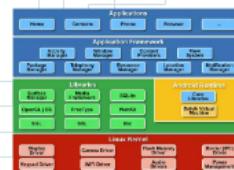


# Android Programming for Mobile Devices

API Level		
ANDROID VERSION	API LEVEL	VERSION CODE
Android 1.0	2	BASE_1_0
Android 1.1	3	CUPCAKE
Android 2.0	4	Eclair
Android 2.1	5	Eclair_MR1
Android 2.2	6	FROYO
Android 2.3.1	7	GINGERBREAD_MR1
Android 2.3.2, 3.0, 3.1	8	HONEYCOMB
Android 3.2	9	HONEYCOMB_MR1
Android 4.0	10	ICE_CREAM_SANDWICH
Android 4.0.3, 4.1	11	ICE_CREAM_SANDWICH_MR1
Android 4.2	12	JELLY_BEAN
Android 4.3, 4.4.2	13	JELLY_BEAN_MR1
Android 5.0	14	KITKAT
Android 5.1	15	KITKAT_WATCH
Android 6.0	16	MARSHMALLOW
Android 7.0	17	Nougat
Android 7.1	18	Nougat
Android 8.0	19	Oreo
Android 9.0	20	Pie
Android 10.0	21	Q
Android 11.0	22	R



The Android Versions



## Android Intent Invocation

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

    private void onClick(View view){
        startActivity(new
            Intent("com.example.bofashola.MainActivity"));
    }
}
```

## Android Resources

- Drawable
- Layout
- Values
  - string

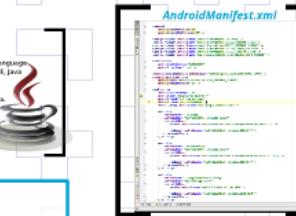
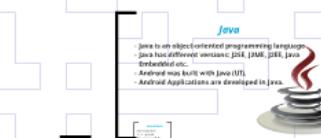
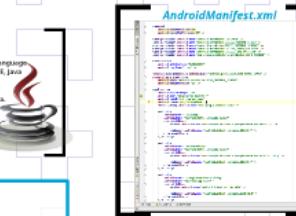
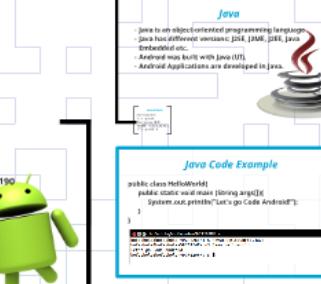


```
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools" android:layout_width="match_parent"
    android:layout_height="match_parent" android:paddingLeft="@dimen/activity_horizontal_margin"
    android:paddingRight="@dimen/activity_horizontal_margin"
    android:paddingTop="@dimen/activity_vertical_margin"
    android:paddingBottom="@dimen/activity_vertical_margin"
    tools:context=".com.example.bofashola.pronghornweather.Activity">

    <TextView android:text="@string/hello_world" android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:textSize="75dp"
        android:id="@+id/textView" />

    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:id="@+id/button"
        android:onClick="onClick"
        android:layout_below="@+id/textView"
        android:layout_alignParentLeft="true"
        android:layout_alignParentStart="true"
        android:layout_alignEnd="@+id/textView" />

