Android Application

For Accessing Indexed Video Lectures from Server Using WiFi-Service

A project report submitted in partial fulfillment of the requirements for B.Tech. Project

B.Tech.

by

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CERTIFICATE

This is to certify that the BTP Report titled, which is being submitted to ABV-Indian Institute of Information Technology and Management, Gwalior for the partial fulfillment of five year Integrated Post Graduate Programmed by Pavan Kumar Goyal, Prankul Garg and Anshul Nigam is a record of bonafide work done under my supervision and guidance. It is further certified that the work presented here has not been submitted to any other University or Institute for the award of any degree or diploma.

Prof. Anupam Shukla

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We are highly indebted to Prof. Anupam Shukla, and are obliged for giving us the autonomy of functioning and experimenting with ideas.

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Finally we are grateful to our friends and colleagues whose constant encouragement served to renew our spirit, refocus our attention and energy and helped us in carrying out this work.

The matter presented in this thesis as not been submitted elsewhere for the award of any other degree of diploma from any Institutions.

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ABSTRACT

In the present 21st Century every person needs a viable and easy access to undertake any task. The ease that the present technologies provide saves our lots of time and effort. So adhering to the modern world we have developed “Virtual Classroom” an Android Application that establishes a network between the mobile device and server. Taking in mind the generalized Indian Society this application would be helpful in imparting education policies in the country. Using this application one can access the on demand video lecture that is stored at server without downloading onto device. This would create a new revolution in the Indian society and would provide a feasible solution to education system problem.

The application called “Virtual Classroom” that provides video streaming of the server which is in the same network as that of mobile device. Moreover we have implemented features for indexing (subtopics) of video lectures and bookmarking at a point in lecture. These features help students for quick revision of lectures at exam time because we don’t have much time for viewing all the lectures again. This will certainly minimize the effort of a student to understand a particular topic and is accessible from anywhere within the network range. This is the feature that we want to execute in our institute for easy accessibility of lectures and better understanding.

Keywords - Android, Mobile Application, Smart Phone, Wi-Fi, Video Codec’s, External Storage, XML Pull Parser, SQLite

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ABBREVIATIONS

Definition OR Abbreviation	Description
ADT	Android Development Tools
API	Application Programming Interface
APK file	Android Application Pac**k**age file
AVD	Android virtual Device
GUI	Graphical user Interface
IDE	Integrated Development Environment
SDD	Software Design Document
SDK	Software Development Kit
DVM	Dalvik Virtual Machine
XML	e**X**tensible **M**arkup **L**anguage

CHAPTER 1

INTRODUCTION AND LITERATURE SURVEY

INTRODUCTION

In this techno era, we are making new advancement in terms of technology thereby changing its definition. There is substantial increase in the field of entertainment , education and other various kind of Applications and Games are attracting the consumer .

Because of the progress made in facilitating the wireless sensor technology remote monitoring, the number of Smartphone applications that increase the opportunity. As a result, it is now more common of video lectures, the study use wireless monitoring devices or remote control apps in our daily lives.

Now a Days we see , technology changes day by day rapidly . Size of gadgets decreases and functionality of gadgets increases . Desktop to Laptops and now laptops to Smartphone's .

As we all know that when we study via PPT then we have to option to highlight a particular line or a paragraph so that it will be useful for quick revision. There is also indexing so student can go to a particular subtopic via direct link to it, within the PPT.

But when it comes to study via Video Lecture then there was no such facilities to seek out to a particular subtopic, no index so that we can get to a particular subtopic within the lecture and no bookmark feature , so we can take efficient use of video lectures for quick revision purposes.

The purpose of the project is to provide the android platform and develop a android VCR application to provides the flexibility of studying anytime, anywhere, and at their own pace. Users can also play the subtitles with the video for better understanding. Bookmarking feature helps users to create and update the bookmarks within the particular video lecture.

When we talk about market share, the android OS has largest market share and huge popularity in the world . so the market share and all makes the best choice from business

and research perspectives. Android OS is widely deployed in different handsets and tablets in the world.

1.1 Development and proposed Goals

The main goal of the project is to design and implement a prototype VCR application for the android. For the development, deployment and test purpose the Samsung Galaxy Y S5360 is to be used as a primary test device.

The objective of this tool is to view the video lectures present in the SD-Card or Video streaming from a Server via wifi using any android devices.

The application will behave as a client that will pair and connect with the Server via wifi technology. All those video lectures which are residing on the Server will be parsed and will display on the client's phone screen.

Product Perspectives:

- User can easily view the video lecture accessed from SD-Card or streaming from a server.
- User can navigate through the video lecture via index(created by using tree data structure).
- Bookmark particular subtopic within the lecture.
- Play Subtitle for better understanding.

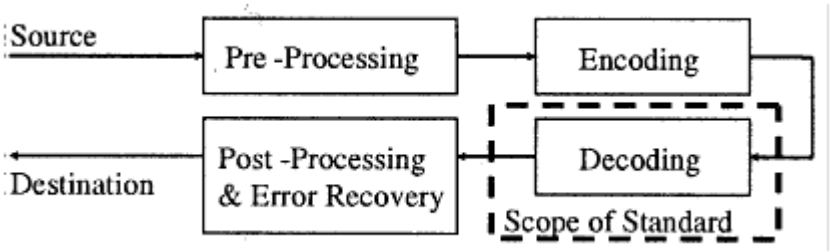
In addition accuracy and efficient use of resources are major aspect of the design of the application.

1.2 Literature Survey

In the present scenario there is considerable development in the accessibility of resources. The information sharing and internet facilities have embarked their presence in the current prospective. WiFi[1], a type of IEEE 802.11 WLAN (Wireless Local Area Network) that is a name for Wifi Fidelity defined by Wifi Alliances. It is designed for cable replacement in corporate environment, providing IP connectivity in residential, small office and campus environments.

Android [2] is an operating system that runs on top of Linux kernel with a custom JVM set on top of it. It allows only JAVA applications to be installed .It shows better performance compared to Sun embedded JVM without JIT because of bionic libc and better VM design. It is developed in C, C++ language.

Video Coding [3] deals with the compression of image to that of being most ubiquitous resource activity for the audience to learn about coding standards without having to plough through formal documentation .Basic stress is given on video generalization, digitalization and formats. A major video codec that we have used in "This Application" is H.264 [4]. It is a latest video coding standard of ITU-T Video Coding Experts Group and ISO/IEC Moving Picture Experts Group.



Scope of Video Coding Standardization [4]

In our Android Application "This Application" we have embedded a feature that is used for synchronizing with the streamed video lecture called XML Parsing [5]. The parsing model starts with character conversion followed by lexical analysis that is invariant

among different parsing models with syntactic analysis creates data representation based on parsing model used. Using xml parsing in “This Application” we have included the streaming capability feature. It requires low latency and memory usage and usually parses a small portion of document sequentially without having full fledged information of entire document structure.

Video Streaming [6] in android is divided into five layers, including the user interface, data capture and data output codec and network transmission layer. With this the cycle and complexity of media application cycle gets reduced and hence improves overall software maintainability. This development was meant to enhance the stability and provide portability to the various android based applications

1.3 Approaches to implement

There are two methodologies to implement

- Access Video Lectures from SD-Card
- Streaming from Server via Wi-Fi

CHAPTER 2

ANDROID PLATFORM AND OTHER

TECHNOLOGIES USED

2.1 Android Architecture

Android operating system contains a lot of applications such as calculator, contacts . Application Frameworks enables reusability and replacement functionality of components; Android architecture provides different libraries such as for multimedia, database, and for security ; and the Linux kernel is mainly responsible for the management of memory and security [8] .

Every Android application runs in its own VM(virtual machine).

