MOBILE COMPUTING LAB

ETIT – 452

Faculty Name: Ms. Divya Arora

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Roll No.: 13314802719

Semester: 8th

Group: 8C7

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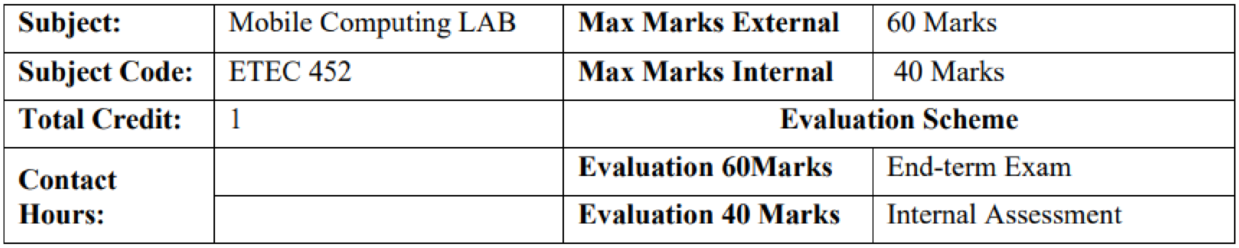
PSP Area, Sector – 22, Rohini, New Delhi – 110085

MAHARAJA AGRASEN INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Outcome Based Learning

Course Outcomes (Revision)



Subject:	Mobile Computing LAB	**Max Marks External**	60 Marks
Subject Code:	ETEC 452	**Max Marks Internal**	40 Marks
Total Credit:	1	**Evaluation Scheme**	
Contact Hours:		**Evaluation 60Marks**	End-term Exam
		Evaluation 40 Marks	Internal Assessment

452.1) Recall and Describe the various tags of WML, basics of MANETs and Android.

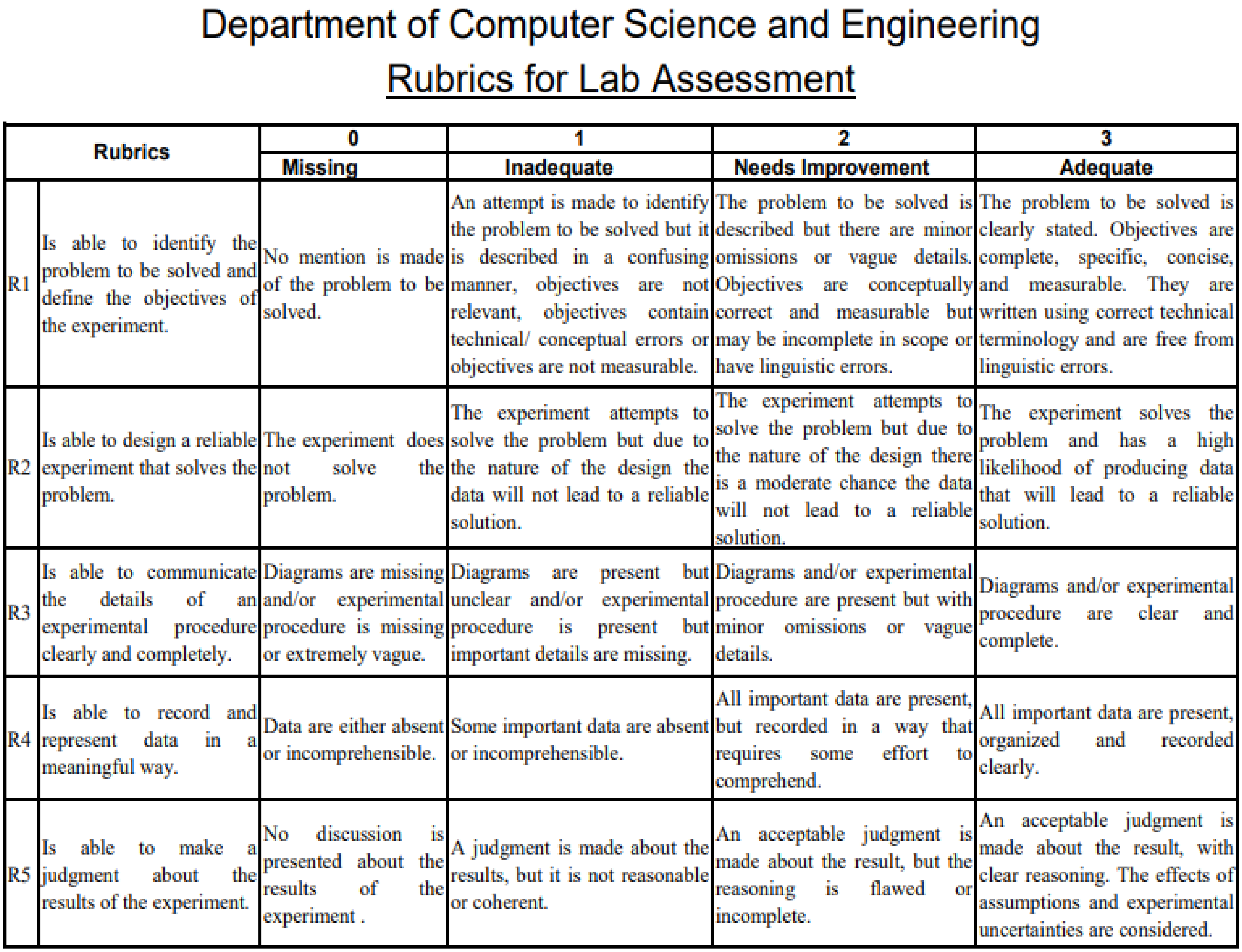
452.2) To understand the principles of Adhoc networks, frontend design using WML and connectivity with the databases.

452.3) Use the tags of WML, packages of Androids to demonstrate topologies and techniques of Wireless networks using NS3.

452.4) Select suitable approach to design an applications using XML, Android etc.

452.5) To evaluate various MANET routing algorithms, and select which is better in the scenario provided.

452.6) Develop android based applications and create new algorithms for wireless communications using NS3.



Department of Computer Science and Engineering

Rubrics for Lab Assessment

Rubrics		0	1	2	3
		Missing	Inadequate	Needs Improvement	Adequate
R1	Is able to identify the problem to be solved and define the objectives of the experiment.	No mention is made of the problem to be solved.	An attempt is made to identify the problem to be solved but it is described in a confusing manner, objectives are not relevant, objectives contain technical/ conceptual errors or objectives are not measurable.	The problem to be solved is described but there are minor omissions or vague details. Objectives are conceptually correct and measurable but may be incomplete in scope or have linguistic errors.	The problem to be solved is clearly stated. Objectives are complete, specific, concise, and measurable. They are written using correct technical terminology and are free from linguistic errors.
R2	Is able to design a reliable experiment that solves the problem.	The experiment does not solve the problem.	The experiment attempts to solve the problem but due to the nature of the design the data will not lead to a reliable solution.	The experiment attempts to solve the problem but due to the nature of the design there is a moderate chance the data will not lead to a reliable solution.	The experiment solves the problem and has a high likelihood of producing data that will lead to a reliable solution.
R3	Is able to communicate the details of an experimental procedure clearly and completely.	Diagrams are missing and/or experimental procedure is missing or extremely vague.	Diagrams are present but unclear and/or experimental procedure is present but important details are missing.	Diagrams and/or experimental procedure are present but with minor omissions or vague details.	Diagrams and/or experimental procedure are clear and complete.
R4	Is able to record and represent data in a meaningful way.	Data are either absent or incomprehensible.	Some important data are absent or incomprehensible.	All important data are present, but recorded in a way that requires some effort to comprehend.	All important data are present, organized and recorded clearly.
R5	Is able to make a judgment about the results of the experiment.	No discussion is presented about the results of the experiment .	A judgment is made about the results, but it is not reasonable or coherent.	An acceptable judgment is made about the result, but the reasoning is flawed or incomplete.	An acceptable judgment is made about the result, with clear reasoning. The effects of assumptions and experimental uncertainties are considered.

(MOBILE COMPUTING LAB

PRACTICAL RECORD

PAPER CODE: ETIT-452

Name: VARUN NEGI

University Roll No.: 13314802719

Group: 8C7

Branch: CSE

S. No	EXPERIMENT NAME	DATE	MARKS					Total Marks	Signature
			R 1	R 2	R 3	R 4	R 5		
1	Write a WML program to print a formatted Text on the mobile Screen using various tags.								
2	Write a WML program to connect multiple cards from same desk.								
3	Write WML program to display table with three columns Image name, Image and third column contain hyperlink to open another card.								

4	**Write a WML program to create a form with multiple options.**								
5	**Write a WML program to use the time control and to trigger On pick event.**								
6	**Write a WML script to find maximum out of two numbers with help of inbuilt function Lang.Max() and to find absolute value with help of inbuilt function Lang.abs()**								
7	**Write a Program in NS3 to Simulate OLSR.**								
8	**Write a Program in NS3 to Simulate AODV.**								
9	**Write a Android Program to create list view, grid view and database connectivity**								
10	**Make an application of using XML or Android from the following: Game, Clock, calendar, Convertor, phone book, Text Editor.**								

11	**Developing Android App such as E-Commerce based or E learning Based apps**								
12	**Program to develop a calling application.(Android)**								
13	**Program to develop a mailing application. (Android)**								
14	**Program to design MULTIPLE ACTIVITY. (Android)**								

Overall Comments:

Faculty Name: Ms. Divya Arora

Signature

Experiment-1

Aim: Write a WML program to print a formatted Text on the mobile Screen using various tags.

Theory:

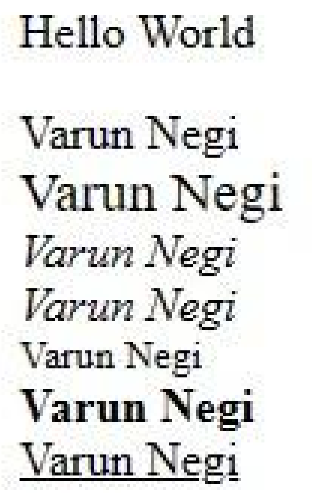
Attribute	**Value**	**Description**
align	left righ t center	Aligns the paragraph. Default is "left"
mode	wrap nowrap	Sets whether a paragraph should wrap lines or not.
xml:lang	*language_code*	Sets the language used in the element
class	*cdata*	Sets a class name for the element. The class name is case sensitive. An element can be connected to multiple classes. Multiple class names within the class attribute are separated by white space
id	*id*	Sets a unique name for the element

WML Elements	
<b>	**Defines bold text**
<big>	Defines big text
<em>	Defines emphasized text
<i>	*Defines italic text*
<small>	Defines small text
<strong>	Defines strong text
<u>	Defines underlined text
	Purpose
<!-->	Defines a WML comment
<wml>	Defines a WML deck (WML root)
<head>	Defines head information
<meta>	Defines meta information
<card>	Defines a card in a deck
<access>	Defines information about the access control of a deck
<template>	Defines a code template for all the cards in a deck

Code:

```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.3//EN"
"http://www.wapforum.org/DTD/wml13.dtd">
<wml>
<card id="ABC" title="Practical 1">
<p>Hello World</p>
<onevent type="ontimer">
<go href="#ABC1"/>
</onevent>
<timer value="50"/>
</card>
<card id="ABC1" title="Practical 1">
<p>Varun Negi</b><br>
<big>Varun Negi</big><br>
<em>Varun Negi</em><br>
<i>Varun Negi</i><br>
<small>Varun Negi</small><br>
<strong>Varun Negi</strong><br>
<u>Varun Negi</u>
</p>
</card>
</wml>
```

Output:



```
Hello World

Varun Negi
Varun Negi
Varun Negi
Varun Negi
Varun Negi
Varun Negi
Varun Negi
```

Viva Voice

Q. What is the use of WML decks?

⇒ WML document that is used to create an application is called as deck and it provides way to add more pages. Deck provides the insertion of the data into one or more cards which is also called as pages. Deck interacts with the user and the framework on which the application is being built. Decks are stored on a configured web server that serves the purpose of including the MIME type of data.