    <RelativeLayout>
```

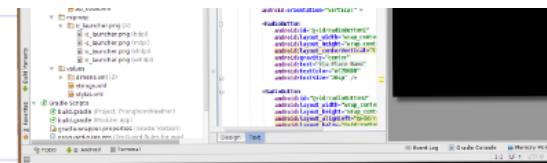


## Drawable + Screen Densities

- Screen Sizes: small, normal, large, and extra-large
  - xlarge screens are at least 960dp x 720dp
  - large screens are at least 640dp x 480dp
  - normal screens are at least 470dp x 320dp
  - small screens are at least 426dp x 320dp
- Densities:
  - ldpi (low) - 120dpi
  - mdpi (medium) - 160dpi
  - hdpi (high) - 240dpi
  - xhdpi (extra-high) - 320dpi
  - xxhdpi (extra-extra-high) - 480dpi
  - xxxhdpi (extra-extra-extra-high) - 640dpi

DPI = dots per inch

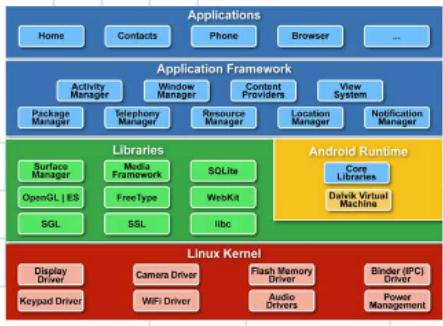
## Layout



# Android Programming for Mobile Devices

## API Level

ANDROID VERSION	API LEVEL	VERSION_CODE
Android 1.0	1	BASE
Android 1.1	2	BASE_1_1
Android 1.5	3	CUPCAKE
Android 1.6	4	DONUT
Android 2.0	5	ECLAIR
Android 2.0.1	6	ECLAIR_0_1
Android 2.1.x	7	ECLAIR_MR1
Android 2.2.x	8	FROYO
Android 2.3, 2.3.1, 2.3.2	9	GINGERBREAD
Android 2.3, 2.3.4	10	GINGERBREAD_MR1
Android 3.0.x	11	HONEYCOMB
Android 3.1.x	12	HONEYCOMB_MR1
Android 3.2	13	HONEYCOMB_MR2
Android 4.0, 4.0.1, 4.0.2	14	ICE_CREAM_SANDWICH
Android 4.1, 4.1.1	15	ICE_CREAM_SANDWICH_MR1
Android 4.0.3, 4.0.4	16	JELLY_BEAN
Android 4.2, 4.2.2	17	JELLY_BEAN_MR1
Android 4.3	18	JELLY_BEAN_MR2
Android 4.4	19	KITKAT
Android 4.4W	20	KITKAT_WATCH
Android 5.0	21	LOLLIPOP
Android 5.1	22	LOLLIPOP_MR1



Prezi

## Android Activity

First Activity

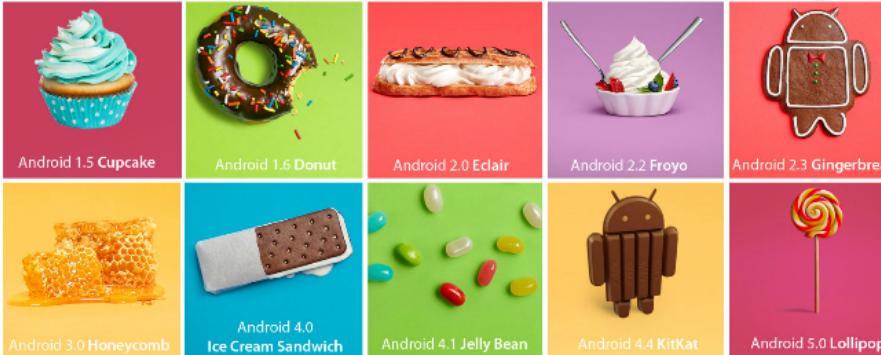
Second Activity

## Android

- Mobile Operating System
- Powers hundreds of millions of devices in 190 countries.
- Devices include:  
Phones, Tablets,  
Wearables, Cars and TVs



## The Android Versions



## Android Intents



## Java

- Java is an object-oriented programming language
- Java has different versions: J2SE, J2ME, J2EE, Java Embedded etc.
- Android was built with Java (UI).
- Android Applications are developed in Java.



## Java Code Example

```
public class HelloWorld {
    public static void main (String args[])
        System.out.println("Let's go Code Android!");
    }
}
```

```
[ 12 ~ ]$ cd /Users/ahmed/Downloads/HelloWorld/HelloWorld/
[ 12 ~ ]$ javac HelloWorld.java
[ 12 ~ ]$ java HelloWorld
Let's go Code Android!
[ 12 ~ ]$
```

## Android



## Android Activity Life Cycle

## Drawable + Screen De

- Screen Sizes: small, normal, large
- xlarge screens are at least 960dp wide
  - large screens are at least 640dp wide
  - normal screens are at least 480dp wide



# *Android*

- Mobile Operating System
- Powers hundreds of millions of devices in 190 countries.
- Devices include:  
Phones, Tablets,  
Wearables, Cars and TVs



## *The Android Versions*

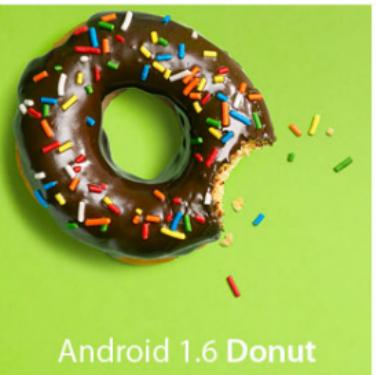


