## Android Application Development

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#### **Outline**

- Android development
  - Introduction
  - Android System in-depth
  - Setting up an Android Environment
  - Application development
  - Android debugging
  - Publishing your app on Google Play Store
  - References and links



#### Introduction

- History: Startup to Google Android
- Why Android is so famous?
- Android's association with GNU/Linux
- Recent changes in Android



## Android System in-depth





## Setting up an Android Environment

#### Prepare development system

- Android SDK(Software development Kit)
- IDE (Eclipse or Android Studio)
- AVD(Android Virtual Device)
- Setting up your Android phone for code development

#### Dependencies

- jdk sudo apt-get install openjdk-6-jdk
- For 64bit system
   sudo apt-get install ia32-libs-multiarch libc6



### SDK Tools

- Logcat
- DDMS
- Monitor
- dmesg



### **Android Application Development**

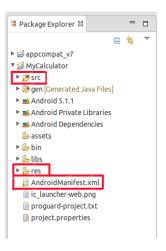


## What's the plan?

- Basic Calculator app
- Intents
- Connecting to the Internet and download Data
- Saving Data in SQLite Database



## Basic project structure



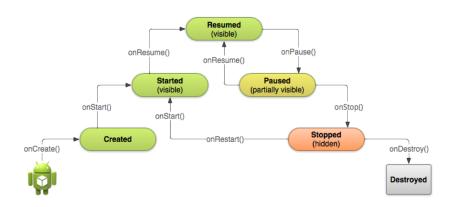


## Android's four main components

- Activity
- Service
- Content Provider
- Broadcast Receiver



## Activity life cycle





# Let's code... MyCalculator screen





### res/layout/activity\_main.xml...(1)

```
<LinearLayout
    android: id="@+id/linearLayout1"
    android: layout_width="match_parent"
    android: layout_height="wrap_content"
    android: layout_alignParentTop="true"
    android: layout_centerHorizontal="true" >
    <EditText
        android: id="@+id/et_num1"
        android: layout_width="wrap_content"
        android: layout_height="wrap_content"
        android: layout_weight="1"
        android:ems="10"
        android: hint="Enter value of x"
        android:inputType="numberDecimal" >
        <requestFocus />
    </EditText>
    <EditText
        android: id="@+id/et_num2"
        android: layout_width="wrap_content"
        android: layout_height="wrap_content"
        android: layout_weight="1"
        android:ems="10"
        android: hint="Enter value of v"
        android:inputType="numberDecimal" />
</LinearLayout>
```

Enter value of x Enter value of y



### res/layout/activity\_main.xml...(2)

```
<LinearLayout
    android: layout_width="match_parent"
    android: layout_height="wrap_content"
    android: layout_below="@+id/linearLayout1"
    android: layout_centerHorizontal="true"
    android: layout_marginTop="24dp" >
    <Button
        android: id="@+id/btn_add"
        android: layout_width="wrap_content"
        android: layout_height="wrap_content"
        android: text="+"
        android: layout_weight="1" />
    <Button
        android: id="@+id/btn sub"
        android: layout_width="wrap_content"
        android: layout_height="wrap_content"
        android: text="-"
        android: layout_weight="1" />
    <Button
        android: id="@+id/btn_multiply"
        android: layout_width="wrap_content"
        android: layout_height="wrap_content"
        android: text="*"
        android: layout_weight="1" />
    <Button
        android: id="@+id/btn_divide"
        android: layout_width="wrap_content"
```

android lawout hoight-"wran content"



### res/layout/activity\_main.xml...(3)

```
android:text="/"
android:layout_weight="1" />

</LinearLayout>

<TextView
android:id="@+id/tv_result"
android:layout_weight="wrap_content"
android:layout_height="wrap_content"
android:layout_centerHorizontal="true"
android:layout_centerVertical="true"
android:text=""
android:text=""
```

10.0 + 20.0 = 30.0



## src/com/.../MainActivity.java...(1)

```
public class MainActivity extends ActionBarActivity implements OnClickListener {
    private EditText et_num1;
    private EditText et_num2:
    private Button btn_add:
    private Button btn_sub;
    private Button btn_divide;
    private Button btn_multiply;
    private TextView result;
   @Override
    protected void onCreate (Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView (R. layout . activity_main);
        et_num1 = (EditText)findViewById(R.id.et_num1);
        et_num2 = (EditText)findViewById(R.id.et_num2);
        btn_add = (Button)findViewById(R.id.btn_add);
        btn_sub = (Button)findViewById(R.id.btn_sub);
        btn_multiply = (Button)findViewById(R.id.btn_multiply);
        btn_divide = (Button)findViewById(R.id.btn_divide);
        result = (TextView)findViewBvId(R.id.tv_result);
        btn_add.setOnClickListener(this):
        btn_sub.setOnClickListener(this);
        btn_multiply.setOnClickListener(this);
        btn_divide.setOnClickListener(this);
```