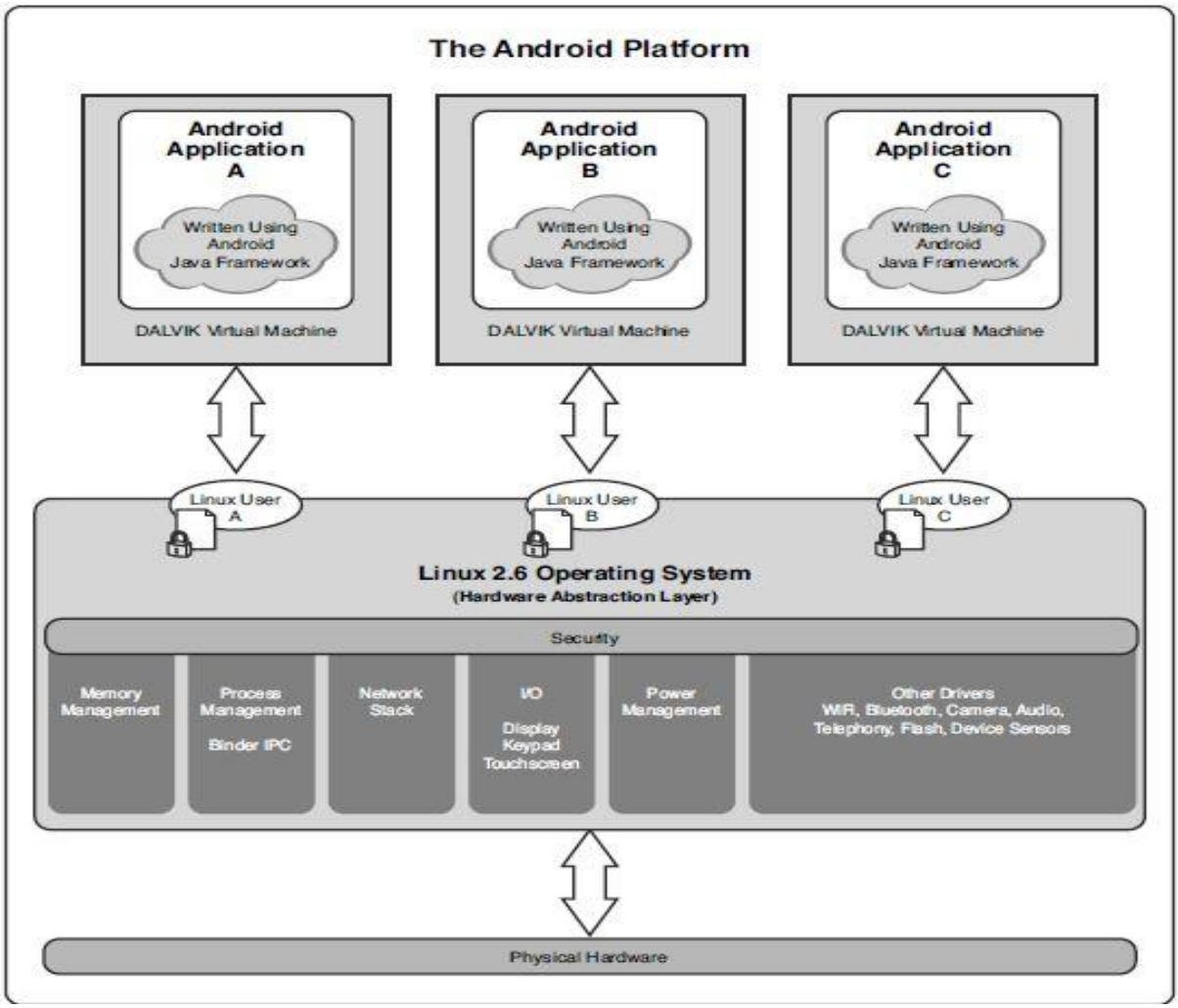


Fig 2.1 Android platform architecture Diagram.

2.2 Android Application and Development Environment

Android applications uses Java language for coding, they compiled the source code into byte codes that is converted into an executable .dex file which is known as Dalvik executable file, by using converter called dx.Then this file is compiled in android package file (apk file), This .apk file we can easily install on Android OS devices.

Linux system is multi user , taking into mind this aspect of android OS, Android application can be behaved as an independent individual Linux user. Every application which is running on the system is identified by the unique ID called Linux user id . Each and every process that is running on the system, has its own VM(virtual machine)[8].

Every android application uses for basic components . These are also called the building block of any any android application. These are following:-

1 . Activity

Activity is the core component of every android application; Every activity correspond to a task that is done by application. An activity can also be viewed as an independent screen. User interface through which user interacts to do functioning like calling activity, show list view of items etc. Android application uses many activities according to its requirements. For example This application has an activity that shows the list of video lectures which are present either on SD-card or resides on the Server and another activity for play video lecture along with index , bookmark ,subtitle and menu [8].

2 . Services

Services are mainly run in the background ,Like after a period updating the GUI of a particular activity is done by services . we can implement Services where operations are time consuming and processes which are to be scheduled and that can running regularly. Services doesn't have User Interfaces [8].

3. Content Providers

Content Providers are used as interface to data. A content provider which helps to maintain data which is shared among different applications. Data is shared and modified using content providers according to the needs for a particular application. Permission for modifying the data has to be given in android manifest.xml file . For data security and data encapsulation content providers are used [8].

4. Broadcast receivers

Broadcast receivers announce the announcements made by system. Like Examples if battery is low broadcast receiver announces this information and also informs for update that ready to download. Broadcast Receivers initiate services for doing something [8].

One of the major pros of developing the application on android platform is its cheap and easiness of the development environment.

2.3 JAVA

Java is a high-level programming language that is developed by Sun Microsystems. Java is an object-oriented programming language which is similar to C++, but this is simplified to eliminate language features that is the reason for common programming bugs and errors. Java source code files with .java extension is compiled into byte codes which having .class extension, This .class file then executed by the Java interpreter. We can run Compiled Java code on most of the systems , Java runtime environments and interpreters, are termed as Java Virtual Machines ,that exists for most of the operating systems, that includes UNIX, Macintosh OS, and Windows. By using just-in-time compiler (JIT) , we can convert the byte code into machine language instructions[9].

2.4 XML

XML is an acronym for Extensible Markup Language . That is defined in 1998 by World Wide Web Consortium (W3C) .

The following is a valid, well-formatted XML that we have used for our application .

```
<Theme name="Introduction to SQL">
<SlideName>Introduction to SQL.PNG</SlideName>
<StartTime>00:00:00</StartTime>
<EndTime>00:00:10</EndTime>
</Theme>
```

XML Pull Parser

XML Pull Parser can be viewed as interface which defines parsing functionality that is given in XMLPULL V1 API.

There are different parsers depending on which the features are defined:

- First one is Non-validating parser that is defined in XML 1.0 spec when FEATURE_PROCESS_DOCDECL is TRUE.
- Second one Validating parser that is defined in XML 1.0 spec when FEATURE_VALIDATION is TRUE (this implies FEATURE_PROCESS_DOCDECL is TRUE) [10].

2.5 Storage Options

For saving the persistent application data android provides some storage options . This storage option is choose according to the requirement of application and also whether the data of application is private or public . Following are the data storage options:

Internal Storage : Stores private data on the device memory.

External Storage : Stores data on shared external storage Like SD card.

SQLite Databases : Stores structured data in sqlite database.

Network Connection: Stores data on web with own network server.

2.5.1 External Storage

Android-compatible devices support for a storage which is shared "external storage" that we can use for storing different files. This can be of two types, first one is a removable storage (Like an SD card or pen drive) and other is internal which is not removable storage. The files which are saved in external storage are public and these files can be modified by the user after enabling USB mass storage option for communicating the device to the computer.

```
boolean mExternalStorageAvailable = false;
boolean mExternalStorageWriteable = false;
String state = Environment.getExternalStorageState();

if (Environment.MEDIA_MOUNTED.equals(state)) {
    // We can read and write the media
    mExternalStorageAvailable = mExternalStorageWriteable = true;
} else if (Environment.MEDIA_MOUNTED_READ_ONLY.equals(state)) {
    // We can only read the media
    mExternalStorageAvailable = true;
    mExternalStorageWriteable = false;
} else {
    // Something else is wrong. It may be one of many other states, but all we need
    //  to know is we can neither read nor write
    mExternalStorageAvailable = mExternalStorageWriteable = false;
}
```

The above example checks whether there exist a external storage in the device for reading or writing data. *getExternalStorageState()* method returns other states we can check, like to check the media is connected to computer or not ,or has been removed roughly, etc. We can use these methods for notifying the user with more information when the application needs to access the media [11].