```
bofashola@bofashola-VPCF226FM:~$ javac HelloWorld.java  
bofashola@bofashola-VPCF226FM:~$ java HelloWorld  
Let's go Code Android!  
bofashola@bofashola-VPCF226FM:~$
```

## The Android Versions



Android 1.5 Cupcake



Android 1.6 Donut



Android 2.0 Eclair



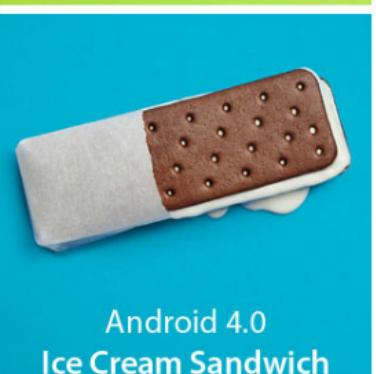
Android 2.2 Froyo



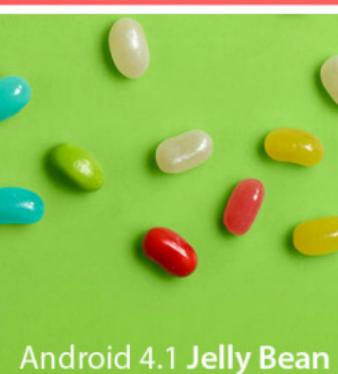
Android 2.3 Gingerbread



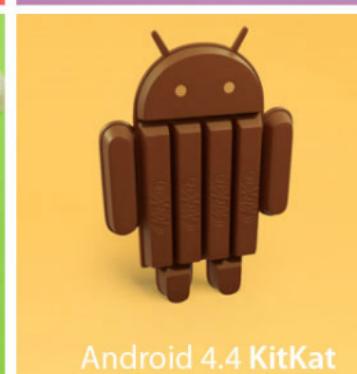
Android 3.0 Honeycomb



Android 4.0  
Ice Cream Sandwich



Android 4.1 Jelly Bean



Android 4.4 KitKat



Android 5.0 Lollipop

@ibnlivetech

*Android Intents*

## *API Level*

ANDROID VERSION	API LEVEL	VERSION_CODE
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Android 1.1	2	BASE_1_1
Android 1.5	3	CUPCAKE
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Android 2.3.3, 2.3.4	10	GINGERBREAD_MR1
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Android 4.0, 4.0.1, 4.0.2	14	ICE_CREAM SANDWICH
Android 4.1, 4.1.1	15	ICE_CREAM SANDWICH_MR1
Android 4.0.3, 4.0.4	16	JELLY_BEAN
Android 4.2, 4.2.2	17	JELLY_BEAN_MR1
Android 4.3	18	JELLY_BEAN_MR2
Android 4.4	19	KITKAT
Android 4.4W	20	KITKAT_WATCH
Android 5.0	21	LOLLIPOP
Android 5.1	22	LOLLIPOP_MR1

# Applications

Home

Contacts

Phone

Browser

...

## Application Framework

Activity Manager

Window Manager

Content Providers

View System

Package Manager

Telephony Manager

Resource Manager

Location Manager

Notification Manager

## Libraries

Surface Manager

Media Framework

SQLite

OpenGL | ES

FreeType

WebKit

SGL

SSL

libc

## Android Runtime

Core Libraries

Dalvik Virtual Machine

## Linux Kernel

Display Driver

Camera Driver

Flash Memory Driver

Binder (IPC) Driver

Keypad Driver

WiFi Driver

Audio Drivers

Power Management

# *Java*

- Java is an object-oriented programming language
- Java has different versions: J2SE, J2ME, J2EE, Java Embedded etc.
- Android was built with Java (UI).
- Android Applications are developed in Java.



## *Android Studio*

- The Integrated Development Environment (IDE)
- IntelliJ + Android Software Development Kit

## *Java Code Example*

```
public class HelloWorld{  
    public static void main (String args[]){  
        System.out.println("Let's go Code Android!");  
    }  
}
```

```
x - □ bofashola@bofashola-VPCF226FM: ~  
bofashola@bofashola-VPCF226FM:~$ javac HelloWorld.java  
bofashola@bofashola-VPCF226FM:~$ java HelloWorld  
Let's go Code Android!  
bofashola@bofashola-VPCF226FM:~$ █
```

# *Android Studio*

- The Integrated Development Environment (IDE)
- IntelliJ + Android Software Development Kit

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

PronghornWeather app src main res layout pronghorn\_activity\_main.xml

Android Project Structure Z: Structure

app manifests AndroidManifest.xml java com.example.bofashola.pronghornweather DisplayWeatherActivity LocationServiceErrorMessages LocationUtils MapActivity PlaceNameActivity PronghornWeatherActivity WeatherValues ZipCodeActivity res drawable layout activity\_display\_weather.xml activity\_main.xml maps\_main.xml placename\_main.xml pronghorn\_activity\_main.xml zipcode\_main.xml menu display\_weather.xml main.xml map.xml place\_name.xml pronghorn\_weather.xml zip\_code.xml mipmap ic\_launcher.png (4) ic\_launcher.png (hdpi) ic\_launcher.png (mdpi) ic\_launcher.png (xhdpi) ic\_launcher.png (xxhdpi) values dimens.xml (2) strings.xml styles.xml Gradle Scripts build.gradle (Project: PronghornWeather) build.gradle (Module: app) gradle-wrapper.properties (Gradle Version) proguard-rules.pro (ProGuard Rules for app)

pronghorn\_activity\_main.xml

```
<ScrollView xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    android:fillViewport="true" >

    <RelativeLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:background="#000"
        android:padding="5dp"
        android:paddingBottom="16dp"
        android:paddingLeft="16dp"
        android:paddingRight="16dp"
        android:paddingTop="16dp"
        android:scrollbarAlwaysDrawVerticalTrack
        android:scrollbarStyle="outsideOverlay"
        android:scrollbars="horizontal|vertical" >