Q. What is WSDL?

⇒ WSDL is an XML notation for describing a web service. A WSDL definition tells a client how to compose a web service request and describes the interface that is provided by the web service provider. A WSDL definition is divided into separate sections that specify the logical interface and the physical details of a web service. The physical details include both endpoint information, such as HTTP port number, and binding information, which specifies how the SOAP payload is represented and which transport is used.

Q. What Are The Wml Variable? How To Use Them?

⇒ Multiple cards can be contained within one deck, some mechanism needs to be in place to hold data as the user traverses from card to card. This mechanism is provided via WML variables.

WML is case sensitive. No case folding is performed when parsing a WML deck. All enumerated attribute values are case sensitive. For example, the following attribute values are all different: id="Card1", id="card1", and id="CARD1".The <setvar> element is used as a result of the user executing some task. The >setvar> element can be used to set a variable's state within the following elements: <go>, <prev>, and <refresh>.

Q. How Can We Refresh Card Variables?

⇒ The *refresh()* function, as suggested by its function name, is used to refresh the current card on the WML browser. It does not take any arguments:

WMLBrowser.refresh();

An empty string is returned if the function call succeeds. If any error occurs, a non-empty string is returned. What it contains depends on the WML browser you use. It should be a message explaining why the function call fails. If immediate refresh is not supported, *invalid* is returned and the refresh operation will be done after the WMLScript interpreter gives back control to the WML browser.

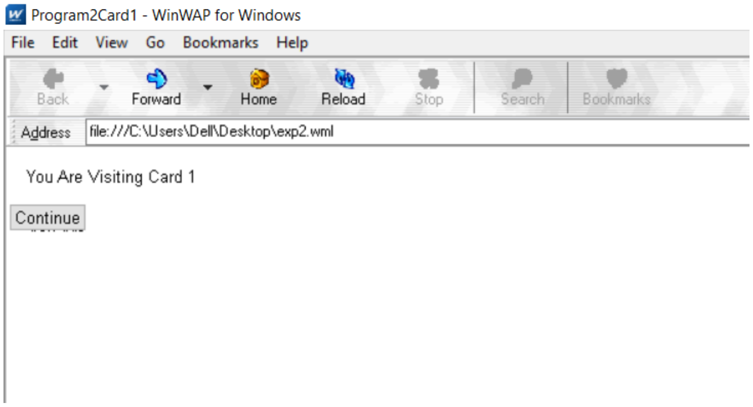
Experiment-2

Aim: Write a WML program to connect multiple cards from same desk.

Code:

```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.3//EN"
"http://www.wapforum.org/DTD/wml13.dtd">
<wml>
<card id="CardNo.1" title="Program2Card1">
<p>You Are Visiting Card 1</p>
<do type="accept" name="CardNo.2" label="Continue">
<go href="#CardNo.2"/>
</do>
</card>
<card id="CardNo.2" title="Program2Card2">
<p>You Are Visiting Card 2</p>
<do type="accept" name="CardNo.3" label="Continue">
<go href="#CardNo.3"/>
</do>
</card>
<card id="CardNo.3" title="Program2Card3">
<p>You Are Visiting Card 3</p>
<do type="accept" name="CardNo.1" label="Go Back">
<go href="#CardNo.1"/>
</do>
</card>
</wml>
```

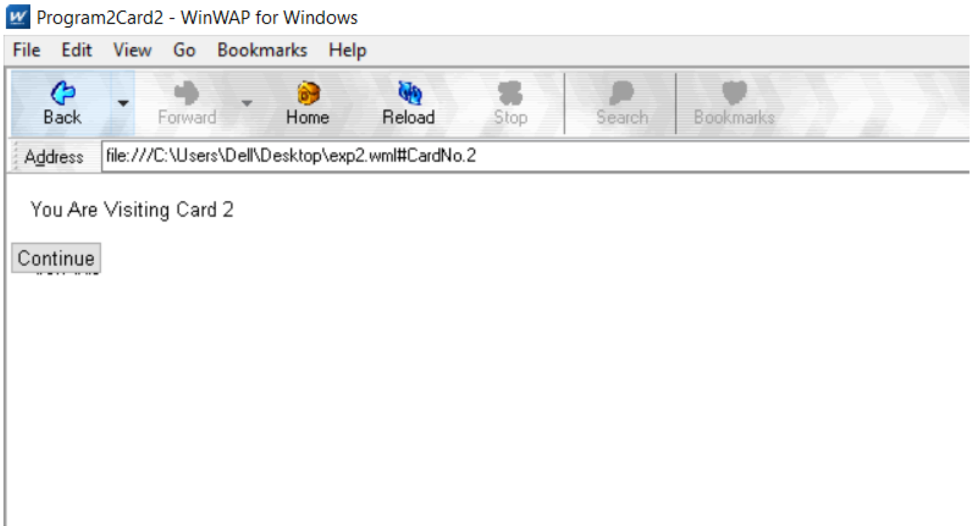
Output:


Program2Card1 - WinWAP for Windows
File Edit View Go Bookmarks Help
Back
Forward
Home
Reload
Stop
Search
Bookmarks
Address

file:///C:\Users\Dell\Desktop\exp2.wml

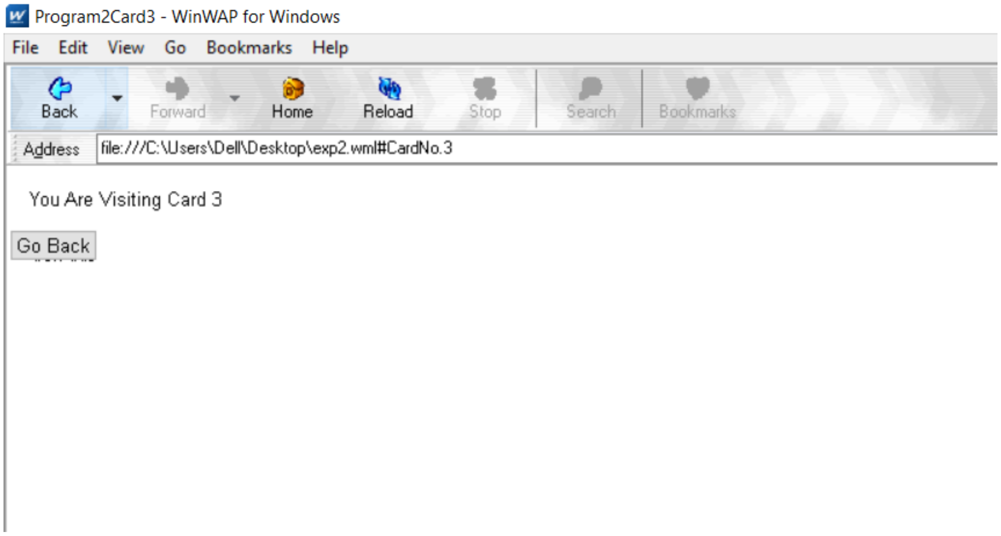
You Are Visiting Card 1

Continue



file:///C:\Users\Dell\Desktop\exp2.wml#CardNo.2

You Are Visiting Card 2



file:///C:\Users\Dell\Desktop\exp2.wml#CardNo.3

You Are Visiting Card 3

Viva Voice

Q. What is the use of XML?

⇒ **Web publishing:** XML allows you to create interactive pages, allows the customer to customize those pages, and makes creating e-commerce applications more intuitive.

Web searching and automating Web tasks: XML defines the type of information contained in a document, making it easier to return useful results when searching the Web.

General applications: XML provides a standard method to access information, making it easier for applications and devices of all kinds to use, store, transmit, and display data.

E-business applications: XML implementations make electronic data interchange (EDI) more accessible for information interchange, business-to-business transactions, and business-to-consumer transactions.

Metadata applications: XML makes it easier to express metadata in a portable, reusable format.

Q. What is Meta Data?

⇒ Sometimes you have the need to set up some app-wide configuration information in an Android app or need to create a class that can be used in multiple projects with a generic way of setting configuration values. This is particularly useful for things like API keys that will probably be different across apps but should be accessible in the same way. There are several ways to do it, but the simplest one is to add a meta-data node to the AndroidManifest.xml file.

Q. What is the difference between HTML and WML?

⇒ A main difference between HTML and WML is that the basic unit of navigation in HTML is a page, while that in WML is a card.

A WML file can contain multiple cards and they form a deck.

When a WML page is accessed from a mobile phone, all the cards in the page are downloaded from the WAP server.

Q. What is XML DOM Document?

⇒ DOM is an acronym stands for Document Object Model. It defines a standard way to access and manipulate documents. The Document Object Model (DOM) is a programming API for HTML and XML documents. It defines the logical structure of documents and the way a document is accessed and manipulated

Experiment-3

Aim: Write WML program to display table with three columns Image name, Image and third column contain hyperlink to open another card.

Code:

```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.3//EN"
"http://www.wapforum.org/DTD/wml13.dtd">
<wml>
<card id="page1" title="Table in WML">
<p>
<table columns="1">
<tr>
<td>IMAGE NAME</td>
<td>IMAGE</td>
<td>LINK</td>
</tr>
<tr>
<td>Sunflower</td>
<td>
<img src="sun.jpg" alt="sun" height="62" width="60" />
</td>
<td>
<anchor>
<go href="exp3.wml#sun"/>
Link
</anchor>
</td>
</tr>
<tr>
<td>Rose</td>
<td>
<img src="rose.jpg" alt="rose" height="62" width="60" />
</td>
<td>
<anchor>
<go href="exp3.wml#rose"/>
Link
</anchor>
</td>
</tr>
<tr>
<td>Lily</td>
```

```
<td>
<img src="lily.jpg" alt="lily" height="62" width="60" />
</td>
<td>
<anchor>
<go href="exp3.wml#lily"/>
Link
</anchor>
</td>
</tr>
</table>
</p>
</card>
<card id="sun">
<img src="sun.jpg" />
</card>
<card id="rose">
<img src="rose.jpg" />
</card>
<card id="lily">
<img src="lily.jpg" />
</card>
</wml>
```

Output:

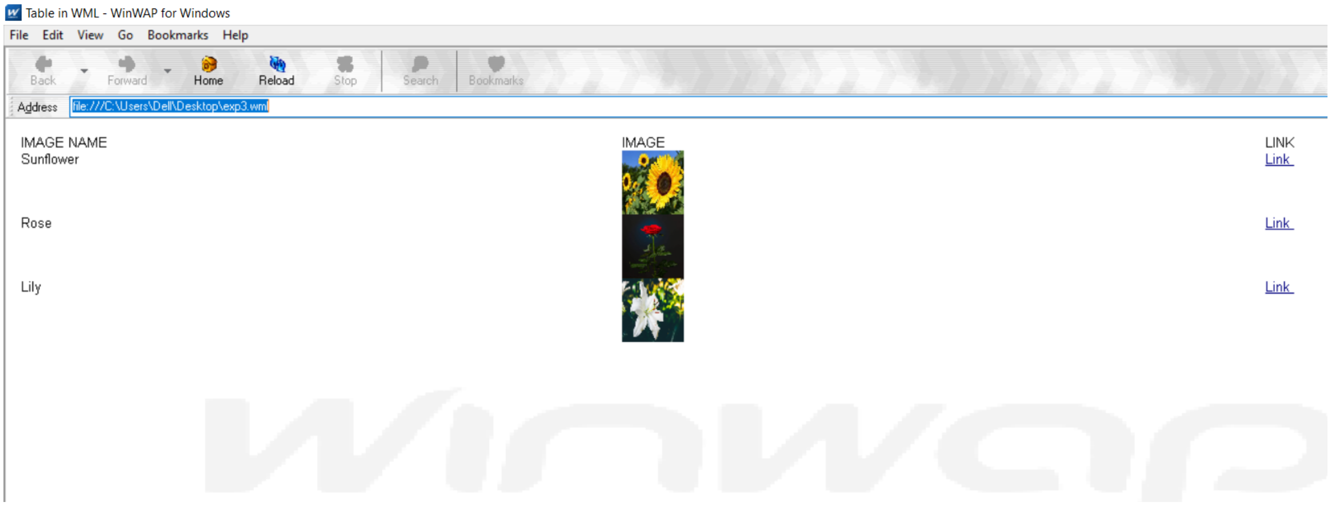


Table in WML - WinWAP for Windows
File Edit View Go Bookmarks Help
Back
Forward
Home
Reload
Stop
Search
Bookmarks
Address

file:///C:\Users\Dell\Desktop\exp3.wml

IMAGE NAME	IMAGE	LINK
Sunflower		Link
Rose		Link
Lily		Link

Viva Questions

Q. What is the function of WAP Gateway?

⇒ A WAP gateway sits between mobile devices using the WAP protocol and the World Wide Web, passing pages from one to the other much like a proxy. This translates pages into a form suitable for the mobiles, for instance using the Wireless Markup Language (WML).