2.5.2 SQLite Databases

Android also provides the facility for *SQLite* databases. The databases which is created by us can accessible by the particular application in wich we have created, but not in the other applications .

Recommended method for creating a new SQLite database is , first write a subclass of *SQLiteOpenHelper* and then override *onCreate()* method, in this class we can execute SQLite command for create tables , delete table , insert values in the database [12].

For example:

```
public class DictionaryOpenHelper extends SQLiteOpenHelper {

    private static final int DATABASE_VERSION = 2;
    private static final String DICTIONARY_TABLE_NAME = "dictionary";
    private static final String DICTIONARY_TABLE_CREATE =
                "CREATE TABLE " + DICTIONARY_TABLE_NAME + " (" +
                KEY_WORD + " TEXT, " +
                KEY_DEFINITION + " TEXT);";

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

    @Override
    public void onCreate(SQLiteDatabase db) {
        db.execSQL(DICTIONARY_TABLE_CREATE);
    }
}
```

First get an instance of the *SQLiteOpenHelper class* by using constructor that is defined before . Call *getReadableDatabase()* and *getWritableDatabase()* for reading and writing in the database respectively. All these methods return a SQLiteDatabase object which

represent database and also provides some methods that we can use for SQLite operations.

2.6 Network Connection

A network connection can be used as it becomes available in order to access the data which is on web based services. For network functions , classes are to be used from the following specified packages:

- java.net.*
- android.net.*

android.net.wifi : Classes are defined in order to manage Wi-Fi functionality.
The Wi-Fi APIs enables a platform which applications can easily communicate with the lower-level wireless stack that helps in establishing Wi-Fi network access. There is availability of almost all device supplicants, which hereby includes connected network's link speed, IP address, negotiation state, plus information about other available networks. More API features comprises of some attributes like ability to scan, add, save, terminate and initiate Wi-Fi connection. [13].

APIs may require the following user permissions [8]:

- ACCESS_WIFI_STATE
- CHANGE_WIFI_STATE
- CHANGE_WIFI_MULTICAST_STATE

```
<manifest ...>
    <uses-feature android:name="android.hardware.wifi" />
    ...
</manifest>
```

2.7 Video Delivery: HTTP Pseudo-Streaming

We used H264 streaming Module mechanism for streaming video contents from the server [4].

Time shifting seek

It enables user to immediately move to any specific part of the video despite of the size of the video whether it is downloaded or not.

Virtual video clips

One more feature that adds in account is 'virtual video clips', wherein user has rights only to specify playback a particular part of the video or to generate the download links to the specific parts of the particular video. It helps in creating the possibilities for adaptive streaming.

Network efficiency

'Bandwidth Shaping' allows user to stream videos and only use the desired bandwidth to watch the video lecture over the network.

2.8 Mechanism

When a user seeks to unbuffered part of the video,Video player validly translate this move to the nearest seek point. After that a request is done by the server, taking seek point offset as a parameter.

In case of MP4 videos, offset is in seconds:

http://nptel.iitm.ac.in/video.php?subjectId=106106093/bbb.mp4?starttime=30.4

Bit rate Switching

HTTP Pseudo streaming defines the ability to adjust dynamically and improve video quality for particular user. This mechanism can be defined as *bit rate switching*.

To use this bitrate swiching, user needs the multiple copies of each and every video, with different dimensions and bitrate. The player identifies the different *levels* of user video and hence automatically opt the best quality according to the following needs :

- If it fits in the *bandwidth* of the server : client connection.
- If it fits the *screen* of the player's display (or, to be precise, which is not more than 20% larger).
- If it does not exceed more than 25% of *frames dropped* at any time (for example, if video lecture is at 40fps, and a level that results in 10 fps drop will not be stream) .

2.9 Used Softwares and Packages

We have used the following software to develop the application:

- Java Development Kit 1.7
- Java Runtime Environment 1.7
- Eclipse
- Android SDK
- ADT Plug-in
- Apache Tomcat 7.0
- SQLite Database
- XML Editor Tool

All these are Open Source software's and are freely available.

CHAPTER 3

DESIGN AND DATA FLOW DIAGRAMS

USE CASE DIAGRAM TO REPRESENT THE USER INTERACTION WITH THE APPLICATION

3.1 Ready to start

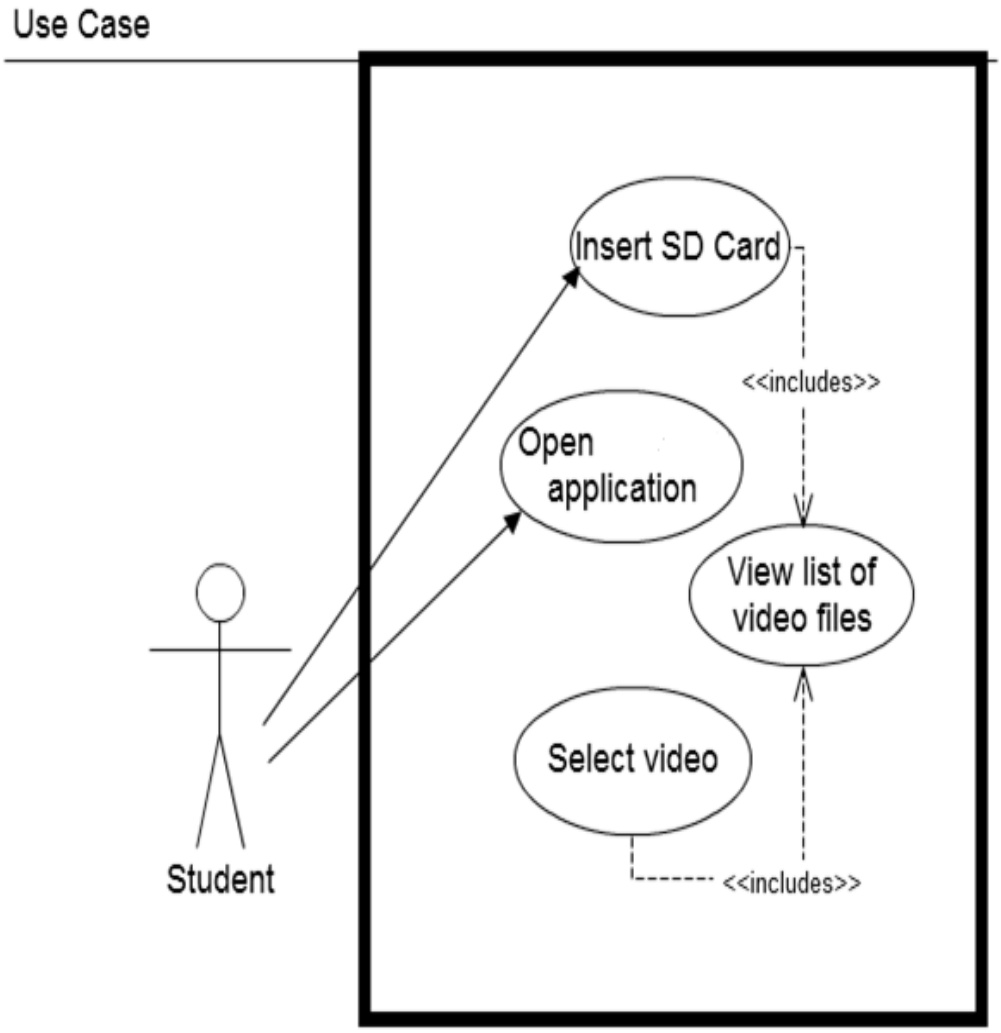


Fig 1: Use case diagram to open the application.

