
                12    conn.Open();
                13    object kolon= comm.ExecuteScalar();
                14    if (kolon.ToString() != null)
                {
                    15    object ispower = comm2.ExecuteScalar();
                    16    Session.Add("User", user);
                    17    Session.Add("MEMBER_ID", ispower.ToString());
                    18    if (ispower.ToString() != null)
                    {
                        19    Session.Add("IsPower", "Power User");
                    }
                    20    else
                    {
                        21    Session.Add("IsPower", "Normal User");
                    }
                }
                22    Response.Redirect("default.aspx");
            }
            catch (Exception ex)
            {
                Response.Redirect("default.aspx");
            }
            finally
            {
                23    conn.Close();
            }
        }
    }
}
```



$$\begin{aligned}
 V(G) &= E - N + 2 \\
 &= 11 - 10 + 2 \\
 &= 3
 \end{aligned}$$

Path1 : 1,2,3,4,5,6,7,8,9,10,11,12,13,21,22

Path 2: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,20,21,22

Path 3: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,,17,18,21,22

Test cases:

Path	kolon	isPower	Expected result
1	null	-----	Redirect to login page
2	Not null	null	Login as a normal user
3	Not null	Not null	Login as a power user

Test Result:

No defect has found.

Data Flow Testing

```
namespace Library_Management_System
{
    public partial class Login : System.Web.UI.Page
    {
        protected void Page_Load(object sender, EventArgs e)
        {
            1     NameValueCollection nvc = Request.Form;           //nvc, def
            2     string user = nvc[0];                          //user,def;nvc c-use
            3     string pass = nvc[1];                          //pass,def; nvc c-use

                //Response.Write(user.ToString());
                OleDbConnection conn = new
OleDbConnection("Provider=Microsoft.Jet.OLEDB.4.0;Data Source=" +
Server.MapPath("App_Data/library.mdb"));
            4     OleDbCommand comm = new OleDbCommand("Select * from MEMBER where
USERNAME=@USER and PASSWORD=@PASS", conn);                //comm def
            5     OleDbCommand comm2 = new OleDbCommand("Select * from MEMBER where
USERNAME=@USER and PASSWORD=@PASS and IS_POWER=-1", conn); //comm2 def