Q. What is Distillation technique in WAP?

⇒ Distillation techniques convert the information from the rest of the internet into a suitable form for the WAP enabled devices. Web warden forwards all cellophane requests to a remote distillation server. Distillation server connected to rest of web and can fetch HTML pages, images

Q. What is the use of UAProf?

⇒ UAProf (User agent profile) is an XML document that contains information about the user agent type and device capabilities. It is a standard defined and maintained by the Open Mobile Alliance (formerly the WAP Forum).

Q. Why WML is called Light weight Language?

⇒ WAP - WML Script. WMLScript (Wireless Markup Language Script) is the client-side scripting language of WML (Wireless Markup Language). A scripting language is similar to a programming language, but is of lighter weight.

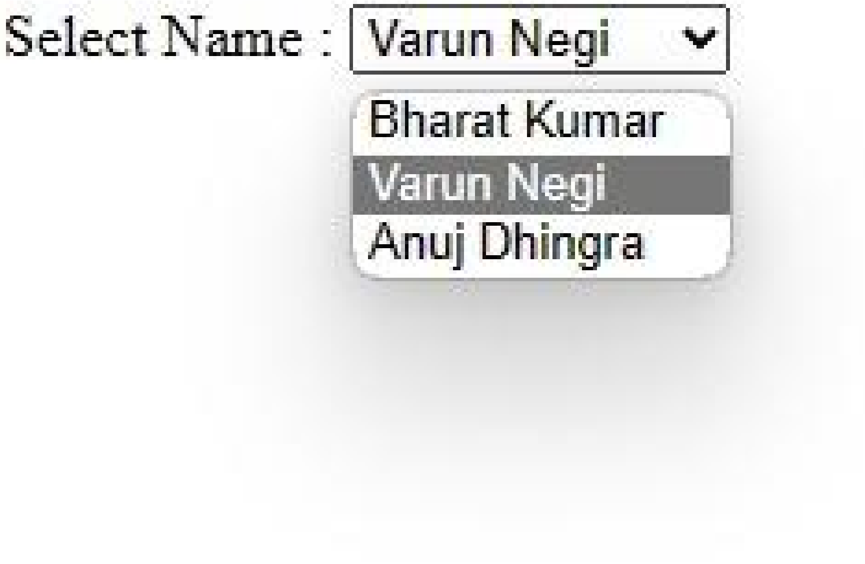
Experiment-4

Aim: Write a WML program to create a form with multiple options.

Code:

```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.2//EN"
"http://www.wapforum.org/DTD/wml12.dtd">
<wml>
<card title="Practical4">
<p> Select Name :
<select>
<option value="htm">Varun Negi </option>
<option value="xml">Bharat Kumar</option>
<option value="wap">Anuj Dhingra</option>
</select>
</p>
</card>
</wml>
```

Output:



Select Name : Varun Negi

Viva questions

Q. What is Push and Pull technique in WAP?

⇒ In the normal client/server model, a client requests information or a service from a server. The server responds by transmitting information or performing a service to the client. This is known as pull technology—the client pulls information from the server.

In contrast to this, there is also push technology. The WAP push framework transmits information to a device without a previous user action. This technology is also based on the client/server model, but there is no explicit request from the client before the server transmits its content.

Q. List out the Databases used to store Data of WML pages?

⇒ MS-Access
Oracle 11g

Q. What is the advantages of using XML DOM document?

⇒ XML structure is traversable, and it can be randomly accessed by traversing the tree.
XML structure is modifiable, and values can be added, changed and removed

Q. What is DTD?

⇒ A DTD is a Document Type Definition. A DTD defines the structure and the legal elements and attributes of an XML document. With a DTD, independent groups of people can agree on a standard DTD for interchanging data. An application can use a DTD to verify that XML data is valid.

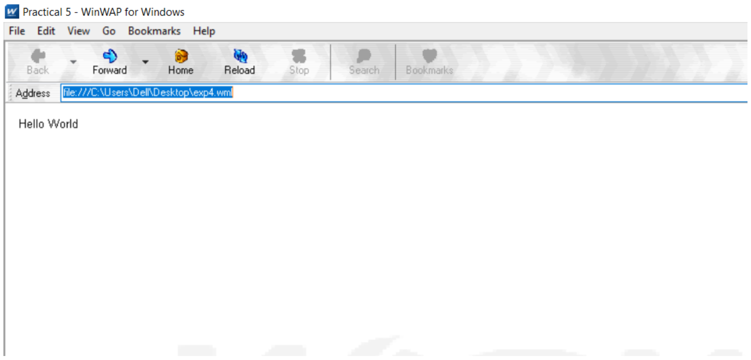
Experiment-5

Aim: Write a WML program to use the time control and to trigger on pick event.

Code:

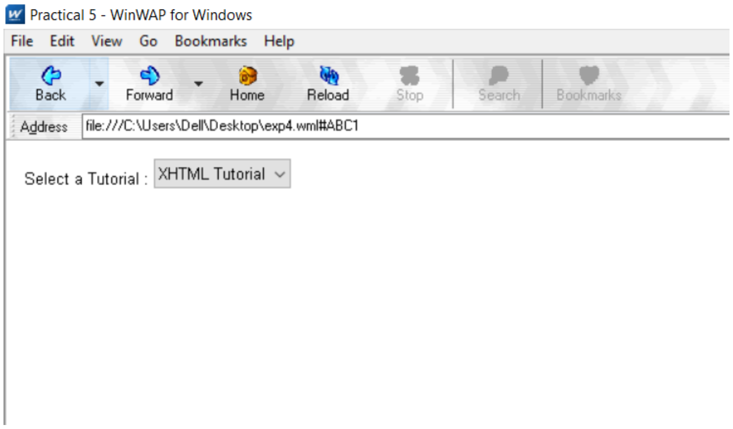
```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.3//EN"
"http://www.wapforum.org/DTD/wml13.dtd">
<wml>
<card id="ABC" title="Practical 5">
<p>
Hello World
</p>
<onevent type="ontimer">
<go href="#ABC1"/>
</onevent>
<timer value="100"/>
</card>
<card id="ABC1" title="Practical 5">
<p>Select a Tutorial :
<select title="tutorials" name="selection_list">
<option onpick="#xhtml">XHTML Tutorial</option>
<option onpick="#wap">WAP Tutorial</option>
</select>
</p>
</card>
<card id="xhtml" title="Practical 5">
<p>
XHTML stands for EXtensibleHyperText Markup Language.
</p>
</card>
<card id="wap" title="Practical 5">
<p>
Wireless Application Protocol (WAP) is a technical standard for accessing information over a mobile
wireless network.
</p>
</card>
</wml>
```

Output:


Practical 5 - WinWAP for Windows
File Edit View Go Bookmarks Help
Back
Forward
Home
Reload
Stop
Search
Bookmarks
Address

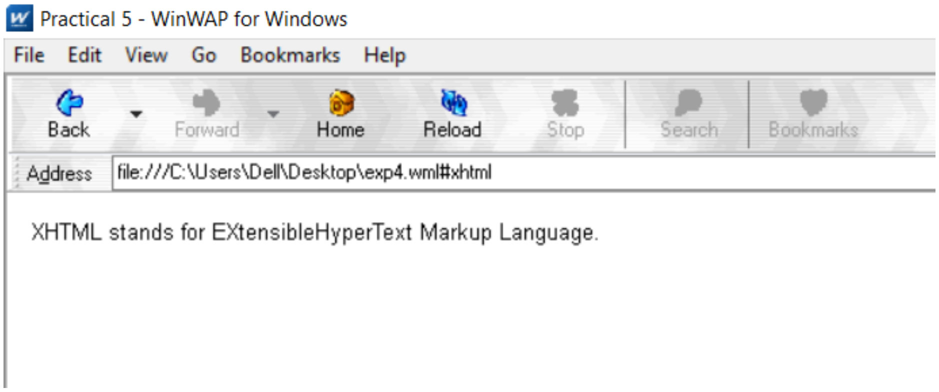
file:///C:\Users\Dell\Desktop\exp4.wml

Hello World


Practical 5 - WinWAP for Windows
File Edit View Go Bookmarks Help
Back
Forward
Home
Reload
Stop
Search
Bookmarks
Address

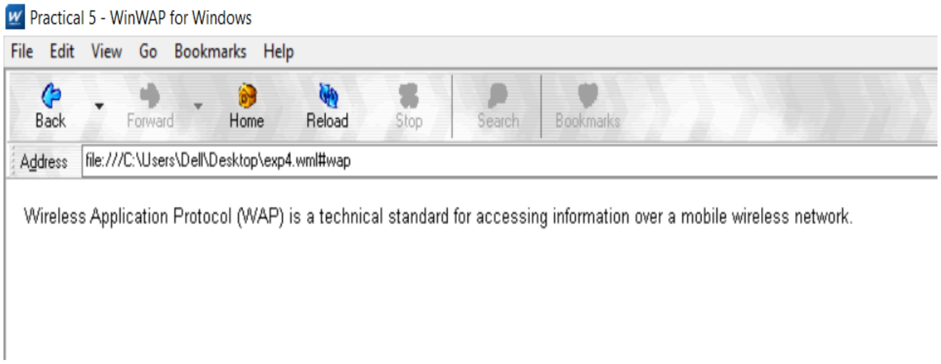
file:///C:\Users\Dell\Desktop\exp4.wml#ABC1

Select a Tutorial : XHTML Tutorial


Practical 5 - WinWAP for Windows
File Edit View Go Bookmarks Help
Back
Forward
Home
Reload
Stop
Search
Bookmarks
Address

file:///C:\Users\Dell\Desktop\exp4.wml#xhtml

XHTML stands for EXtensibleHyperText Markup Language.


Practical 5 - WinWAP for Windows
File Edit View Go Bookmarks Help
Back
Forward
Home
Reload
Stop
Search
Bookmarks
Address

file:///C:\Users\Dell\Desktop\exp4.wml#wap

Wireless Application Protocol (WAP) is a technical standard for accessing information over a mobile wireless network.

Viva Questions

Q. Does WAP run over GPRS?

⇒ GPRS is a method of connecting to your provider while WAP is the protocol that runs on top of GPRS. WAP is suited for GPRS only connections. There are also other services that use GPRS aside from WAP

Q. Which Security is used in WAP?

⇒ Wireless Transport Layer Security (WTLS). WTLS is a wireless relative of the more common SSL mechanism used by all major web browsers. WTLS resembles SSL in that both rely on certificates on the client and server to verify the identity of the participants involved. While SSL implementations generally rely on RSA encryption, WTLS supports RSA, Diffie-Hellman, and Elliptic Curve encryption. WTLS also doesn't provide for end-to-end security due to WAP's current architecture and limitations of server-side Transport Layer Security (another name for SSL).