3.2 At Initial Phase

There are so many options at initial phase , user can go through any of it.

Use Case

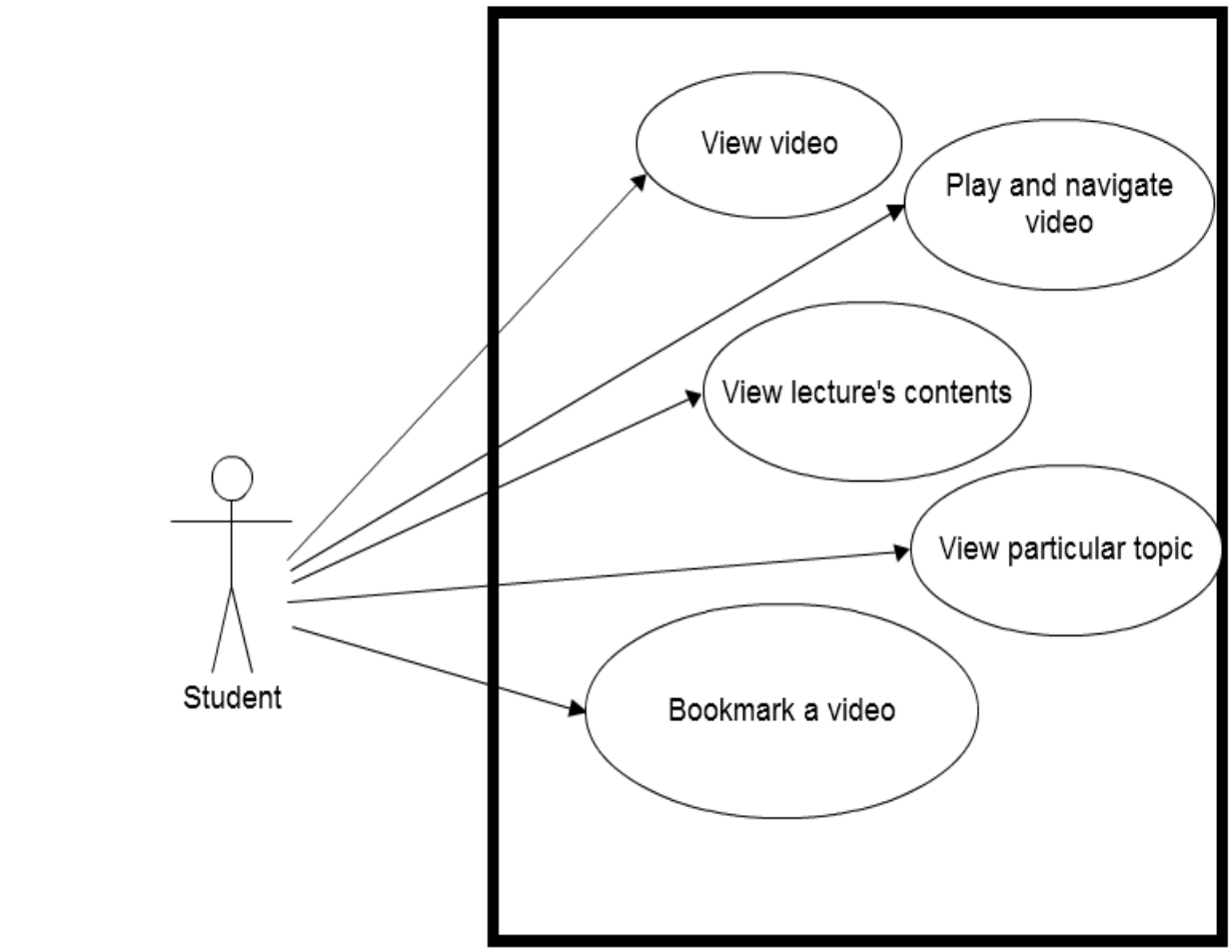


Fig 2: Use case diagram to start the video lecture

3.3 To Add or Update Bookmark

User can Create new bookmark or update the created before.

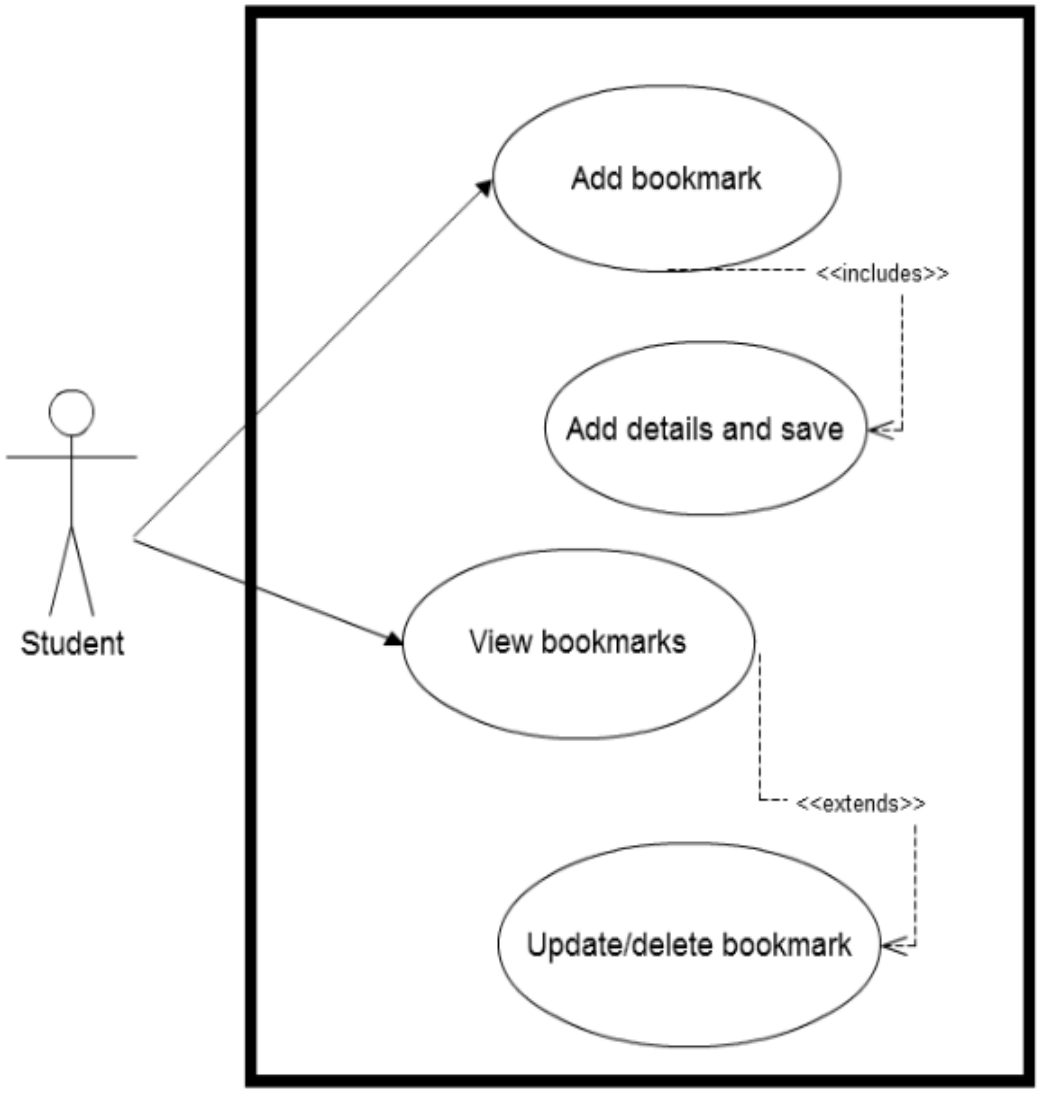


Fig 3: Use case diagram for bookmarking

3.4 To Load subtitles

User can load subtitles to get better understanding the lecture.