### src/com/.../MainActivity.java...(2)

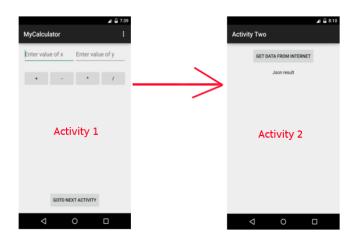
```
@Override
public void onClick(View v) {
    float x, y;
    if (!TextUtils.isEmpty(et_num1.getText().toString()) && !TextUtils.isEmpty(
         et_num2.getText().toString())) {
        x = Float.parseFloat(et_num1.getText().toString());
        y = Float.parseFloat(et_num2.getText().toString());
        switch (v.getId()) {
        case R. id . btn_add:
            Toast.makeText(MainActivity.this, "Add button clicked", Toast.
                  LENGTHLONG) . show():
            result.setText(x + " + " + y + " = " + (x+y));
            break:
        case R.id.btn_sub:
            Toast.makeText(MainActivity.this, "Sub button clicked", Toast.
                  LENGTHLONG).show();
            result.setText(x + " - " + v + " = " + (x-v)):
            break:
        case R.id.btn_multiply:
            Toast.makeText(MainActivity.this, "Multiply button clicked", Toast.
                  LENGTHLONG) . show():
            result.setText(x + " * " + v + " = " + (x*v));
            break:
```



### src/com/.../MainActivity.java...(3)



#### Intent





### res/layout/activity\_main.xml

```
<Button
android:id="@+id/btn.next"
android:layout.width="wrap_content"
android:layout.height="wrap_content"
android:layout.alignParentBottom="true"
android:layout.centerHorizontal="true"
android:text="Goto next Activity" />
```



### src/com/.../MainActivity.java

```
private Button btn_next;
@Override
protected void onCreate (Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView (R. layout . activity_main);
    btn_next = (Button)findViewById(R.id.btn_next);
    intentFunctions():
private void intentFunctions() {
    btn_next.setOnClickListener(new OnClickListener() {
        @Override
        public void onClick(View v) {
            //go to next activity
            Intent i = new Intent(MainActivity.this, ActivityTwo.class);
            startActivity(i);
            //Open link in browser
            Intent i = new Intent(Intent.ACTION_VIEW, Uri.parse("http://www.
 vogella.com"));
            startActivity(i);
            //send message
            Intent i = new Intent(Intent.ACTION_SEND);
            i.setType("text/plain");
            i.putExtra(android.content.Intent.EXTRA_TEXT," hello");
            startActivity(i);
            //call functionality
            Intent i = new Intent(Intent.ACTION_CALL,
            Uri.parse("tel:(+49)12345789"));
```



### src/com/.../ActivityTwo.java

```
public class ActivityTwo extends ActionBarActivity{
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_two);
    }
```



### res/layout/activity\_two.xml

```
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
android:layout.width="fill_parent"
android:layout_height="fill_parent" >
</RelativeLayout>
```



#### AndroidManifest.xml

```
<uses-permission android:name="android.permission.CALL_PHONE"/>
<uses-permission android:name="android.permission.INTERNET"/>
<activity
    android:name="com.example.mycalculator.ActivityTwo"
    android:label="Activity Two" ></activity>
```



### Internet Connectivity and download Data





#### AndroidManifest.xml

 $<\!uses-permission\_android:\!name="android.permission.INTERNET"/\!>$ 



### res/layout/activity\_two.xml

```
<Button
    android: id="@+id/button1"
    android: layout_width="wrap_content"
    android: layout_height="wrap_content"
    android: layout_alignParentTop="true"
    android: layout_centerHorizontal="true"
    android: layout_marginTop="14dp"
    android: onClick="getData"
    android: text="Get data from internet" />
<TextView
    android:id="@+id/tv_result"
    android: layout_width="wrap_content"
    android: layout_height="wrap_content"
    android: layout_below="@+id/button1"
    android: layout_centerHorizontal="true"
    android: layout_marginTop="15dp"
    android: text="Ison result" />
```



### src/com/.../ActivityTwo.java...(1)

```
private TextView tv_result;
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView (R. layout . activity_two);
    tv_result = (TextView)findViewById(R.id.tv_result);
public void getData(View v){
    //downlaod json data from internet
    new DownloadData().execute();
public class DownloadData extends AsyncTask<String , String > {
    String result="";
    @Override
    protected void onPreExecute() {
        super.onPreExecute();
```

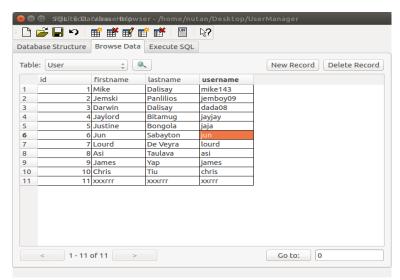


## src/com/.../ActivityTwo.java...(2)

```
@Override
protected String doInBackground(String... params) {
    HttpClient httpclient = new DefaultHttpClient();
    HttpContext httpcontext = new BasicHttpContext();
    HttpGet httpget = new HttpGet("http://demo.codeofaninja.com/tutorials/
         json-example-with-php/index.php");
    try
        HttpResponse response = httpclient.execute(httpget, httpcontext);
        BufferedReader b_reader = new BufferedReader(new InputStreamReader(
             response.getEntity().getContent());
        String line = null;
        while ((line = b_reader.readLine()) != null){
            result += line + "\n":
    } catch (Exception e) {
        e.printStackTrace();
    return result:
@Override
protected void onPostExecute(String result) {
    super.onPostExecute(result);
    System.out.println(result);
    tv_result.setText(result);
```