        <TextView
            android:id="@+id/textInstruct"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_below="@+id/welcomeText"
            android:layout_centerHorizontal="true"
            android:layout_marginTop="24dp"
            android:gravity="center"
            android:text="Enter Location:"
            android:textColor="#C2D6DD"
            android:textSize="25sp" />

        <RadioGroup
            android:id="@+id/radioGrouped"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_alignRight="@+id/textInstruct"
            android:layout_below="@+id/textInstruct"
            android:layout_marginTop="42dp"
            android:orientation="vertical" >

            <RadioButton
                android:id="@+id/radioButton1"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_centerVertical="true"
                android:gravity="center"
                android:text="Via Place Name"
                android:textColor="#C2D6DD"
                android:textSize="20sp" />

            <RadioButton
                android:id="@+id/radioButton2"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_alignLeft="@+id/radioButton1"
                android:layout_below="@+id/radioButton1"
                android:layout_marginTop="16dp"
                android:gravity="center"
                android:text="Via Zip Code" />

        </RadioGroup>
    </RelativeLayout>
</ScrollView>
```

Preview Nexus 4 AppTheme 22 Commander Maven Projects Gradle Preview

Pronghorn Weather Report

Enter Location:

Via Place Name

Via Zip Code

Via Google Maps

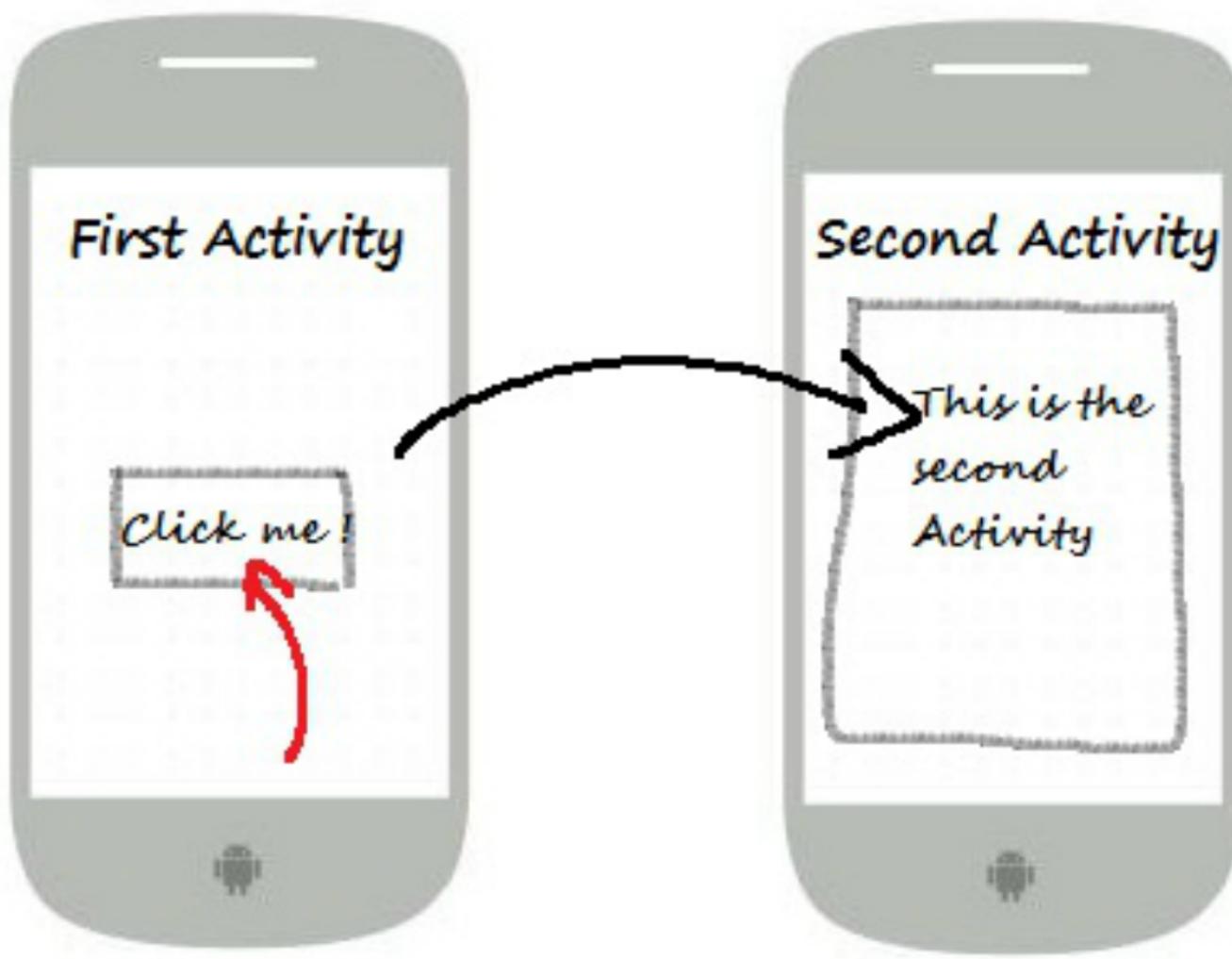
CHOOSE

Event Log Gradle Console Memory Monitor

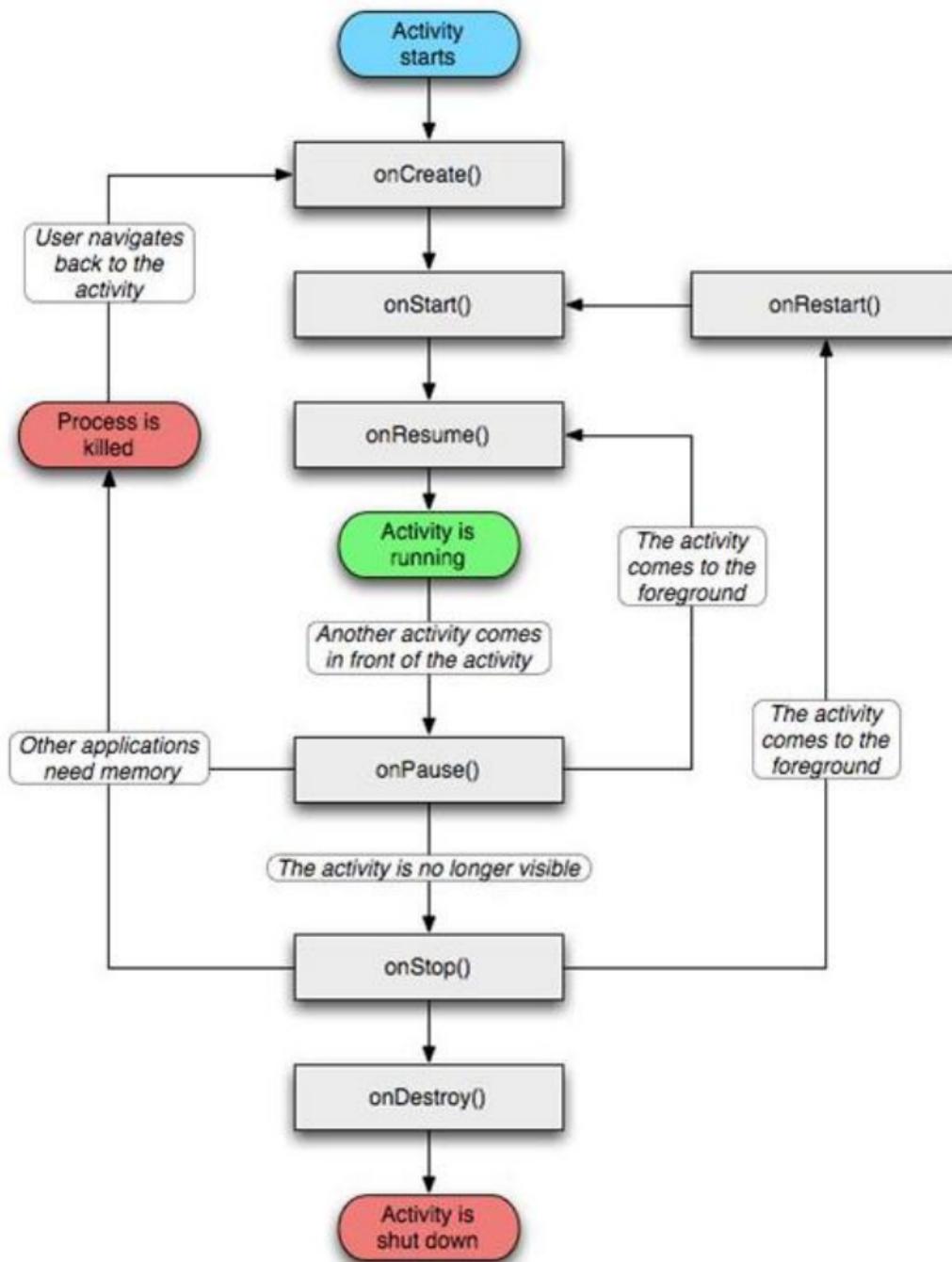
# *Android App Components*



## *Android Activity*



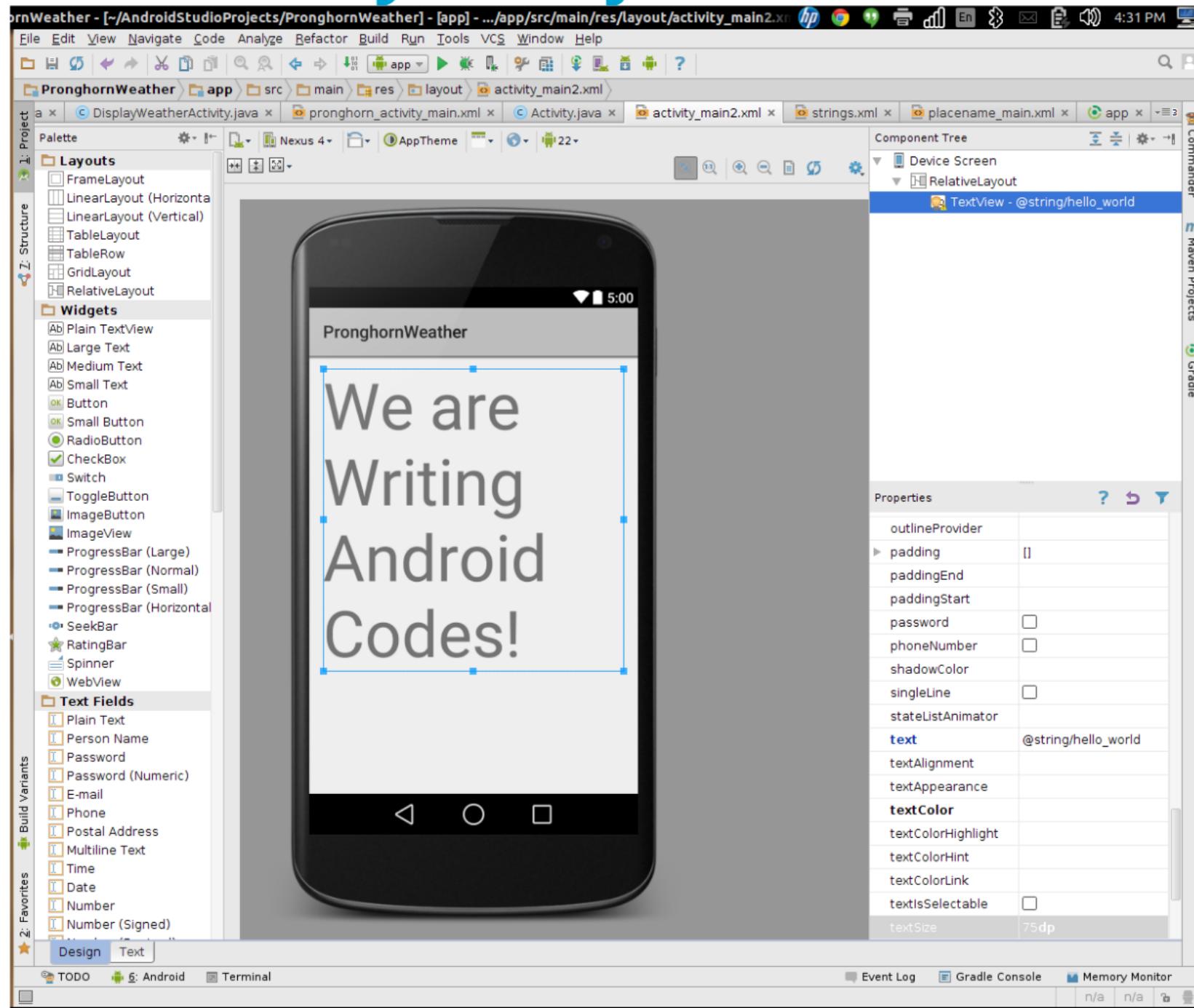
# Android Activity Life Cycle



# *Android Activity*

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

# Activity Interface: WYSIWYG



# Android Interface : XML

rnWeather - [~/AndroidStudioProjects/PronghornWeather] - [app] - .../app/src/main/res/layout/activity\_main2.xml

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

PronghornWeather app src main res layout activity\_main2.xml

pronghorn\_activity\_main.xml Activity.java activity\_main.xml strings.xml