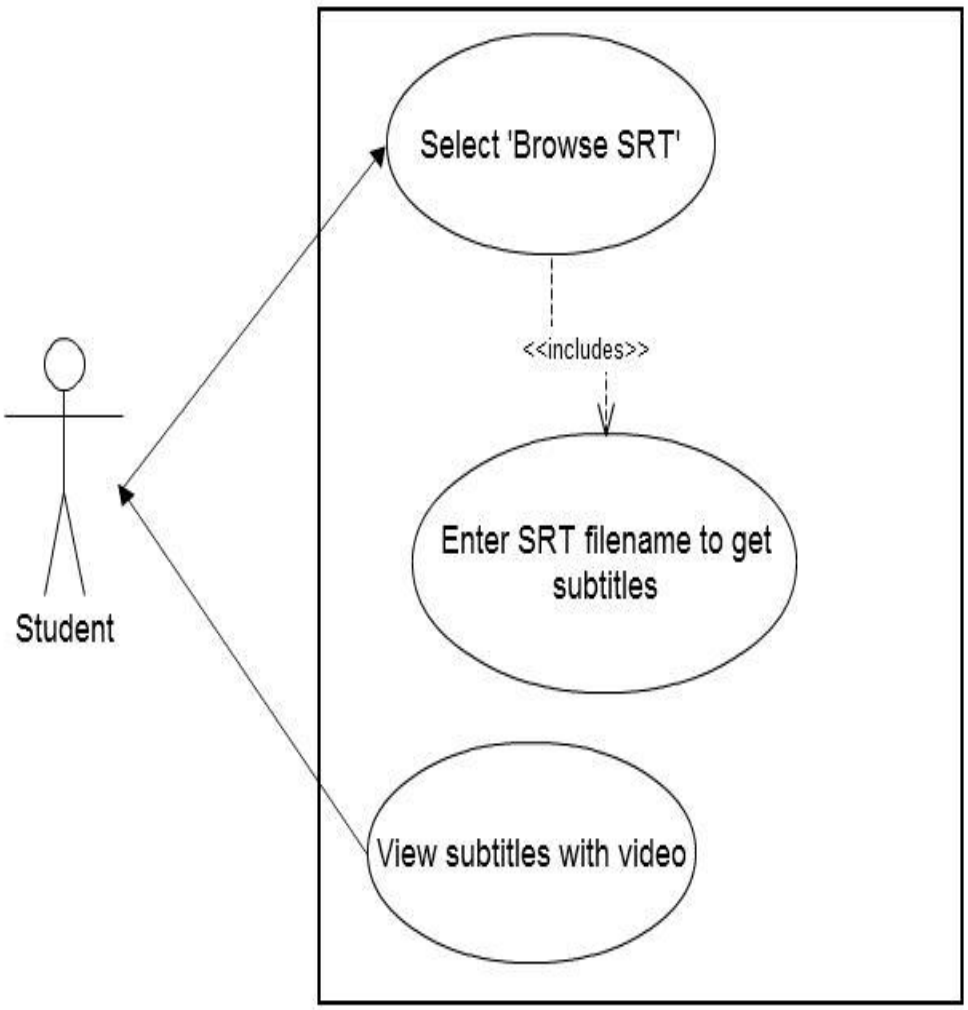


Fig 4: Use case diagram for viewing videos with subtitle

3.5 Class Diagram

How's the different classes are interlinked to each other , what are the different functions , methods ,variables we have implemented in the different classes.

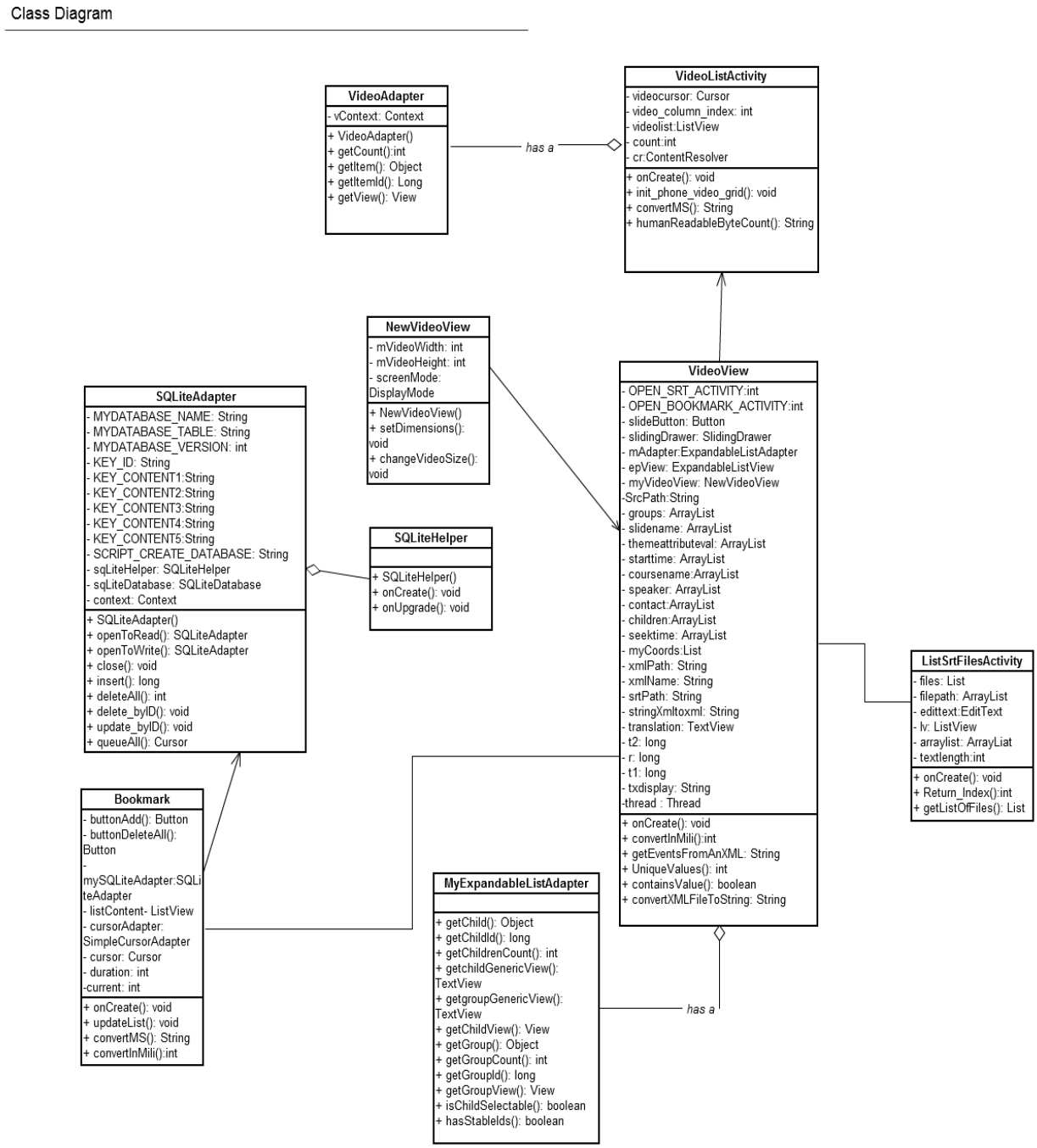


Fig 5: Class Diagram

3.6 Activity Diagram

How's the different activities are interlinked to each other , according to the access the functionality of application.