### SQLite Database





## src/com/.../DatabaseHandler.java...(1)

```
public class DatabaseHandler extends SQLiteOpenHelper{
    private static final String DATABASE.NAME = "UserManager";
    private static final String TABLE_NAME = "User";
    private static final String KEY_ID = "id";
    private static final String KEY_FIRSTNAME = "firstname";
    private static final String KEY_LASTNAME = "lastname";
    private static final String KEY_USERNAME = "username";
    public DatabaseHandler(Context context) {
        super(context , DATABASE.NAME, null , 1);
   @Override
    public void onCreate(SQLiteDatabase db) {
        String CREATE_TABLE = "CREATE TABLE "+TABLE_NAME+" ("+KEY_ID+" INTEGER PRIMARY
              KEY, "+KEY_FIRSTNAME+" TEXT, "+KEY_LASTNAME+" TEXT, "+KEY_USERNAME+" TEXT
             "+")":
       db.execSQL(CREATE_TABLE);
   @Override
    public void onUpgrade(SQLiteDatabase db, int oldVersion, int newVersion) {
        db.execSOL("DROP TABLE IF EXISTS " + TABLE_NAME);
        // Create tables again
        onCreate(db);
```



### src/com/.../DatabaseHandler.java...(2)

```
//insert values in table
public void addUser(String firstname, String lastname, String username) {
    SQLiteDatabase db = this.getWritableDatabase();
    ContentValues value = new ContentValues();
    value.put(KEY_IRSTNAME, firstname);
    value.put(KEY_LASTNAME, lastname);
    value.put(KEY_LSERNAME, username);
    db.insert(TABLE_NAME, null, value);
    db.close();
}
```

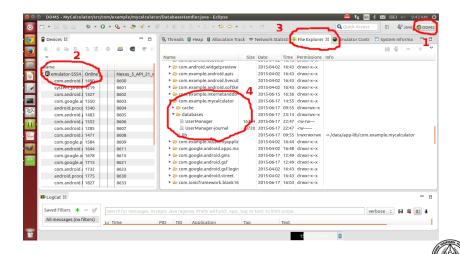


## src/com/.../ActivityTwo.java

```
@Override
protected void onPostExecute(String result) {
    super.onPostExecute(result);
    System.out.println(result);
    tv_result.setText(result);
    //parse json result and insert values in database
    addUsersInDatabase(result);
private void addUsersInDatabase(String result) {
    //get instance of database handle class
    DatabaseHandler db = new DatabaseHandler(ActivityTwo.this);
    //parse ison result
    trv
       JSONArray user_list = new JSONArray(new JSONObject(result).getString(
             "Users")):
        System.out.println(user_list.length());
        //iterate over json array
        for (int i = 0; i < user_list.length(); i++) {
            ISONObject user = new ISONObject(user_list.get(i).toString());
           //add values to database
            db.addUser(user.getString("firstname"), user.getString("lastname"
                 ), user.getString("username"));
    } catch (JSONException e) {
        e.printStackTrace();
```



#### How to find database?



## Android Debug Bridge(adb)

- Enable USB debugging
- List all the devices attached to the system adb devices
- Android shell
   adb shell
- Install/uninstall apk's adb install test.apk adb uninstall test.apk
- Copying files to/from an emulator/device *adb push file.txt data/*



## Android debugging cntd..

- Issue shell commands pm - package manager am - activity manager
- Specify device with -d,-e,-s *adb* —*d logcat*
- adb server adb start server adb kill – server



# Publishing your app on Google Play Store...(1)

#### Signing the app to release

- In eclipse, right click on app and go to Export
- Export Android app, Click on Next,
- Create a new keystore, specify location and name, password, Next
- Fill entire form on this page Alias name, password, validity(1000 yrs) and so on. Click Next
- Choose path where signed apk is to be stored
- Click Export and Done



# Publishing your app on Google Play Store...(2)

#### Create developer account and upload apk

- Go to https://play.google.com/apps/publish/ to create a developers account with your gmail id
- Pay 25 USD, for creating the account using google wallet
- Fill information required to continue
- Click on Add first Application button, and specify name and title of the app
- Go to, content rating and pricing sections to specify if app is free or paid
- Finally go to, APk section browse and upload the signed apk on the store
- Click the publish button to make app live on the play store App goes live at least 3 hours after publishing



### References and links

- developer.android.com
- www.youtube.com/playlist?list=PL4CC7F724314E6C42
- www.mkyong.com/tutorials/android-tutorial
- http://code.google.com/p/android-scripting
- http://www.vogella.com/tutorials/Android/article.html



Questions?