            6     comm.Parameters.AddWithValue("USER", user);    //comm def,c-use;user c-use
            7     comm.Parameters.AddWithValue("PASS", pass);    //comm def,c-use;pass c-use
            8     comm2.Parameters.AddWithValue("USER", user);   //comm2 def,c-use; user c-
use
            9     comm2.Parameters.AddWithValue("PASS", pass);   //comm2 def,c-use; pass c-use
            try
            {
                conn.Open();
            10     object kolon= comm.ExecuteScalar();//kolon def;com c-use
            11     if (kolon.ToString()!=null)//kolon p-use
                {
                    12     object ispower = comm2.ExecuteScalar(); //ispower def;comm2 c-use
                    13     Session.Add("User", user);             //user c-use
                    14     Session.Add("MEMBER_ID", ispower.ToString()); //isPower c-use
                    15     if (ispower.ToString() != null)//isPower p-use
                        {
                            17     Session.Add("IsPower", "Power User");
                        }
                    18     else
                        {
                            19     Session.Add("IsPower", "Normal User");
                        }
                }
            20     Response.Redirect("default.aspx");
            }
            catch (Exception ex)
            {
                Response.Redirect("default.aspx");
            }
            finally
            {
                21     conn.Close();
            }
        }
    }
}
```

Table for nvc		
Pair id	Def	Use
1	1	2
2	1	3

Table for pass		
Pair id	Def	Use
1	3	7
2	3	9

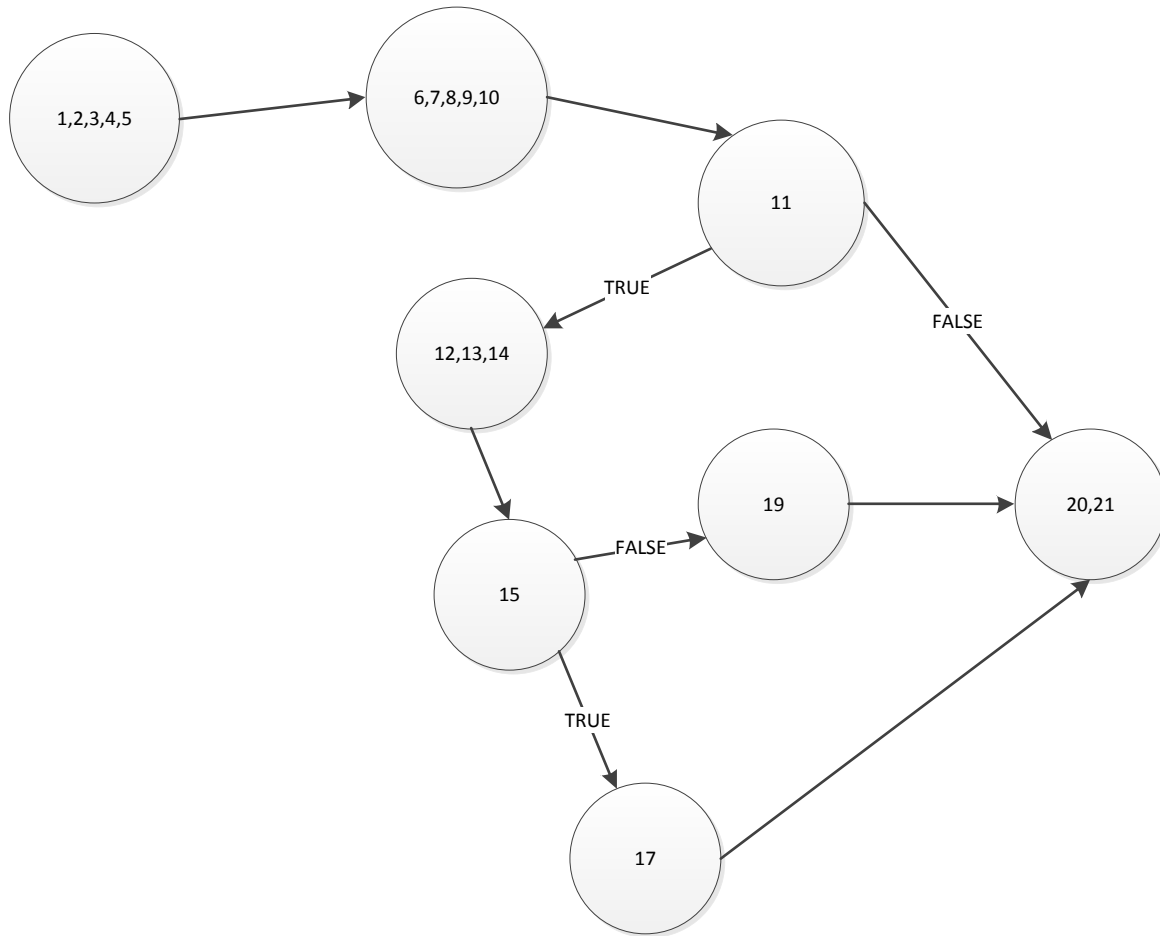
Table for user		
Pair id	Def	Use
1	2	6
2	2	8
3	2	13

Table for comm		
Pair id	Def	Use
1	4	6
2	6	7
3	7	10

Table for comm2		
Pair id	Def	Use
1	5	8
2	8	9
3	9	12

Table for isPower		
Pair id	Def	Use
1	12	14

Table for kolon		
Pair id	Def	Use
1	10	11



All statements coverage

Inputs	user	password	statements	Expected output	output
1	1	1	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,17,20,21	Login as a power	Login as a power
2	eciftci	LKJHH76	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,19,20,21	Login as a regular user	Login as a regular user
3	2	1	1,2,3,4,5,6,7,8,9,10,11,20,21	Error message	Back to main page

Test Result:

Defect occurred for input 3. Defect reported to development team.