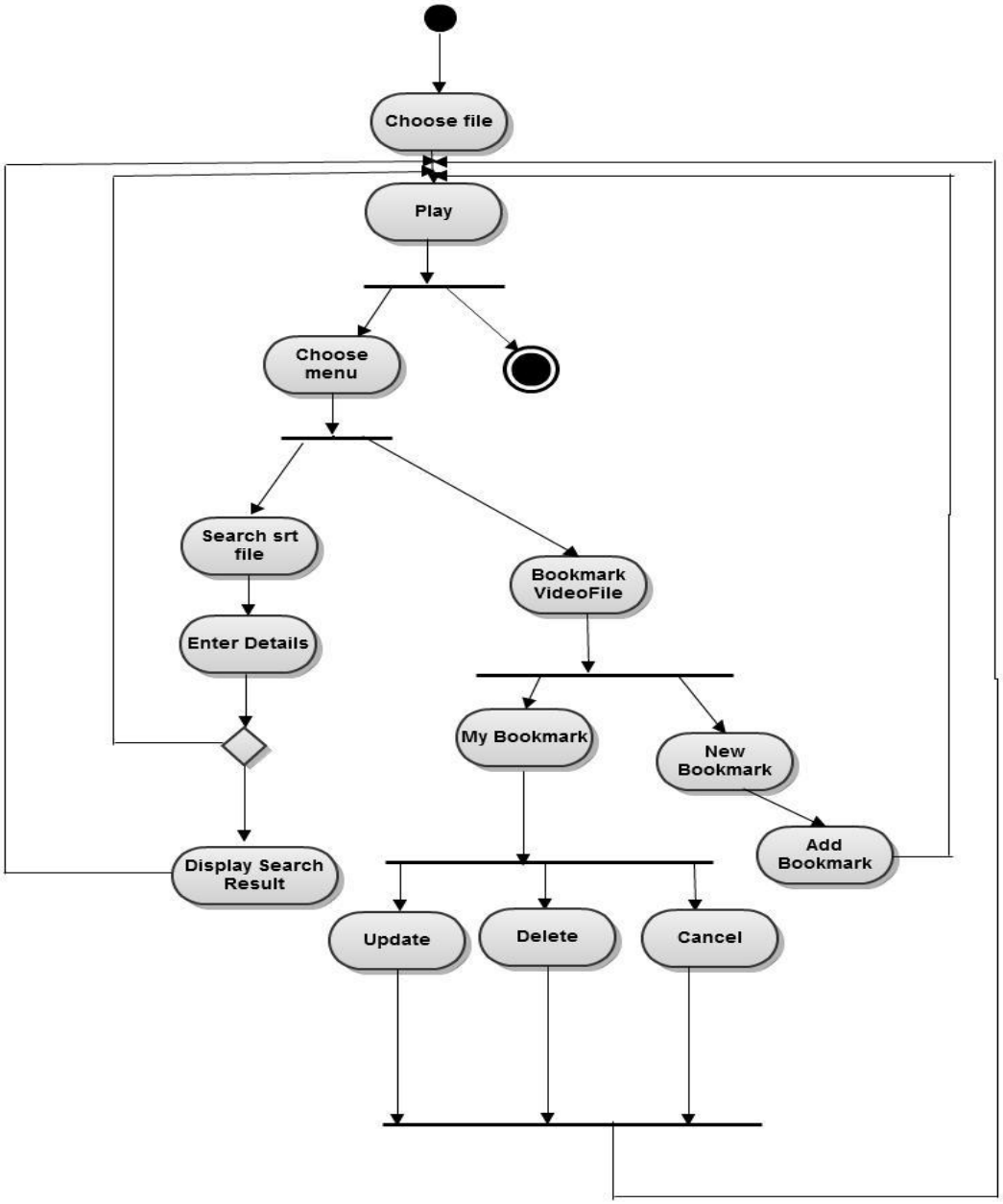


Fig 6:Activity Diagram

3.7 Data Flow Diagram

How's the data flow between different activities , passing of parameters as a request from one activity to another activity.