Q. Is WML case sensitive?

⇒ Variable names in WML are case-sensitive. The first character of a variable name must be a letter or an underscore. The rest of the characters can be letters, numbers or underscores.

Q. What does Post field tag do?

⇒ The <postfield> tag is used to post variables values to the server.
The <postfield> tag contains information to be sent to the server along with a <go> tag.

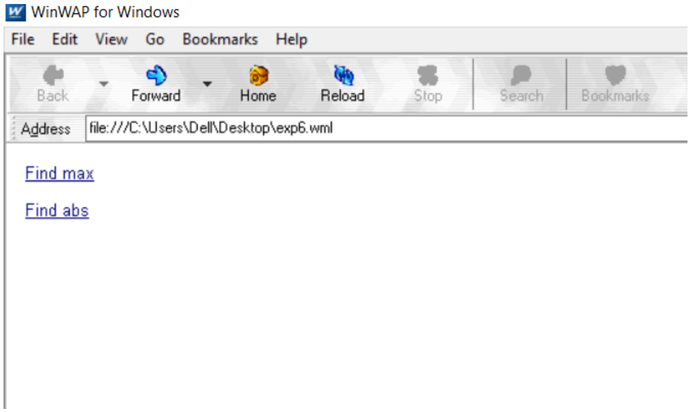
Experiment-6

Aim: Write a WML script to find maximum out of two numbers with help of inbuilt function Lang.Max() and to find absolute value with help of inbuilt function Lang.abs().

Code:

```
// wml
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.3//EN"
"http://www.wapforum.org/DTD/wml13.dtd">
<wml>
<card id="card1">
<p>
<a href="exp6.wmls#findmax()">Find max</a>
<br/>
</p>
<p>
<a href="exp6.wmls#findabs()">Find abs</a>
<br/>
</p>
</card>
<card id="card2">
<p> Max of two numbers is:
$(maxnumber) </p>
</card>
<card id="card3">
<p> Absolute value is:
$(number)  </p>
</card>
</wml>
// wmls
extern function findmax() {
var result1 = Dialogs.prompt("Enter 1st number",0);
var result2 = Dialogs.prompt("Enter 2nd number",0);
var maxnum = Lang.max(result1, result2);
WMLBrowser.setVar("number1", result1);
WMLBrowser.setVar("number2", result2);
WMLBrowser.setVar("maxnumber", maxnum);
WMLBrowser.go("exp6.wml#card2");
}
extern function findabs(){
var num = Dialogs.prompt("Enter number", 0);
var absmun = Lang.abs(num);
WMLBrowser.setVar("number", absmun);
WMLBrowser.go("exp6.wml#card3");}
```

Output:

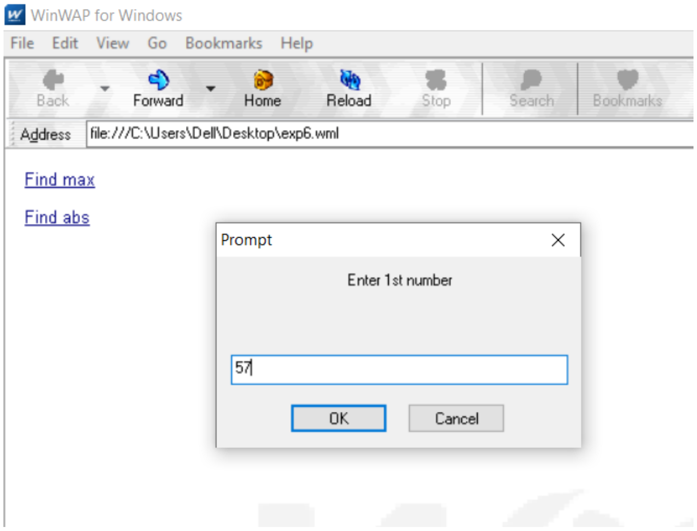


WinWAP for Windows
File Edit View Go Bookmarks Help
Back Forward Home Reload Stop Search Bookmarks
Address

file:///C:\Users\Dell\Desktop\exp6.wml

Find max

Find abs



WinWAP for Windows
File Edit View Go Bookmarks Help
Back Forward Home Reload Stop Search Bookmarks
Address
OK
Cancel

file:///C:\Users\Dell\Desktop\exp6.wml

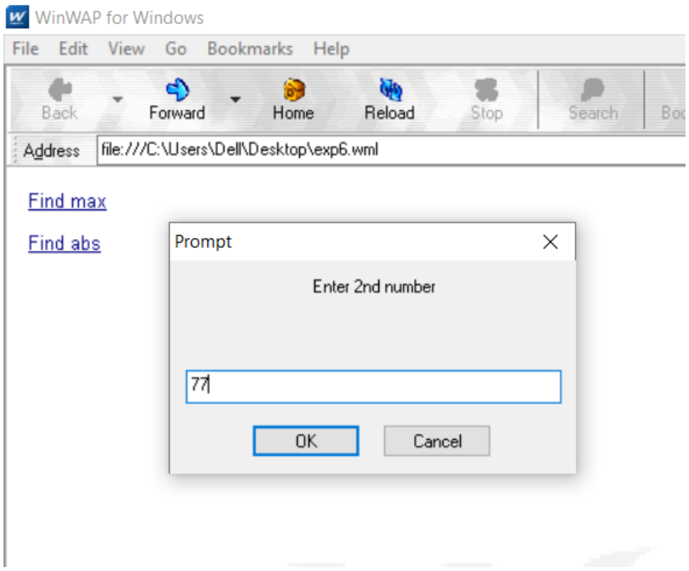
Find max

Find abs

Prompt

Enter 1st number

57


WinWAP for Windows
File Edit View Go Bookmarks Help
Back Forward Home Reload Stop Search Boo
Address
OK
Cancel

Address: file:///C:\Users\Dell\Desktop\exp6.wml

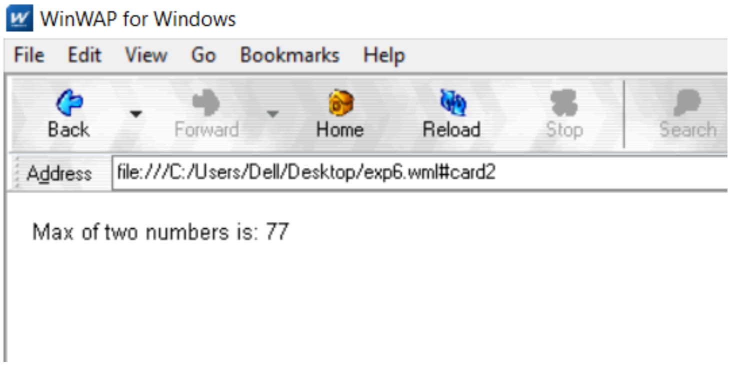
Find max

Find abs

Prompt

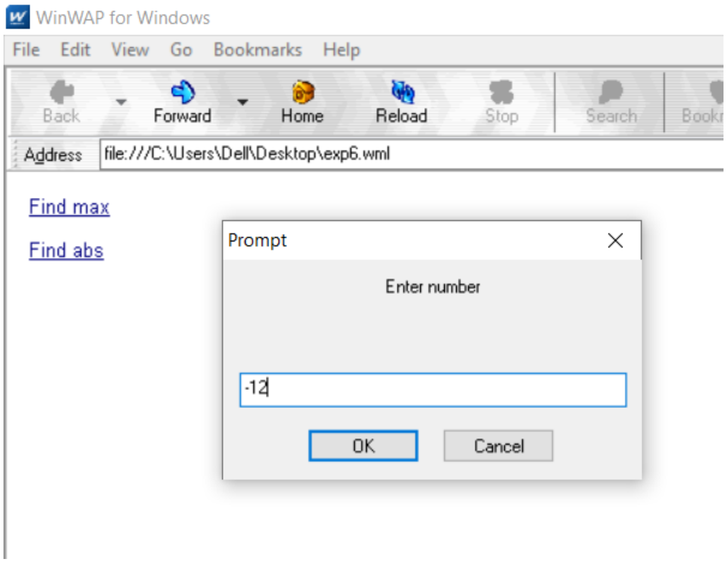
Enter 2nd number

77


WinWAP for Windows
File Edit View Go Bookmarks Help
Back Forward Home Reload Stop Search
Address

Address: file:///C:/Users/Dell/Desktop/exp6.wml#card2

```
Max of two numbers is: 77
```


WinWAP for Windows
File Edit View Go Bookmarks Help
Back Forward Home Reload Stop Search Bookr
Address
OK
Cancel

Address: file:///C:\Users\Dell\Desktop\exp6.wml

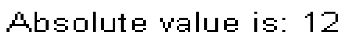
Find max

Find abs

Prompt

Enter number

-12



```
Absolute value is: 12
```

Viva Questions

Q.What is the function of WMLScript?

⇒ It is used for the client side and has many tasks that provide user input validation, generation of error messages, etc.

Q. What is the use of WML in WMLScript?

⇒ WML provides many features to, represent the content that needs to, be displayed like, navigational support, data input, hyperlinks, etc. It has the provision to put the image and present it in variety of forms with the help of HTML. It uses other markup languages with the WAP to provide flexibility in the use of WML in WMLScript.

Q. What is the use of WML decks?

⇒ Deck provides the insertion of the data into one or more cards which is also called as pages. Deck interacts with the user and the framework on which the application is being built.

Q. What is the process where WML cards request the device to access WAP?

⇒ WML cards are just like pages on the Decks that are used to request the services on the device to access WAP. WAP gateway acts as a bridge between the mobile device and World Wide Web for the communication purpose. It provides the pages or cards from one system to another system using the proxy on the WWW.

Q. What is the support of mobile devices for WMLScript?

⇒ Mobile devices are used to run and showcase the result of the input that is given and written by the use of WMLScript. WMLScript is written such that it provides hardware interfacing with the mobile using the WML.

Q. What is the process of adding the client side logic to WAP using WMLScript?

⇒ WMLScript is similar to the JavaScript and it provides the same feature as JavaScript. WMLScript provides the client only scripting platform on the Internet that is used with the WML.

Q. What is the purpose of using WMLScript?

⇒ WMLScript provides the validator that can be used to validate the user input given in the form. WMLScript provides the advanced functionality to write and read the code with the tools provided by it. It provides the facilities that can be accessed by the user agent and more application can run on the devices.

Q. What are the data types used in WMLScript?

⇒ Boolean: this is the data type used for the values like true or false
Integer: this is a data type containing the numerical values
Floating-point: this is the data type used to provide the value in decimal points like 1.00, 1 e-10.
String: stores the values in the form of characters in a contiguous memory location.

Experiment-7

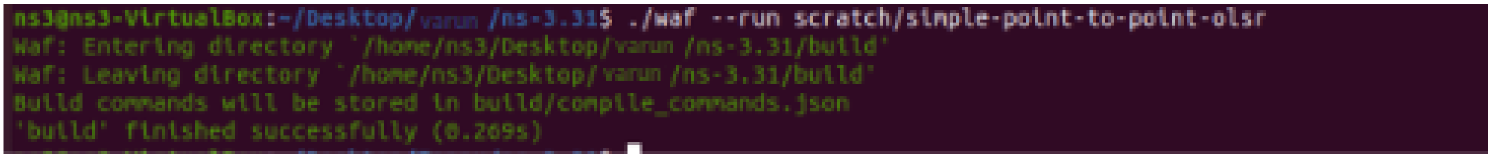
Aim: Write a Program in NS3 to Simulate OLSR.