```
<RelativeLayout 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:paddingLeft="16dp"
    android:paddingRight="16dp"
    android:paddingTop="16dp"
    android:paddingBottom="16dp"
    tools:context="com.example.bofashola.pronghornweather.Activity">

    <TextView android:text="@string/hello_world" android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:textSize="75dp" />

</RelativeLayout>
```

Preview Nexus 4 AppTheme Android 22 Commander Maven Projects Gradle Preview

PronghornWeather

We are Writing Android Codes!

Design Text

Event Log Gradle Console Memory Monitor

The screenshot shows the Android Studio interface with the project 'PronghornWeather' open. The code editor displays the XML layout file 'activity\_main2.xml'. The preview window shows a smartphone displaying the text 'We are Writing Android Codes!' in large, bold, black font. The bottom navigation bar of the phone is visible. The status bar at the top shows the time as 4:30 PM.

## *Android Intents*



Intent



## *Android Resources*

## *Android Intent Invocation*

```
public class Activity extends  
ActionBarActivity {  
    @Override  
    protected void onCreate(Bundle  
 savedInstanceState) {  
        super.onCreate(savedInstanceState);  
        setContentView(R.layout.activity_main);  
    }  
    private void onClick(View view){  
        startActivity(new  
 Intent("com.example.bofashola.MainActivity2"));  
    }  
}
```



# AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.bofashola.pronghornweather" >
    <uses-sdk
        android:minSdkVersion="10"
        android:targetSdkVersion="19" />
    <activity
        android:name=".Activity"
        android:label="@string/title_activity_main2" >
        <intent-filter>
            <action
                android:name="com.example.bofashola.pronghornweather.Activity" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
    </activity>
    <activity
        android:name=".Activity2"
        android:label="@string/title_activity_main3" >
        <intent-filter>
            <action
                android:name="com.example.bofashola.pronghornweather.Activity2" />
                <category android:name="android.intent.category.DEFAULT" />
            </intent-filter>
    </activity>
</manifest>
```

# AndroidManifest.xml

The screenshot shows the AndroidManifest.xml file in the Android Studio IDE. The code is color-coded to highlight XML tags and attributes. A yellow horizontal bar highlights the application tag. The manifest defines three activities: Activity, Main3Activity, and PronghornWeatherActivity. Each activity has its name, label, intent filters (including actions and categories), and theme defined.

```
<uses-sdk
    android:minSdkVersion="10"
    android:targetSdkVersion="19" />

<uses-permission android:name="android.permission.INTERNET" />
<uses-permission android:name="android.permission.ACCESS_NETWORK_STATE" />
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
<uses-permission android:name="com.example.bofashola.permission.MAPS_RECEIVE" />

<uses-feature
    android:glEsVersion="0x00020000"
    android:required="true" />

<android:uses-permission android:name="android.permission.READ_PHONE_STATE" />
<android:uses-permission
    android:name="android.permission.READ_EXTERNAL_STORAGE"
    android:maxSdkVersion="18" />

<application
    android:allowBackup="true"
    android:icon="@mipmap/ic_launcher"
    android:label="@string/app_name"
    android:theme="@style/AppTheme" >
    <uses-library android:name="com.google.android.maps" />

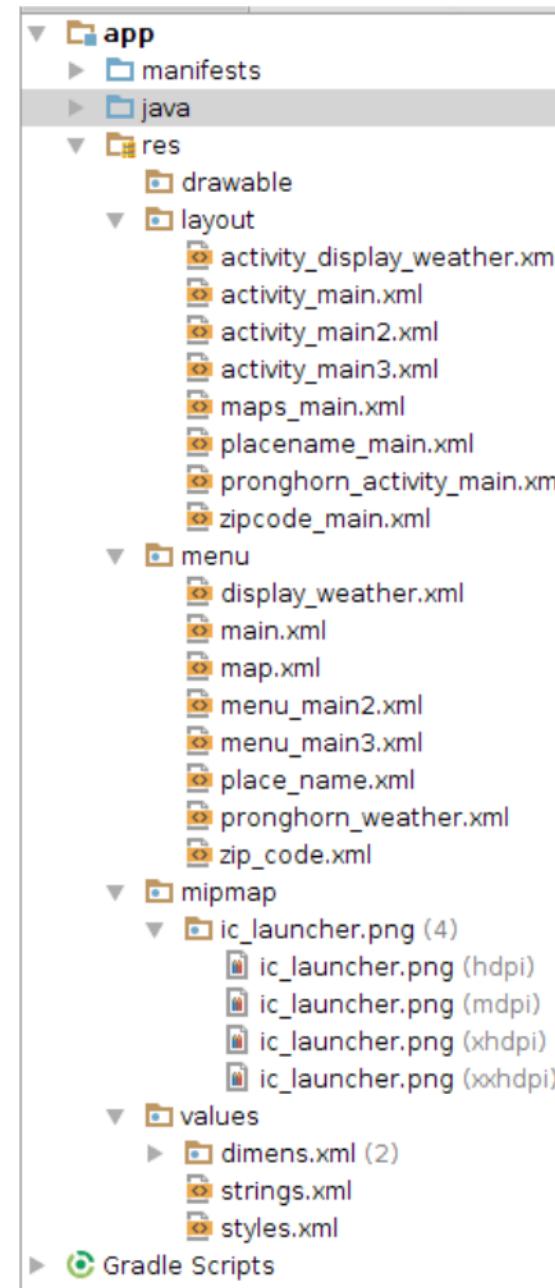
    <activity
        android:name=".Activity"
        android:label="@string/title_activity_main2" >
        <intent-filter>
            <action android:name="com.example.bofashola.pronghornweather.Activity" />
            <category android:name="android.intent.category.DEFAULT" />
        </intent-filter>
    </activity>

    <activity
        android:name=".Main3Activity"
        android:label="@string/title_activity_main3" >
        <intent-filter>
            <action android:name="com.example.bofashola.pronghornweather.Main3Activity" />
            <category android:name="android.intent.category.DEFAULT" />
        </intent-filter>
    </activity>

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

# *Android Resources*

- Drawable
- Layout
- Values
  - string



# Luyut

```
<RelativeLayout 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:paddingLeft="@dimen/activity_horizontal_margin"
    android:paddingRight="@dimen/activity_horizontal_margin"
    android:paddingTop="@dimen/activity_vertical_margin"
    android:paddingBottom="@dimen/activity_vertical_margin"
    tools:context="com.example.bofashola.pronghornweather.Activity">