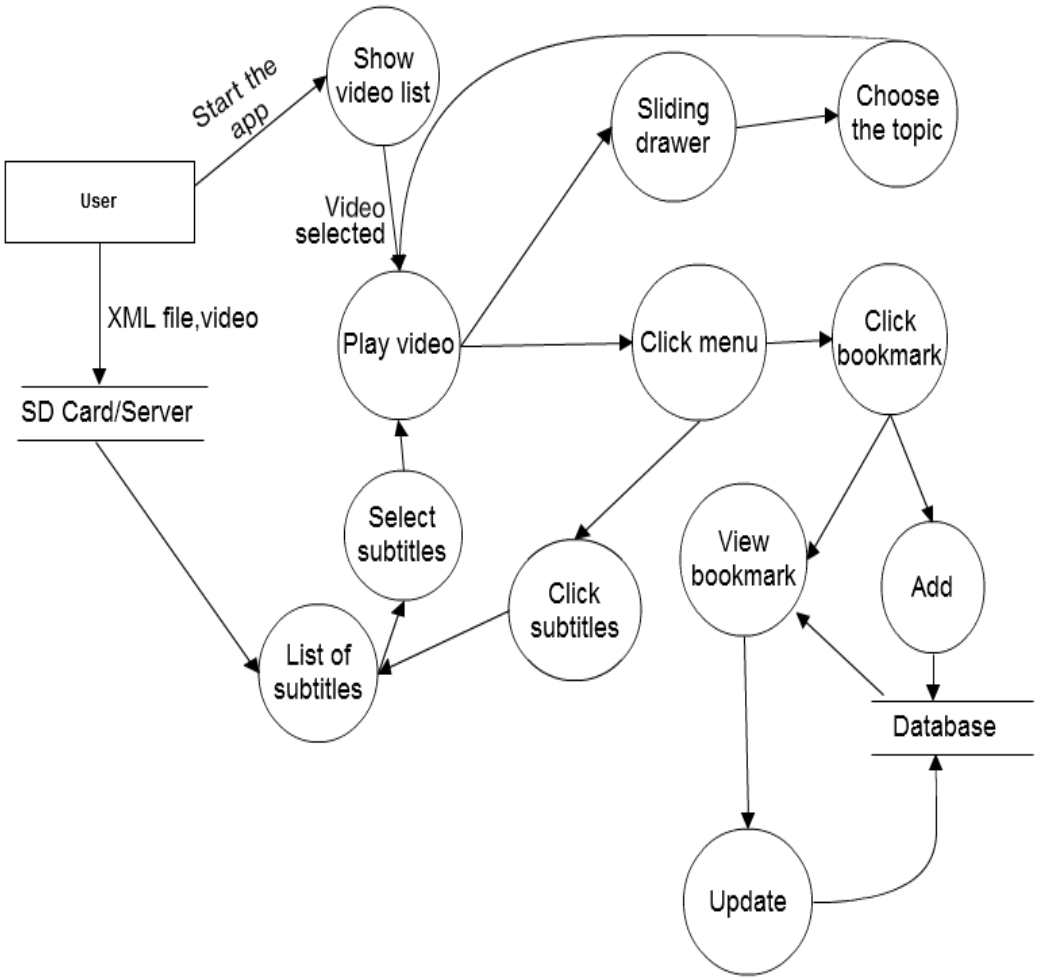


Fig 7:Data Flow Diagram

3.8 Flow Diagram

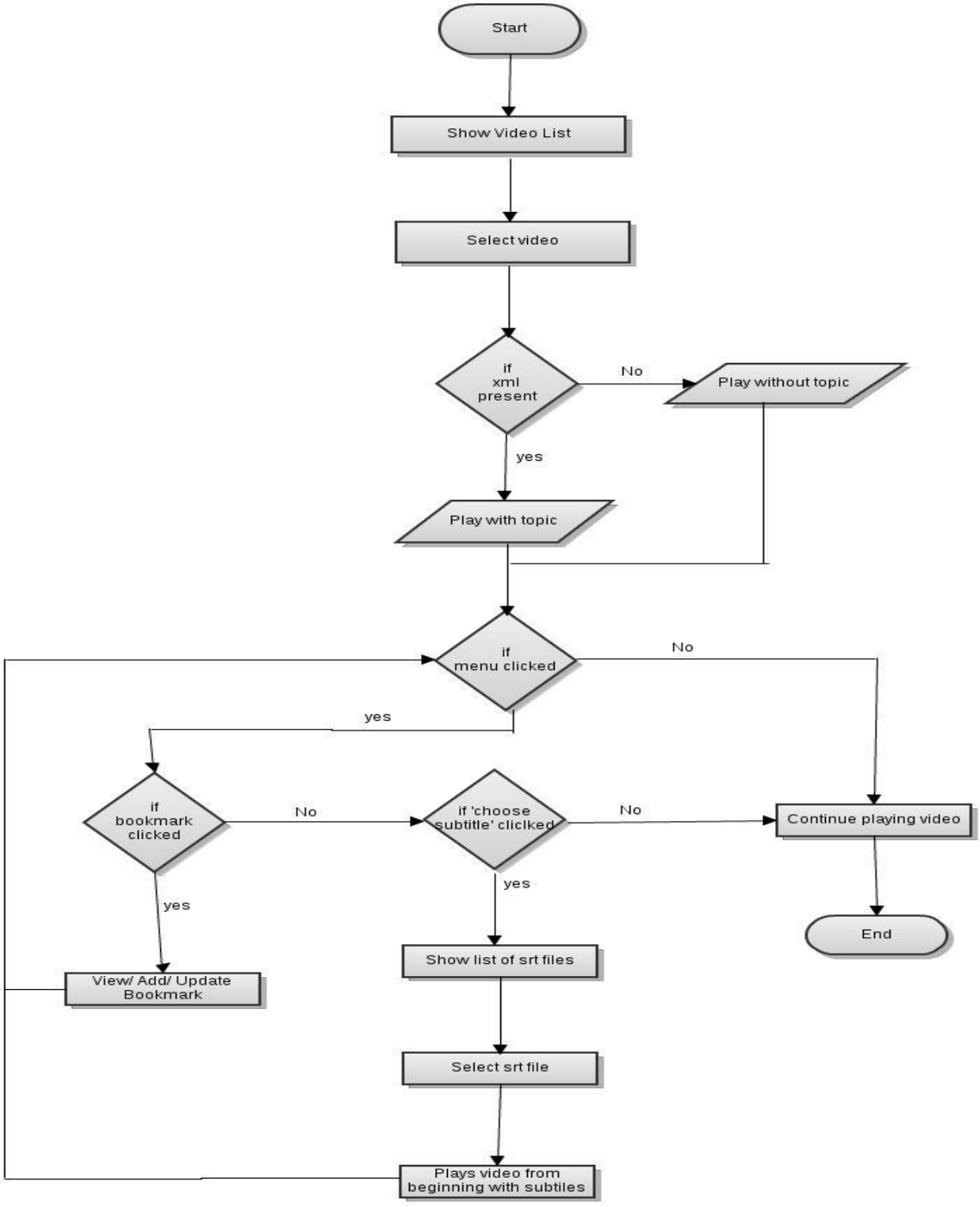


Fig 8: Flow Chart

CHAPTER 4

METHODOLOGY, TESTING AND RESULTS

4.1 Implementation of this Android Application

Here we explain the implementation of this application. The different resources and source files those are used for developing the application are explained here.

4.1.1 Android Manifest with its purpose

Android manifest .xml file describes the major information that is required for the android devices in which the application is to be run . There are different components of application like , permission , xml version , activities, services, broadcast receivers, content providers , etc are declared in androidmanifest.xml file. This file is also used for declaring different permission like Internet access, SD card access , Wi-Fi access ,camera access, and other hardware etc.

In this minimum and Target API version for application can also be declared.

In this application android manifest is used for support Wi-Fi and for enabling Internet connection and for External storage permissions.

Additionally, different activities of the application are also included in android manifest file. There is a snapshot of code of the Android manifest file of our application.

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.android.vcr"
    android:versionCode="1"
    android:versionName="1.0" >

    <uses-sdk android:minSdkVersion="7" />

    <application
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name" >
        <uses-permission android:name="android.permission.MOUNT_UNMOUNT_FILESYSTEMS" />
        <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE"/>
        <uses-permission android:name="android.permission.INTERNET"/>

        <uses-feature android:name="android.hardware.wifi"/>

     <activity
            android:name=".Splash"
            android:label="@string/app_name" android:screenOrientation="landscape" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
```

FIGURE.4.1.1 Code Snippet of the androidmanifest.xml

4.1.2 User Interface with function implementation

This section of report give information the user interface of the android application. Different views and different View Group objects are mainly used for building the user interface in android application.

A view object is an object that can be represented as a data structure and that can stores parameters and properties of layout and the content that is on the given specific area of Screen. In resource/layout folder xml files contains the Graphical Interface of particular activity.

Our application is contains of seven activity . The first one activity class is the splash screen .

The below snapshot displays the main layout view that represents the initial point of the application.

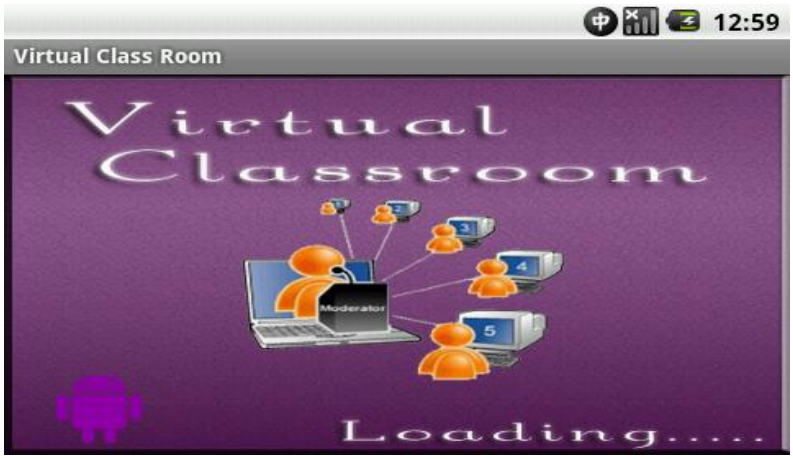


Fig 9: Splash Screen

This splash screen will hold for just 2 secs.

And now users will be redirect to the next activity which is the Landing.java

Fig 10: Landing Screen

Here, are 2 options to access the video lectures either from SD-card or from the server using WiFi.

Suppose user wants to access from server. So the next screen will be open like this.

Fig 11: Wifi-Setting Menu

CODE: Intent to proceed setting request are as following

```
{
Intent i = new Intent(WiFiListVideoes.this,WiFiSettingsActivity.class);
startActivityForResult(i, OPEN_SETTINGS_REQUEST);

}
```

After clicking on WiFi settings a request will be sent to the android device, to open the alert prompt to enter the IP Address of the server.

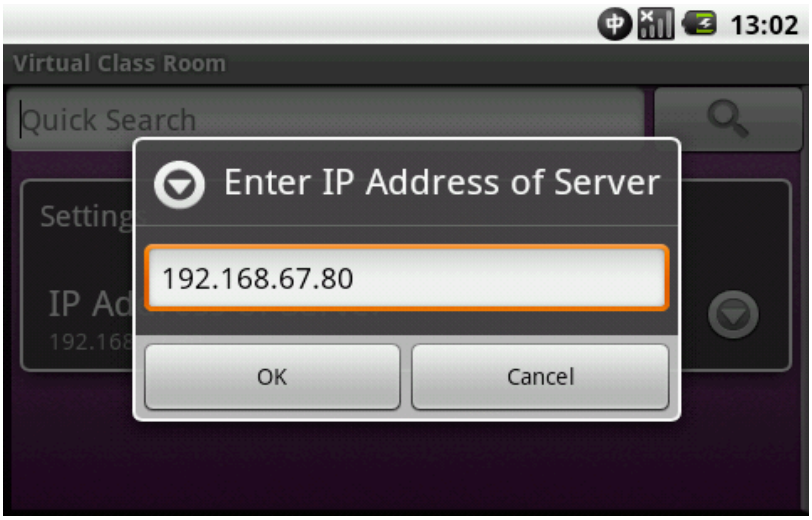


Fig 12: Enter IP of Server

After click on OK, first of all validate function will be execute to check whether the entered IP Address is valid or not. Its corresponding code are as follows:

```
{

        public boolean validate_ip(final String ip) {
                Pattern pattern = Pattern.compile(IPADDRESS_PATTERN);
                Matcher matcher = pattern.matcher(ip);
                return matcher.matches();}
        }
```

If it returns true that means entered IP Address is valid and this IP Address is used to create the URL to access the list of videos which are resides on the server. Its corresponding code is as:

```
if (validate_ip(ip_address))
  {
        videopath = "http://" + ip_address + "/videos/";
            try {
                 url1 = new URL(videopath);
                ApacheURLLister lister1 = new ApacheURLLister();
                list = lister1.listFiles(url1);
                 }
}
```

Now the user will get connect to the server and the list of videos will be parsed using XML and will display on the screen.

Fig 13: Video List Stored On Server

There are entire list of videos. User have to click on one of them to view. After clicking , the name of the video file get append with the existing path to the server and video will paly in the next activity.

```
{
    Intent intent = new Intent(WiFiListVideoes.this,WiFiVideoview.class);
    intent.putExtra("xmlname", xmlname);
    intent.putExtra("ipaddress", ip_address);
    intent.putExtra("videofilepath", ss);
    startActivity(intent);
}
```

It is the videoview.class Activity to streaming video.

Fig 14: Sliding Drawer Functionality

An arrow pointed to a drawer, to open the index. Because android screen size is small so we have used this sliding drawer. So whenever user will click on that button the list of subtopics will be displayed that is shown the screen shot below.

Fig 15: List Of Subtopics

Index contains all the subtopics corresponding to the video lecture. Its corresponding codes are as follows:

```
{

slidingDrawer.setOnDrawerOpenListener(new OnDrawerOpenListener() {

            public void onDrawerOpened()
{

            slideButton.setBackgroundResource(R.drawable.closearrow);
            slideButton.setVisibility(View.VISIBLE);
}
            });

}
```

Just click on any subtopic that you want and it will seek you to that particular subtopic.Now turns to describe the functionality on menu buttons. Pressing on menu will show two options.

- Choose Subtitles
- Bookmark

Fig 16: Menu Screen

Its corresponding menu.xml is below .

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

<item android:id="@+id/srt"
android:title="Choose Subtitle"
android:icon="@drawable/star_none"
android:background="@android:color/transparent"/>

<item android:id="@+id/bookmark"
android:title="BookMark"
android:icon="@drawable/star_none"
android:background="@android:color/transparent" />

</menu>
```

Choose Subtitles

After clicking on it, next activity will open with the list of subtitle files, user have to select the corresponding subtitle file to the video lecture.

Fig 17: List of Subtitles

After selecting the subtitle file, it will play along with the video like this

Fig 18: Playing Video with Subtitles

Bookmark

Bookmark section will open a new activity, list of options in this section are :

- Create Bookmark
- My Bookmark
- Update Bookmark

Fig 19: Add Bookmark

Create Bookmark : it takes 3 entries are as following

- Enter the name of corresponding Video Lecture
- Enter the bookmark name
- Enter the starting time of the bookmark wherever you want

  And then hit "ADD BOOKMARK" to add to "My Bookmarks" .

Its corresponding functional code is as following:

```
{

    mySQLiteAdapter = new WiFiSQLiteAdapter(this);
    mySQLiteAdapter.openToWrite();
    cursor = mySQLiteAdapter.queueAll();
   String[] from = new String[] { WiFiSQLiteAdapter.KEY_CONTENT1,
                                  WiFiSQLiteAdapter.KEY_CONTENT2,
                                  WiFiSQLiteAdapter.KEY_CONTENT3 };
    int[] to = new int[] { R.id.txt1, R.id.txt2, R.id.txt3 };

}
```

My Bookmark: It will show all the bookmarks created by the user

Fig 20: My Bookmarks

Now user can select any of the bookmark that he done last time and can play that video from that particular time that is stored in Sqlite Database.

Update Bookmark: For updating the timings and video name of a bookmark

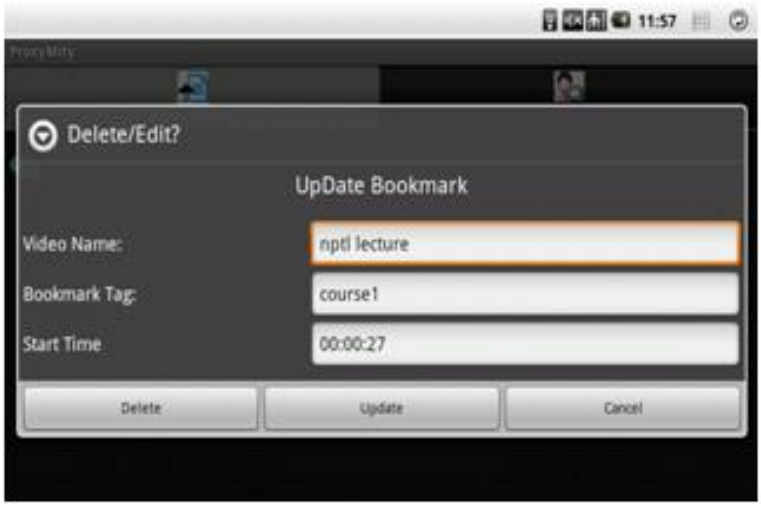


Fig 21: Update Bookmarks

LongClick On the any of the list item in my bookmark section, this will allow a user to delete or update the bookmark .

4.2 Testing

Testing is a major challenge in order to perform a final check up of the application .This operation is carried out by using the various hardware devices and virtual emulators to make the application robust. Using Wi-Fi one needs an extra hardware like a server to cope up with the required needs.

In this application , testing is taken in consideration to perform the testing of mobile application. The testing is defined as an algorithm to testing the application which focuses on the functionalities and features of an application.

The tests are carried out on android 2.3.5 Samsung Galaxy Young S5360.

This tables show a list of different test cases and their results of our application.

Flag	Test ID	Test Description	Test Result	Flag
0	1	Installing .apk file	Installation successful	1
0	2	Application launch and WiFi checking	Exits if no WiFi, prompt user if WiFi is disabled	1
0	3	Launching Time	Time in second to make valid connection with server.	1
0	4	Subtitle check	Loads subtitle if exists	1
0	5	Subtopics	Xml of the corresponding video is loaded that displays list of topic covered.	1
0	6	Bookmark	Buffers in the video from the last bookmark, can be updated.	1

Adding into the context the multitasking issues while testing the application confines the portability of the application. Such as the application should be able to work in efficient manner.

With the development of the android applications, this is necessary to perform the different tests and which can measure the transparency, performance and reliability of the application of the android device while running the new application. There shouldn't be any disruption from the basic application.

4.3 Conclusion

The advancement in mobile technology is to contribute in different ways of our lives that can varies from enjoying with the entertainment, education applications ,games and many other useful tools.

This Application would definitely provide new revolution in our education system scenario. The portability it provides is beneficial from student's point of view. The feature it has makes it a better education tool for students.

The application provides a real time streaming of video and is portable so the range within which one can operate is reasonable.

Finally we can conclude that the use of this application will embark a true mark in the education society and then learning would be affordable to distances.

4.4 Future Direction

This Application helps in creating an interactive environment for the students to study that would also save their time and enhance the mode of portability by enabling a user with the proposed features. So taking its compatibility in mind there are some future perspective to improve the overall performance.

- Audio Dubbing in different languages in order to view lecture in regional language.
- Adjusting the video quality and aspect ratio according to network strength.
- User can adjust the speed of the buffered video lecture according to the need.
- Shows the list of related video lecture at the end of current video lecture.

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