Code:

```
#include <iostream>
#include <fstream>
#include <string>
#include <cassert>
#include "ns3/core-module.h"
#include "ns3/network-module.h"
#include "ns3/internet-module.h"
#include "ns3/point-to-point-module.h"
#include "ns3/applications-module.h"
#include "ns3/olsr-helper.h"
#include "ns3/ipv4-static-routing-helper.h"
#include "ns3/ipv4-list-routing-helper.h"
using namespace ns3;
NS_LOG_COMPONENT_DEFINE ("SimplePointToPointOlsrExample");
int
main (int argc, char *argv[])
{
// Users may find it convenient to turn on explicit debugging
// for selected modules; the below lines suggest how to do this
#if 0
LogComponentEnable ("SimpleGlobalRoutingExample", LOG_LEVEL_INFO);
#endif
// Set up some default values for the simulation. Use the
Config::SetDefault ("ns3::OnOffApplication::PacketSize", UintegerValue (210));
Config::SetDefault ("ns3::OnOffApplication::DataRate", StringValue ("448kb/s"));
//DefaultValue::Bind ("DropTailQueue::m_maxPackets", 30);
// Allow the user to override any of the defaults and the above
// DefaultValue::Bind ()s at run-time, via command-line arguments
CommandLinecmd;
cmd.Parse (argc, argv);
// Here, we will explicitly create four nodes. In more sophisticated
// topologies, we could configure a node factory.
NS_LOG_INFO ("Create nodes.");
NodeContainer c;
c.Create (5);
NodeContainer n02 = NodeContainer (c.Get (0), c.Get (2));
NodeContainer n12 = NodeContainer (c.Get (1), c.Get (2));
NodeContainer n32 = NodeContainer (c.Get (3), c.Get (2));
NodeContainer n34 = NodeContainer (c.Get (3), c.Get (4));
// Enable OLSR
NS_LOG_INFO ("Enabling OLSR Routing.");
OlsrHelperolsr;
Ipv4StaticRoutingHelper staticRouting;
Ipv4ListRoutingHelperlist;
list.Add (staticRouting, 0);
list.Add (olsr, 10);
InternetStackHelper internet;
internet.SetRoutingHelper (list); // has effect on the next Install ()
internet.Install (c);
// We create the channels first without any IP addressing information
NS_LOG_INFO ("Create channels.");
PointToPointHelper p2p;
p2p.SetDeviceAttribute ("DataRate", StringValue ("5Mbps"));
p2p.SetChannelAttribute ("Delay", StringValue ("2ms"));
NetDeviceContainer nd02 = p2p.Install (n02);
NetDeviceContainer nd12 = p2p.Install (n12);
p2p.SetDeviceAttribute ("DataRate", StringValue ("1500kbps"));
p2p.SetChannelAttribute ("Delay", StringValue ("10ms"));
NetDeviceContainer nd32 = p2p.Install (n32);
NetDeviceContainer nd34 = p2p.Install (n34);
// Later, we add IP addresses.
NS_LOG_INFO ("Assign IP Addresses.");
Ipv4AddressHelper ipv4;
ipv4.SetBase ("10.1.1.0", "255.255.255.0");
Ipv4InterfaceContainer i02 = ipv4.Assign (nd02);
ipv4.SetBase ("10.1.2.0", "255.255.255.0");
Ipv4InterfaceContainer i12 = ipv4.Assign (nd12);
ipv4.SetBase ("10.1.3.0", "255.255.255.0");
Ipv4InterfaceContainer i32 = ipv4.Assign (nd32);
ipv4.SetBase ("10.1.4.0", "255.255.255.0");
Ipv4InterfaceContainer i34 = ipv4.Assign (nd34);
// Create the OnOff application to send UDP datagrams of size
// 210 bytes at a rate of 448 Kb/s from n0 to n4
NS_LOG_INFO ("Create Applications.");
uint16_t port = 9; // Discard port (RFC 863)
OnOffHelper onoff ("ns3::UdpSocketFactory",
InetSocketAddress (i34.GetAddress (1), port));
onoff.SetConstantRate (DataRate ("448kb/s"));
ApplicationContainer apps = onoff.Install (c.Get (0));
apps.Start (Seconds (1.0));
apps.Stop (Seconds (10.0));
// Create a packet sink to receive these packets
PacketSinkHelpersink ("ns3::UdpSocketFactory",
InetSocketAddress (Ipv4Address::GetAny (), port));
apps = sink.Install (c.Get (3));
apps.Start (Seconds (1.0));
apps.Stop (Seconds (10.0));
```

```
// Create a similar flow from n3 to n1, starting at time 1.1 seconds
onoff.SetAttribute ("Remote",
AddressValue (InetSocketAddress (i12.GetAddress (0), port)));
apps = onoff.Install (c.Get (3));
apps.Start (Seconds (1.1));
apps.Stop (Seconds (10.0));
// Create a packet sink to receive these packets
apps = sink.Install (c.Get (1));
apps.Start (Seconds (1.1));
apps.Stop (Seconds (10.0));
AsciiTraceHelper ascii;
p2p.EnableAsciiAll (ascii.CreateFileStream ("simple-point-to-point-olsr.tr"));
p2p.EnablePcapAll ("simple-point-to-point-olsr");
Simulator::Stop (Seconds (30));
NS_LOG_INFO ("Run Simulation.");
Simulator::Run ();
Simulator::Destroy ();
NS_LOG_INFO ("Done.");
return 0;
}
```

Output:



```
ns3@ns3-VirtualBox:~/Desktop/varun /ns-3.31$ ./waf --run scratch/simple-point-to-point-olsr
Waf: Entering directory `/home/ns3/Desktop/varun /ns-3.31/build'
Waf: Leaving directory `/home/ns3/Desktop/varun /ns-3.31/build'
Build commands will be stored in build/compile_commands.json
'build' finished successfully (0.269s)
```

Viva Questions

Q. List of Security Issues in Adhoc Networks?

⇒ Sybil
Dos
Negative Reply Threat.
False Address Conflict Threat.
Address Conflict Threat.
Address Space Exhaustion Threat.
Address Spoofing Threat.

Q. What is Multi Casting?

⇒ Multicast is a communication system between a single sender and multiple receivers on a network. One address bit is reserved for multicasting and the remaining (n-1) address bits can hold a group number. Any machine can subscribe to any or all of the groups.

Q. What is MANET?

⇒ A MANET is a type of ad hoc network that can change locations and configure itself on the fly. Because MANETS are mobile, they use wireless connections to connect to various networks. This can be a standard Wi-Fi_connection, or another medium, such as a cellular or satellite transmission.

Some MANETs are restricted to a local area of wireless devices (such as a group of laptop computers), while others may be connected to the Internet.

Q. What are the Characteristics of MANETs?

⇒ **Distributed Operation:** There is no background network for the central control of the network operations.

Multi Hop Routing: When a node tries to send information to other nodes which is out of its communication range, the packet should be forwarded via one or more intermediate nodes.

Autonomous Terminal: In MANET, each mobile node is an independent node, which could function as both a host and a router.

Dynamic Topology: Nodes are free to move arbitrarily with different speeds; thus, the network topology may change randomly and at unpredictable time. The nodes in the MANET dynamically establish routing among themselves as they travel around, establishing their own network.

Light-Weight Terminals: In maximum cases, the nodes at MANET are mobile with less CPU capability, low power storage and small memory size.

Experiment-8

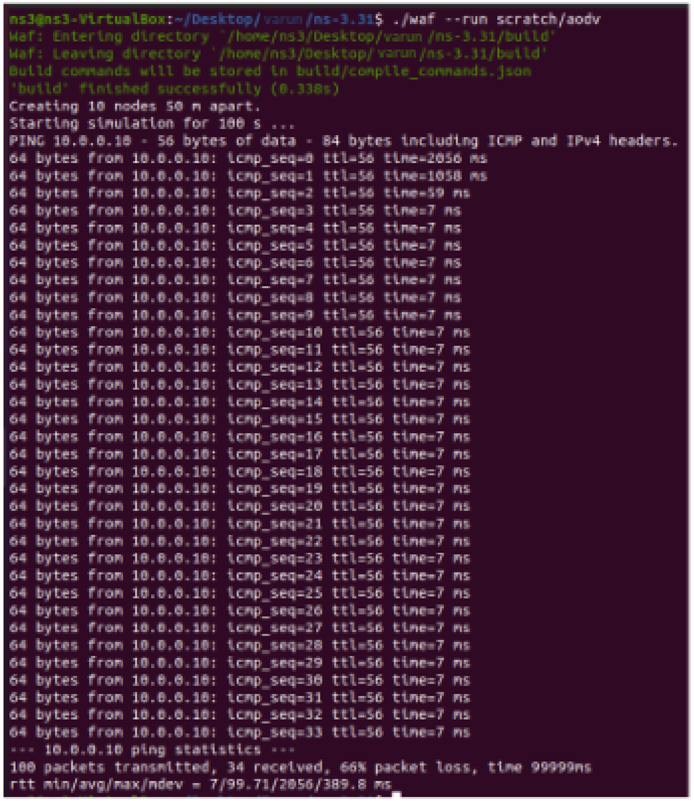
Aim: Write a Program in NS3 to Simulate AODV.

Code:

```
#include <iostream>
#include <cmath>
#include "ns3/aodv-module.h"
#include "ns3/core-module.h"
#include "ns3/network-module.h"
#include "ns3/internet-module.h"
#include "ns3/mobility-module.h"
#include "ns3/point-to-point-module.h"
#include "ns3/v4ping-helper.h"
#include "ns3/yans-wifi-helper.h"
using namespace ns3;
class AodvExample {
public:
AodvExample ();
bool Configure (int argc, char **argv);
void Run ();
void Report (std::ostream & os);
private:
uint32_t size;
double step;
double totalTime;
bool pcap;
bool printRoutes;
NodeContainer nodes;
NetDeviceContainer devices;
Ipv4InterfaceContainer interfaces;
private:
void CreateNodes ();
void CreateDevices ();
void InstallInternetStack ();
void InstallApplications ();};
int main (int argc, char **argv){
AodvExample test;
if (!test.Configure (argc, argv))
NS_FATAL_ERROR ("Configuration failed. Aborted.");
test.Run ();
test.Report (std::cout);
return 0; }
AodvExample::AodvExample ():
size (10),
step (50),
totalTime (100),
pcap (true),
printRoutes (true) {}
bool AodvExample::Configure (int argc, char **argv) {
SeedManager::SetSeed (12345);
CommandLine cmd (__FILE__);
cmd.AddValue ("pcap", "Write PCAP traces.", pcap);
cmd.AddValue ("printRoutes", "Print routing table dumps.", printRoutes);
cmd.AddValue ("size", "Number of nodes.", size);
cmd.AddValue ("time", "Simulation time, s.", totalTime);
cmd.AddValue ("step", "Grid step, m", step);
cmd.Parse (argc, argv);
return true; }
void AodvExample::Run () {
CreateNodes ();
CreateDevices ();
InstallInternetStack ();
InstallApplications ();
std::cout << "Starting simulation for " << totalTime << " s ...\n";
Simulator::Stop (Seconds (totalTime));
Simulator::Run ();
Simulator::Destroy (); }
void AodvExample::Report (std::ostream &){}
void AodvExample::CreateNodes (){
std::cout << "Creating " << (unsigned)size << " nodes " << step << " m apart.\n";
nodes.Create (size);
for (uint32_t i = 0; i < size; ++i){
std::ostringstream os;
os << "node-" << i;
Names::Add (os.str (), nodes.Get (i)); }
MobilityHelper mobility;
mobility.SetPositionAllocator ("ns3::GridPositionAllocator", "MinX", DoubleValue (0.0), "MinY",
        DoubleValue (0.0), "DeltaX", DoubleValue (step), "DeltaY", DoubleValue (0), "GridWidth",
        UintegerValue (size), "LayoutType", StringValue ("RowFirst"));
mobility.SetMobilityModel ("ns3::ConstantPositionMobilityModel");
mobility.Install (nodes); }
void AodvExample::CreateDevices (){
WifiMacHelper wifiMac;
wifiMac.SetType ("ns3::AdhocWifiMac");
YansWifiPhyHelper wifiPhy;
YansWifiChannelHelper wifiChannel = YansWifiChannelHelper::Default ();
wifiPhy.SetChannel (wifiChannel.Create ());
WifiHelper wifi;
wifi.SetRemoteStationManager ("ns3::ConstantRateWifiManager", "DataMode",
StringValue("OfdmRate6Mbps"), "RtsCtsThreshold", UintegerValue (0));
devices = wifi.Install (wifiPhy, wifiMac, nodes);
if (pcap){
wifiPhy.EnablePcapAll (std::string ("aodv")); }}
void AodvExample::InstallInternetStack (){
```

```
AodvHelper aodv;
InternetStackHelper stack;
stack.SetRoutingHelper (aodv); // has effect on the next Install ()
stack.Install (nodes);
Ipv4AddressHelper address;
address.SetBase ("10.0.0.0", "255.0.0.0");
interfaces = address.Assign (devices);
if (printRoutes){
Ptr<OutputStreamWrapper> routingStream = Create<OutputStreamWrapper> ("aodv.routes", std::ios::out);
aodv.PrintRoutingTableAllAt (Seconds (8), routingStream);}}
void AodvExample::InstallApplications (){
V4PingHelper ping (interfaces.GetAddress (size - 1));
ping.SetAttribute ("Verbose", BooleanValue (true));
ApplicationContainer p = ping.Install (nodes.Get (0));
p.Start (Seconds (0));
p.Stop (Seconds (totalTime) - Seconds (0.001));
// move node away
Ptr<Node> node = nodes.Get (size/2);
Ptr<MobilityModel> mob = node->GetObject<MobilityModel> ();
Simulator::Schedule (Seconds (totalTime/3), &MobilityModel::SetPosition, mob, Vector (1e5, 1e5, 1e5));
}
```