    <TextView android:text="@string/hello_world" android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:textSize="75dp"
        android:id="@+id/textView" />

    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Launch Activity"
        android:id="@+id/button"
        android:onClick="onClick"
        android:layout_below="@+id/textView"
        android:layout_alignParentLeft="true"
        android:layout_alignParentStart="true"
        android:layout_alignRight="@+id/textView"
        android:layout_alignEnd="@+id/textView" />

</RelativeLayout>
```

# *String*

```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <string name="app_name">PronghornWeather</string>
    <string name="hello_world">We are Writing Android Codes!</string>
    <string name="secondActivity">This is the second Activity</string>
    <string name="action_settings">Settings</string>
    <string name="pronghornWelcomeText">Pronghorn Weather Report</string>
    <string name="locationInstruct">Enter Location:</string>
    <string name="placeNameButton">Via Place Name</string>
    <string name="placeNameText">Via Place Name</string>
    <string name="viaZipCodeText">Via Zip Code</string>
    <string name="viaGoogleMapsText">Via Google Maps</string>
    <string name="locationSubmitText">Choose</string>
    <string name="zipCodeInputText">Enter Zip Code:</string>
    <string name="getWeatherReport">Fetch Weather Report</string>
    <string name="placeNameInputText">Enter Place Name:</string>
    <string name="title_activity_map">MapActivity</string>
</resources>
```

Screen Sizes: small, normal, large, and extra-large

- **xlarge screens** are at least 960dp x 720dp
- **large screens** are at least 640dp x 480dp
- **normal screens** are at least 470dp x 320dp
- **small screens** are at least 426dp x 320dp

Densities:

- **ldpi (low)** ~120dpi
- **mdpi (medium)** ~160dpi
- **hdpi (high)** ~240dpi
- **xhdpi (extra-high)** ~320dpi
- **xxhdpi (extra-extra-high)** ~480dpi
- **xxxhdpi (extra-extra-extra-high)** ~640dpi

DPI = dots per inch

# Questions

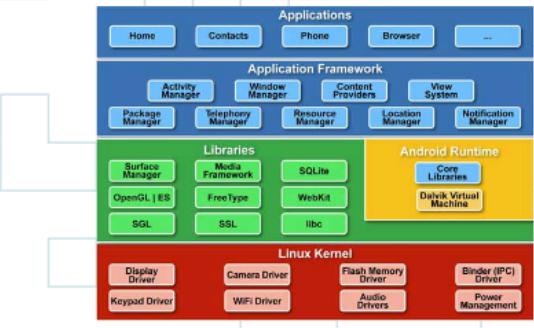




# Android Programming for Mobile Devices

## API Level

ANDROID VERSION	API LEVEL	VERSION_CODE
Android 1.0	1	BASE
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Android 2.0.1	6	ECLAIR_0_1
Android 2.1.x	7	ECLAIR_MR1
Android 2.2.x	8	FROYO
Android 2.3, 2.3.1, 2.3.2	9	GINGERBREAD
Android 2.3, 2.3.4	10	GINGERBREAD_MR1
Android 3.0.x	11	HONEYCOMB
Android 3.1.x	12	HONEYCOMB_MR1
Android 3.2	13	HONEYCOMB_MR2
Android 4.0, 4.0.1, 4.0.2	14	ICE_CREAM_SANDWICH
Android 4.1, 4.1.1	15	ICE_CREAM_SANDWICH_MR1
Android 4.0.3, 4.0.4	16	JELLY_BEAN
Android 4.2, 4.2.2	17	JELLY_BEAN_MR1
Android 4.3	18	JELLY_BEAN_MR2
Android 4.4	19	KITKAT
Android 4.4W	20	KITKAT_WATCH
Android 5.0	21	LOLLIPOP
Android 5.1	22	LOLLIPOP_MR1



Prezi

## Android Activity

First Activity

Second Activity

## Android

- Mobile Operating System
- Powers hundreds of millions of devices in 190 countries.
- Devices include:  
Phones, Tablets,  
Wearables, Cars and TVs



## The Android Versions

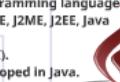


## Android Intents



## Android

### Java



- Java is an object-oriented programming language
- Java has different versions: J2SE, J2ME, J2EE, Java Embedded etc.
- Android was built with Java (UI).
- Android Applications are developed in Java.

## Java Code Example

```
public class HelloWorld {
    public static void main (String args[])
        System.out.println("Let's go Code Android!");
    }
}
```

```
[root@localhost ~]# cd /tmp/
[root@localhost ~]# javac HelloWorld.java
[root@localhost ~]# java HelloWorld
Let's go Code Android!
[root@localhost ~]#
```

## Android Activity Life Cycle



## Drawable + Screen De

Screen Sizes: small, normal, large

- xlarge screens are at least 960dp wide
- large screens are at least 640dp wide
- normal screens are at least 480dp wide