Output:



```
ns3@ns3-VirtualBox:~/Desktop/varun/ns-3.31$ ./waf --run scratch/aodv
Waf: Entering directory `/home/ns3/Desktop/varun/ns-3.31/build'
Waf: Leaving directory `/home/ns3/Desktop/varun/ns-3.31/build'
Build commands will be stored in build/compile_commands.json
'build' finished successfully (0.338s)
Creating 10 nodes 50 m apart.
Starting simulation for 100 s ...
PING 10.0.0.10 - 56 bytes of data - 84 bytes including ICMP and IPv4 headers.
64 bytes from 10.0.0.10: icmp_seq=0 ttl=56 time=2056 ms
64 bytes from 10.0.0.10: icmp_seq=1 ttl=56 time=1058 ms
64 bytes from 10.0.0.10: icmp_seq=2 ttl=56 time=59 ms
64 bytes from 10.0.0.10: icmp_seq=3 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=4 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=5 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=6 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=7 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=8 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=9 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=10 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=11 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=12 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=13 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=14 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=15 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=16 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=17 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=18 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=19 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=20 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=21 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=22 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=23 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=24 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=25 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=26 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=27 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=28 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=29 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=30 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=31 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=32 ttl=56 time=7 ms
64 bytes from 10.0.0.10: icmp_seq=33 ttl=56 time=7 ms
--- 10.0.0.10 ping statistics ---
100 packets transmitted, 34 received, 66% packet loss, time 99999ms
rtt min/avg/max/mdev = 7/99.71/2056/389.8 ms
```

Viva Question

Q. How routing in Adhoc networks different from fixed networks?

⇒ Nodes in the ad hoc networks are constantly moving therefore, the same principles in fixed networks cannot be applied in wireless ad hoc network. In fixed networks like the internet, the ip address are used as identification but since the nodes in the ad hoc networks are moving, they dont use the concept of IP addresses.

Q. What is hidden and exposed terminal problem in Adhoc Networks?

⇒ In a formal way hidden terminals are nodes in a wireless network that are out of range of other node or a collection of nodes. Consider a wireless networking, each node at the far edge of the access point's range, which is known as A, can see the access point, but it is unlikely that the same node can see a node on the opposite end of the access point's range, C. These nodes are known as hidden. The problem is when nodes A and C start to send packets simultaneously to the access point B. Because the nodes A and C are out of range of each other and so cannot detect a collision while transmitting, Carrier sense multiple access with collision detection (CSMA/CD) does not work, and collisions occur, which then corrupt the data received by the access point.

In wireless networks, when a node is prevented from sending packets to other nodes because of a neighboring transmitter is known as the exposed node problem. Consider the below wireless network having four nodes labeled A, B, C, and D, where the two receivers are out of range of each other, yet the two transmitters (B, C) in the middle are in range of each other. Here, if a transmission between A and B is taking place, node C is prevented from transmitting to D as it concludes after carrier sense that it will interfere with the transmission by its neighbor node B. However note that node D could still receive the transmission of C without interference because it is out of range from B.

Q. What is Hiper Access?

⇒ A developing broadband wireless local loop (WLL) access technology specified in the Broadband Radio Access Networks (BRAN) project chartered by the European Telecommunications Standards Institute (ETSI). HiperACCESS is targeting frequencies in the 40.5

Q. What are hybrid routing Protocols?

⇒ Hybrid Routing Protocol (HRP) is a network routing protocol that combines Distance Vector Routing Protocol (DVRP) and Link State Routing Protocol (LSRP) features. HRP is used to determine optimal network destination routes and report network topology data modifications.

HRP is also known as Balanced Hybrid Routing (BHR).

Experiment-9

Aim: Write an Android Program to create list view, grid view and database connectivity.

Code:

```
implementation 'androidx.recyclerview:recyclerview:1.2.1'
implementation 'androidx.gridlayout:gridlayout:1.0.0'
implementation 'androidx.cardview:cardview:1.0.0'
implementation 'androidx.sqlite:sqlite:2.2.0'
```

activity_lab_list.xml: Layout file for the main activity.
list_item_lab.xml: Layout file for the list/grid item.
DatabaseHelper.java: Helper class to manage the SQLite database.
LabListActivity.java: Java file for the main activity.

activity_lab_list.xml:

```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <ListView
        android:id="@+id/listView"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:visibility="gone" />

    <GridView
        android:id="@+id/gridView"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:numColumns="2"
        android:horizontalSpacing="10dp"
        android:verticalSpacing="10dp"
        android:stretchMode="columnWidth"
        android:visibility="visible" />

</RelativeLayout>
```

list_item_lab.xml:

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:orientation="horizontal"
    android:padding="16dp">

    <ImageView

    android:id="@+id/imageView"
        android:layout_width="80dp"
        android:layout_height="80dp"
        android:src="@drawable/ic_launcher_background" />

    <TextView
        android:id="@+id/textView"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_gravity="center"
        android:layout_marginStart="16dp"
        android:textSize="18sp"
        android:text="Lab Name" />

</LinearLayout>
```

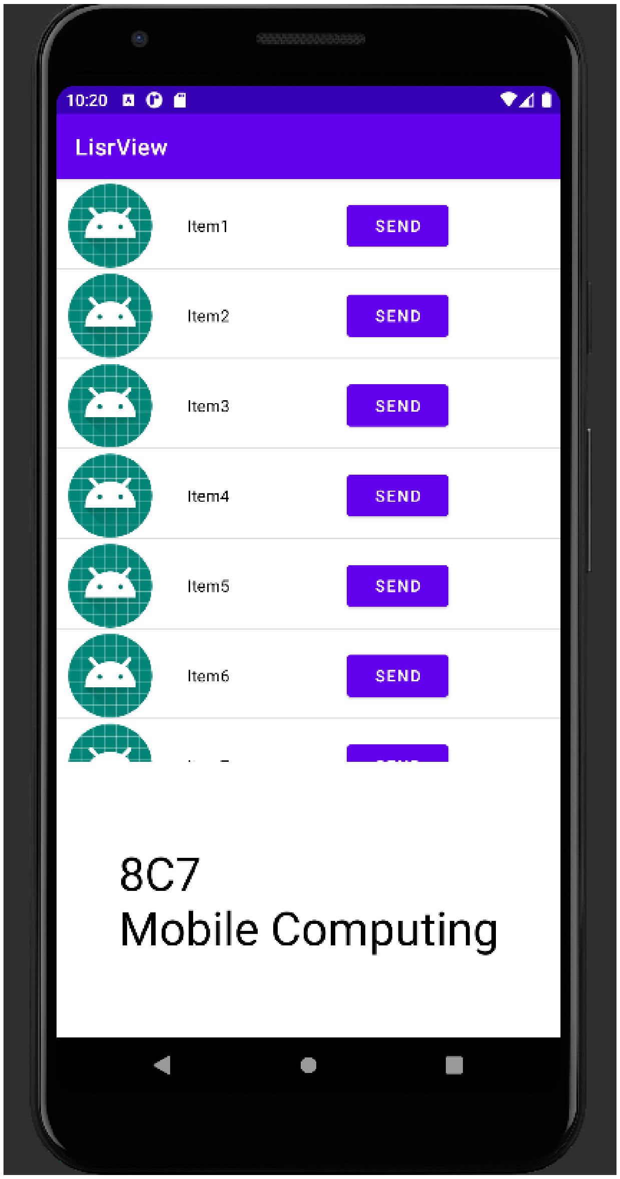
DatabaseHelper.java:

```
import android.content.ContentValues;
import android.content.Context;
import android.database.Cursor;
import android.database.sqlite.SQLiteDatabase;
import android.database.sqlite.SQLiteOpenHelper;

import java.util.ArrayList;
import java.util.List;

public class DatabaseHelper extends SQLiteOpenHelper {

    private static final String DATABASE_NAME = "labs.db";
    private static final int DATABASE_VERSION = 1;

    private static final String TABLE_NAME = "labs";
    private static final String COLUMN_ID = "id";
    private static final String COLUMN_NAME = "name";

    public DatabaseHelper(Context context) {
        super(context, DATABASE_NAME, null, DATABASE_VERSION);
    }

    @Override
    public void onCreate(SQLiteDatabase db) {
        String createTable = "CREATE TABLE " + TABLE_NAME + " (" +
                COLUMN_ID + " INTEGER PRIMARY KEY AUTOINCREMENT, " +
                COLUMN_NAME + " TEXT)";
        db.execSQL(createTable);
    }

    @Override
    public void onUpgrade(SQLiteDatabase db, int oldVersion, int newVersion) {
        db.execSQL("DROP TABLE IF EXISTS " + TABLE_NAME);
        onCreate(db);
    }

    public void addLab(String labName) {
        SQLiteDatabase db = this.getWritableDatabase();
        ContentValues values = new ContentValues();
        values.put(COLUMN_NAME, labName);
        db.insert(TABLE_NAME, null, values);
        db.close();
    }

    public List<String> getAllLabs() {
        List<String> labs = new ArrayList<>();
        String selectQuery = "SELECT * FROM " + TABLE_NAME;
        SQLiteDatabase db = this.getWritableDatabase();
        Cursor cursor = db.rawQuery(selectQuery, null);

        if (cursor.moveToFirst()) {
            do {
                String labName = cursor.getString(cursor.getColumnIndex(COLUMN_NAME));
                labs.add(labName);
            } while (cursor.moveToNext());
        }

        cursor.close();
        db.close();
        return labs;
    }
}
```

LabListActivity.java:

```
import androidx.appcompat.app.AppCompatActivity;
import android.os.Bundle;
import android.widget.ArrayAdapter;
import android.widget.GridView;
import android.widget.ListView;
import java.util.List;

public class LabListActivity extends AppCompatActivity {

   private ListView listView;
   private GridView gridView;
   private DatabaseHelper databaseHelper;

   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_lab_list);

      listView = findViewById(R.id.listView);
      gridView = findViewById(R.id.gridView);

      databaseHelper = new DatabaseHelper(this);
      populateLabs();
   }

   private void populateLabs() {
      List<String> labs = databaseHelper.getAllLabs();

      ArrayAdapter<String> adapter = new ArrayAdapter<>(this, R.layout.list_item_lab, R.id.textView, labs);

      listView.setAdapter(adapter);
      gridView.setAdapter(adapter);
   }
}
```

OUTPUT



8C7
Mobile Computing

Experiment-10

Aim: Make an application using XML or Android from the following: Game, Clock, calendar, Convertor, phone book, Text Editor.

Code:

MainActivity.java

```
package com.example.phoneBookapp;

import androidx.appcompat.app.AppCompatActivity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;

public class MainActivity extends AppCompatActivity {

    private Button phoneBookButton;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        phoneBookButton = findViewById(R.id.phoneBookButton);
        phoneBookButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this, phoneBookActivity.class);
                startActivity(intent);
            }
        });
    }
}
```

phoneBookActivity.java:

```
package com.example.phoneBookapp;

import androidx.appcompat.app.AppCompatActivity;
import android.os.Bundle;
import android.widget.EditText;
```

```
public class phoneBookActivity extends AppCompatActivity {

    private EditText editText;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_text_editor);

        editText = findViewById(R.id.editText);
    }
}
```

activity_main.xml (layout for the main activity):

```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="16dp"
    tools:context=".MainActivity">

    <Button
        android:id="@+id/phoneBookButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Open Text Editor" />

</LinearLayout>
```

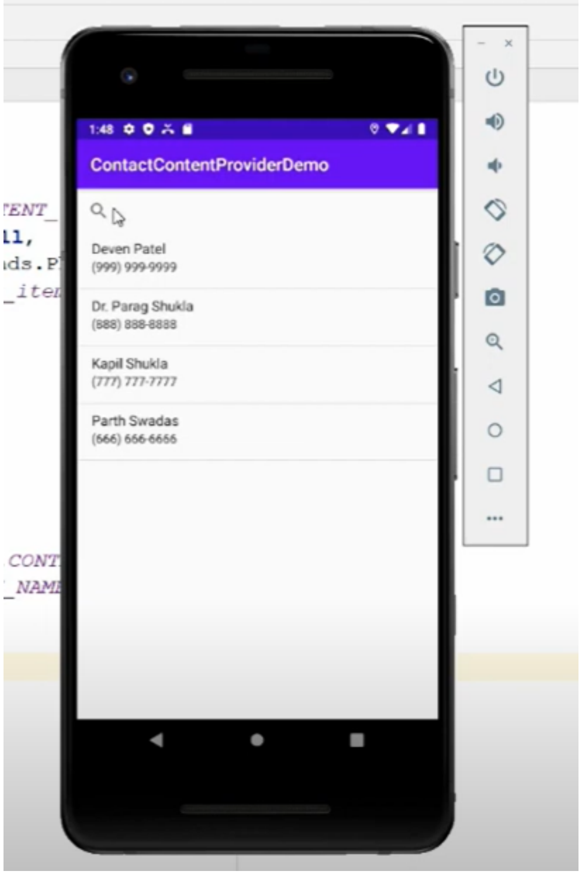
activity_text_editor.xml (layout for the Text Editor activity):

```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="16dp"
    tools:context=".phoneBookActivity">

    <EditText
        android:id="@+id/editText"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:gravity="top|start"
        android:inputType="textMultiLine"
        android:minLines="10"
        android:hint="Start typing your text here..." />

</LinearLayout>
```

strings.xml (values resource file):

```
<resources>
  <string name="app_name">Text Editor App
```

OUTPUT



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Experiment-11

Aim: Develop an android app such as E-Commerce based or E-learning.

Code:

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
   xmlns:tools="http://schemas.android.com/tools"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   android:background="@drawable/bgimage"
   tools:context=".HomeActivity">

   <androidx.appcompat.widget.Toolbar
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:background="#000"
      android:id="@+id/toolbar"
      android:elevation="4dp"
      app:layout_constraintBottom_toTopOf="@+id/table"
      android:theme="@style/ThemeOverlay.AppCompat.Dark.ActionBar"
      app:popupTheme="@style/ThemeOverlay.AppCompat.Light"/>

   <TableLayout
      android:id="@+id/table"
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:paddingHorizontal="10dp"
      app:layout_constraintTop_toBottomOf="@+id/toolbar">

      <TableRow>

…..
      </TableRow>

      <TableRow>

         <TextView
```

```
    android:id="@+id/budgetTv"
    android:layout_height="wrap_content"
    android:layout_width="wrap_content"
    android:text="₹0"
    android:layout_weight="1"
    android:textColor="#fff"
    android:gravity="center"
    android:textStyle="bold"
    android:background="@drawable/borders"
    android:padding="5dp"
    android:textSize="12sp"/>

<TextView
    android:id="@+id/todayTv"
    android:layout_height="wrap_content"
    android:layout_width="wrap_content"
    android:text="₹0"
    android:layout_weight="1"
    android:textColor="#fff"
    android:gravity="center"
    android:textStyle="bold"
    android:background="@drawable/borders"
    android:padding="5dp"
    android:textSize="12sp"/>

<TextView
    android:id="@+id/weekTv"
    android:layout_height="wrap_content"
    android:layout_width="wrap_content"
    android:text="₹0"
    android:layout_weight="1"
    android:textColor="#fff"
    android:gravity="center"
    android:textStyle="bold"
    android:background="@drawable/borders"
    android:padding="5dp"
    android:textSize="12sp"/>
<TextView
    android:id="@+id/savingsTv"
    android:layout_height="wrap_content"
    android:layout_width="wrap_content"
    android:text="₹0"
    android:layout_weight="1"
    android:textColor="#fff"
    android:gravity="center"
    android:textStyle="bold"
```

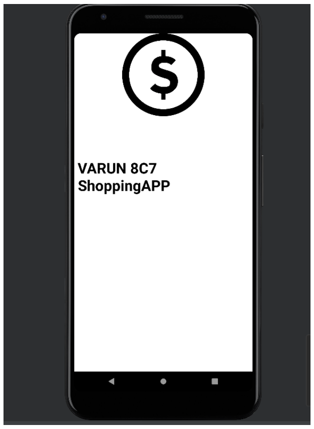
```
            android:background="@drawable/borders"
            android:padding="5dp"
            android:textSize="12sp"/>

    </TableRow>
</TableLayout>


            android:layout_gravity="fill"
            android:layout_rowWeight="1"
            android:layout_columnWeight="1"
            android:layout_margin="8dp"
            android:background="#fff">

            <LinearLayout
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:orientation="vertical"
                android:gravity="center"
                android:layout_gravity="center">

            </LinearLayout>

        </androidx.cardview.widget.CardView>
        <androidx.cardview.widget.CardView
            android:id="@+id/weekCardView"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_row="1"
            android:layout_column="0"
            android:layout_gravity="fill"
            android:layout_rowWeight="1"
            android:layout_columnWeight="1"
            android:layout_margin="8dp"
            android:background="#fff">

            <LinearLayout
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:orientation="vertical"
                android:gravity="center"
                android:layout_gravity="center">

                <ImageView
                    android:layout_width="60dp"
                    android:layout_height="60dp"
            android:src="@drawable/week"/>

          <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Week"
            android:textStyle="bold"
            android:textColor="#000"
            android:textAlignment="center"/>

        </LinearLayout>

      </androidx.cardview.widget.CardView>
      <androidx.cardview.widget.CardView
        android:id="@+id/monthCardView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_row="1"
        android:layout_column="1"
        android:layout_gravity="fill"
        android:layout_rowWeight="1"
        android:layout_columnWeight="1"
        android:layout_margin="8dp"
        android:background="#fff">

        <LinearLayout
          android:layout_width="wrap_content"
          android:layout_height="wrap_content"
          android:orientation="vertical"
          android:gravity="center"
          android:layout_gravity="center">


    </GridLayout>

    <com.google.android.material.floatingactionbutton.FloatingActionButton
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:layout_gravity="bottom|end"
      app:fabSize="normal"
      android:id="@+id/fab"
      android:src="@drawable/ic_add"
      android:layout_margin="16dp"/>

  </androidx.coordinatorlayout.widget.CoordinatorLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

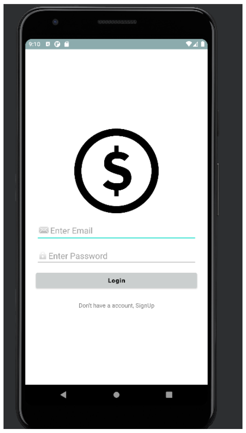
LabListActivity.java:

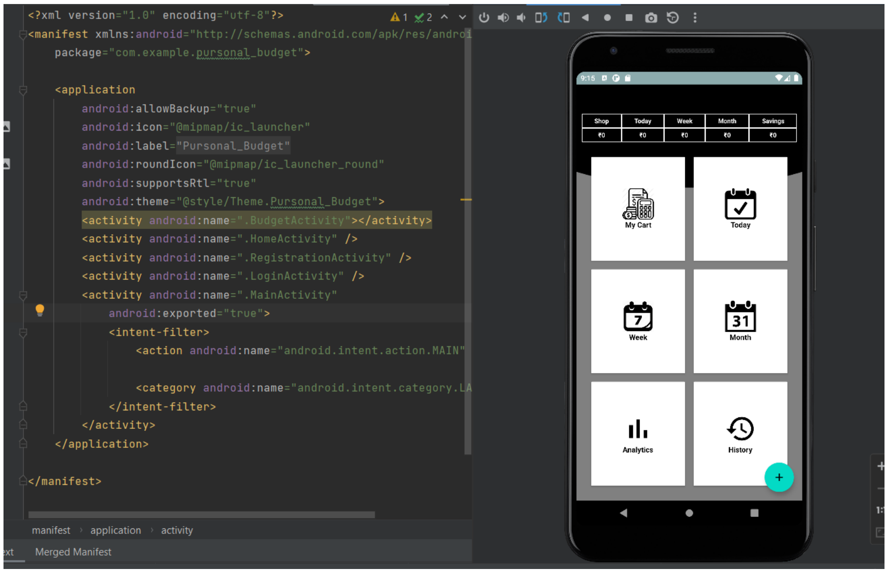
```
public class LoginActivity extends AppCompatActivity {
    EditText email,password;
    Button loginbtn;
    TextView signup;

    private FirebaseAuth mAuth;
    private ProgressDialog progressDialog;


    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_login);
        email=findViewById(R.id.email);
        password=findViewById(R.id.password);
        signup=findViewById(R.id.signup);
        loginbtn=findViewById(R.id.loginBtn);

        mAuth=FirebaseAuth.getInstance();
        progressDialog=new ProgressDialog(this);

        signup.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent=new Intent(LoginActivity.this,RegistrationActivity.class);
                startActivity(intent);
            }
        });

        loginbtn.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                String emailString=email.getText().toString();
                String passwordString=password.getText().toString();
                if(TextUtils.isEmpty(emailString)){email.setError("Email is required");}
                else if(TextUtils.isEmpty(passwordString)){password.setError("Email is required");}
                 else{
                     progressDialog.setMessage("login in progress");     //search more
                     progressDialog.setCanceledOnTouchOutside(false);
                     progressDialog.show();
```

```
mAuth.signInWithEmailAndPassword(emailString,passwordString).addOnCompleteListener(new
OnCompleteListener<AuthResult>() {
                @Override
                public void onComplete(@NonNull Task<AuthResult> task) {
                    if(task.isSuccessful()){
                        Intent intent=new Intent(LoginActivity.this,HomeActivity.class);
                        startActivity(intent);
                        finish();
                        progressDialog.dismiss();
                    }
                    else{
                        Toast.makeText(LoginActivity.this, task.getException().toString(),
Toast.LENGTH_SHORT).show();
                        progressDialog.dismiss();
                    }
```

OUTPUT






```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/androi
    package="com.example.pursonal_budget">

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="Pursonal_Budget"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.Pursonal_Budget">
        <activity android:name=".BudgetActivity"></activity>
        <activity android:name=".HomeActivity" />
        <activity android:name=".RegistrationActivity" />
        <activity android:name=".LoginActivity" />
        <activity android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN"

                <category android:name="android.intent.category.LA
            </intent-filter>
        </activity>
    </application>

</manifest>
```

Shop	Today	Week	Month	Savings
₹0	₹0	₹0	₹0	₹0

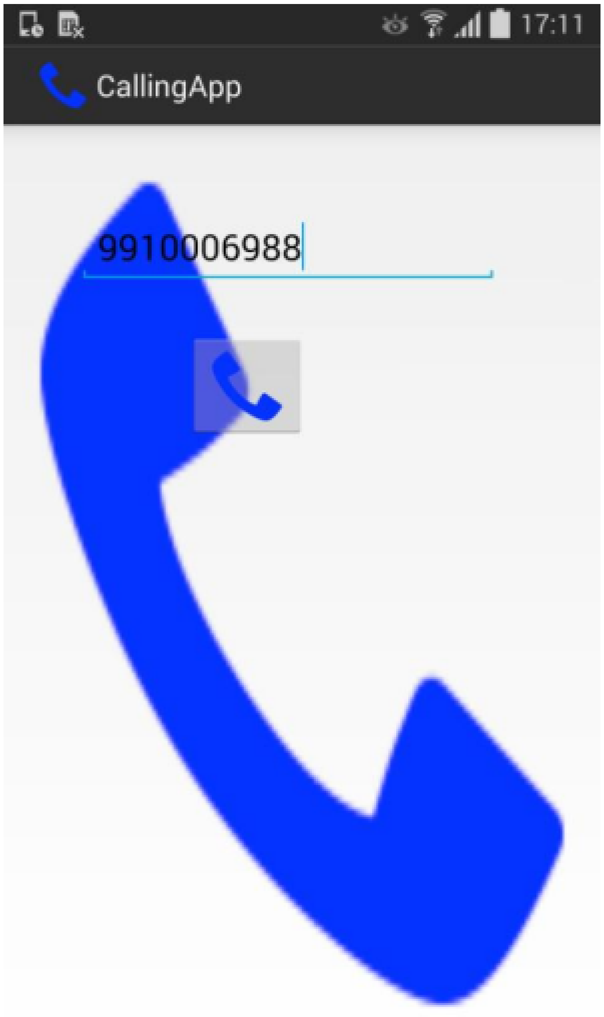
Experiment-12

Aim: Program to develop a calling application.

Code:

```
package com.example.callingapp;
import android.net.Uri;
import android.os.Bundle;
import android.app.Activity;
import android.content.Intent;
import android.view.Menu;
import android.view.View;
import
android.view.View.OnClickListener;
import android.widget.Button;
import android.widget.EditText;
import
android.widget.ImageButton;
public class CallActivity extends Activity implements
OnClickListener { EditText et1;
ImageButton bt1;
@Override
protected void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_call);
et1 = (EditText) findViewById(R.id.editText1);
bt1 = (ImageButton) findViewById(R.id.imageButton1);
bt1.setOnClickListener(this);
}
@Override
public boolean onCreateOptionsMenu(Menu menu) {
// Inflate the menu; this adds items to the action bar if it is present.
getMenuInflater().inflate(R.menu.call, menu);
return true;
}
@Override
public void onClick(View v) {
// TODO Auto-generated method stub
77
// Call a Number
String number = et1.getText().toString();
Intent call = new Intent(Intent.ACTION_CALL);
call.setData(Uri.parse("tel:" + number));
startActivity(call);
}
}
```

OUTPUT



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Experiment-13

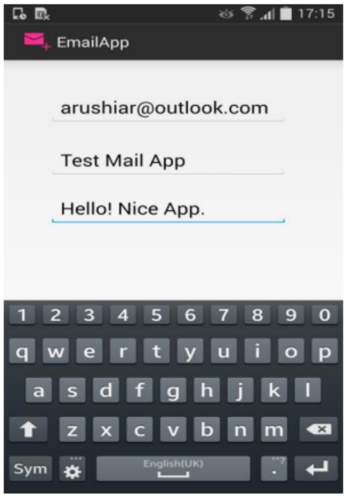
Aim: Program to develop a mailing application.

Code:

```
com.example.emailapp;
import android.os.Bundle;
import android.app.Activity;
import
android.content.Intent;
import android.view.Menu;
import android.view.View;
import
android.view.View.OnClickListener;
import android.widget.EditText;
import
android.widget.ImageButton;
import android.widget.Toast;
public class EmailActivity extends Activity implements
OnClickListener { EditText et1, et2, et3;
ImageButton ib1;
@Override
protected void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_email);
et1 = (EditText)
findViewById(R.id.editText1); et2 =
(EditText)
findViewById(R.id.editText2); et3 =
(EditText)
findViewById(R.id.editText3);
ib1 = (ImageButton) findViewById(R.id.imageButton1);
ib1.setOnClickListener(this);
}
@Override
public boolean onCreateOptionsMenu(Menu menu) {
```

```
// Inflate the menu; this adds items to the action bar if it is present.
getMenuInflater().inflate(R.menu.email, menu);
return true;
}
@Override
public void onClick(View v) {
// TODO Auto-generated method stub
String emailid = et1.getText().toString();
String[] emails = { emailid };
String subject = et2.getText().toString();
String message = et3.getText().toString();
Intent email = new Intent(Intent.ACTION_SEND);
email.setType("*/*");
email.putExtra(Intent.EXTRA_EMAIL, emails);
email.putExtra(Intent.EXTRA_SUBJECT, subject);
email.putExtra(Intent.EXTRA_TEXT, message);
startActivity(email);
Toast.makeText(this, "Mail Sent to Email Provider",
Toast.LENGTH_SHORT).show();
}
}
```

OUTPUT



arushiar@outlook.com

Test Mail App

Hello! Nice App.

Experiment-14

Aim: Program to design multiple activity class.

Code:

MainActivity.java

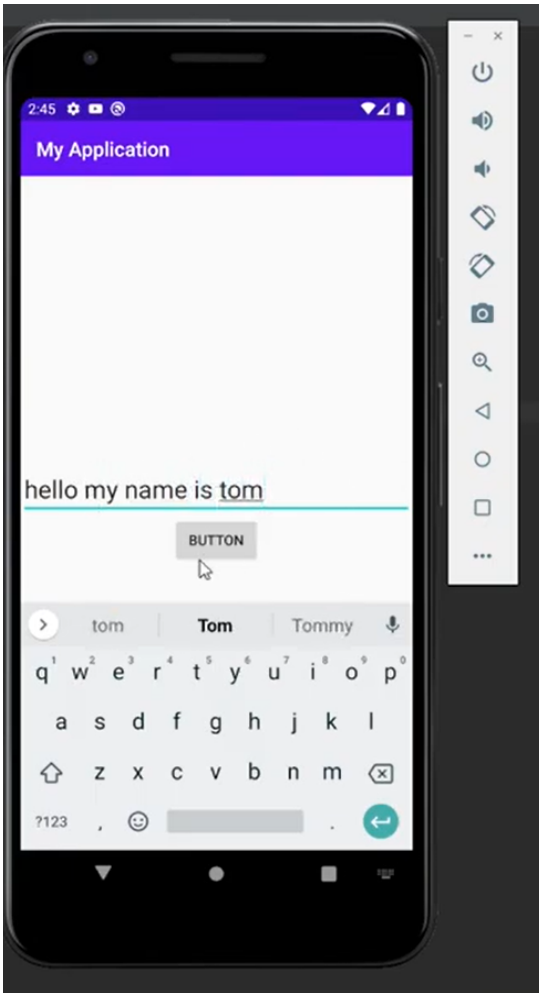
```
public class MainActivity2 extends AppCompatActivity {
   TextView textView,textView4;

   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main2);
      textView=findViewById(R.id.textView);
      Intent i=getIntent();
      String s=i.getStringExtra(MainActivity.EXTRA_NAME);
      textView.setText("Your name is : "+s);
      textView4=findViewById(R.id.textView4);
      String str=i.getStringExtra(MainActivity.EXTRA_NAME2);
      textView4.setText("Your Email is:\n "+str);
   }
}
```

activity_main.xml

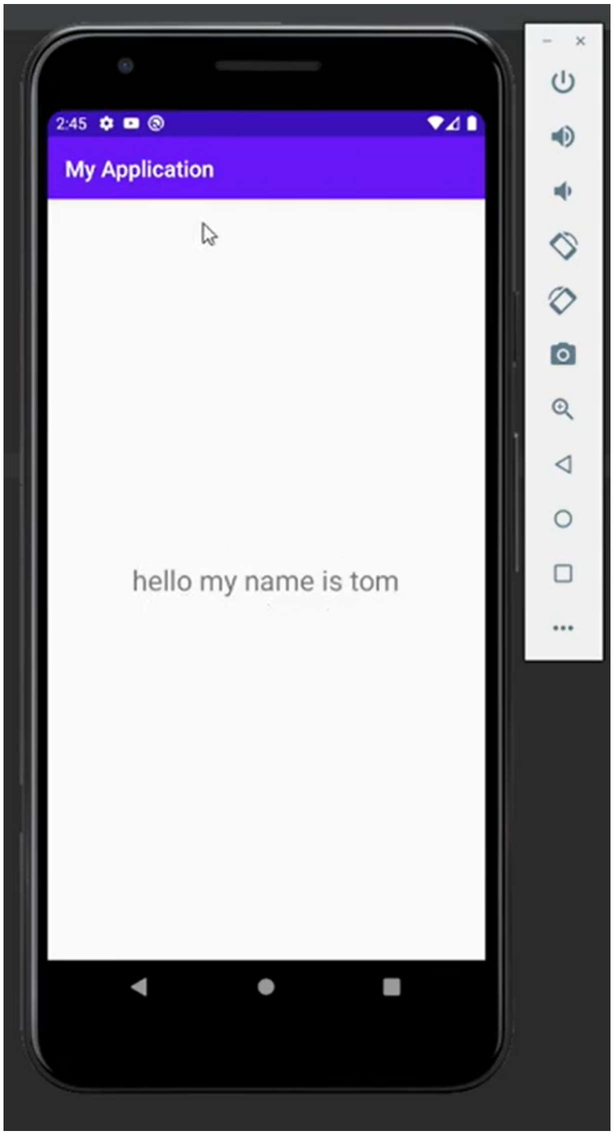
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
   xmlns:tools="http://schemas.android.com/tools"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   tools:context=".MainActivity">

   <EditText
      android:id="@+id/editTextTextPersonName"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:autofillHints=""
      android:ems="10"
      android:hint="Name"
```

```
        android:inputType="textPersonName"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.154" />

    <Button
        android:id="@+id/button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:background="#AE4141"
        android:onClick="show"
        android:text="Button"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/editTextTextPersonName"
        app:layout_constraintVertical_bias="0.208" />

    <ImageButton
        android:id="@+id/imageButton"
        android:layout_width="133dp"
        android:layout_height="123dp"
        android:onClick="help"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.816"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/button"
        app:layout_constraintVertical_bias="0.832"
        app:srcCompat="@drawable/th" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

OUTPUT



hello my name is tom



hello my name is tom