UI Element Sizing

Background

This module demonstrates the importance of sizing of UI elements..

A working version of this app is available at: https://github.com/milk-modules/Apps/tree/master/accessible/DemoApp03

Further reading: https://material.io/guidelines/layout/metrics-keylines.html#metrics-keylines-touch-target-size

Prerequisite

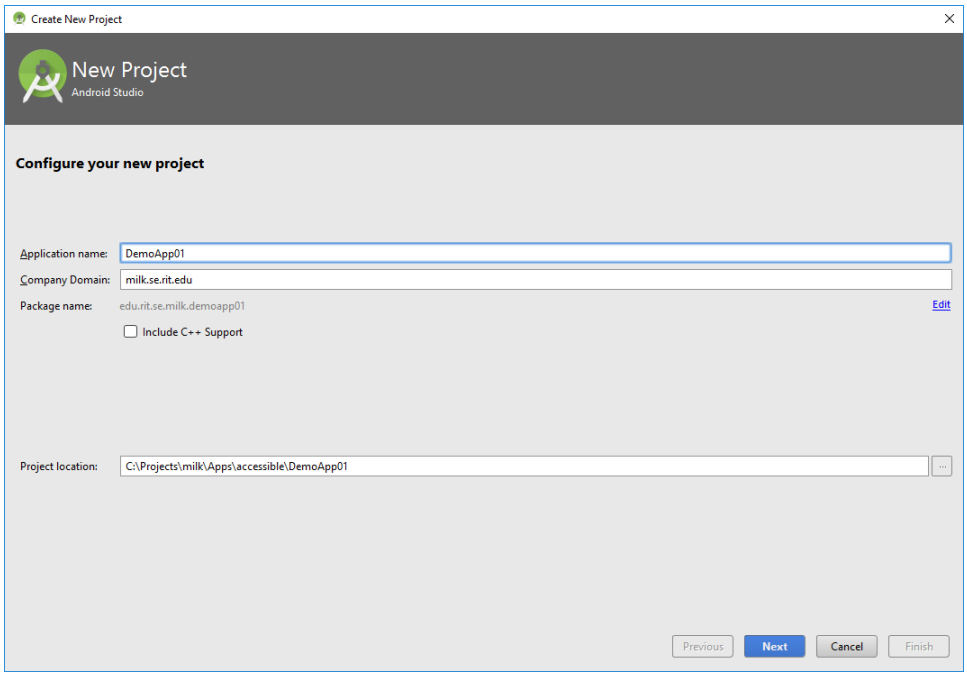
1. Android studio is installed on the development workstation
2. A working Android emulator is available for testing

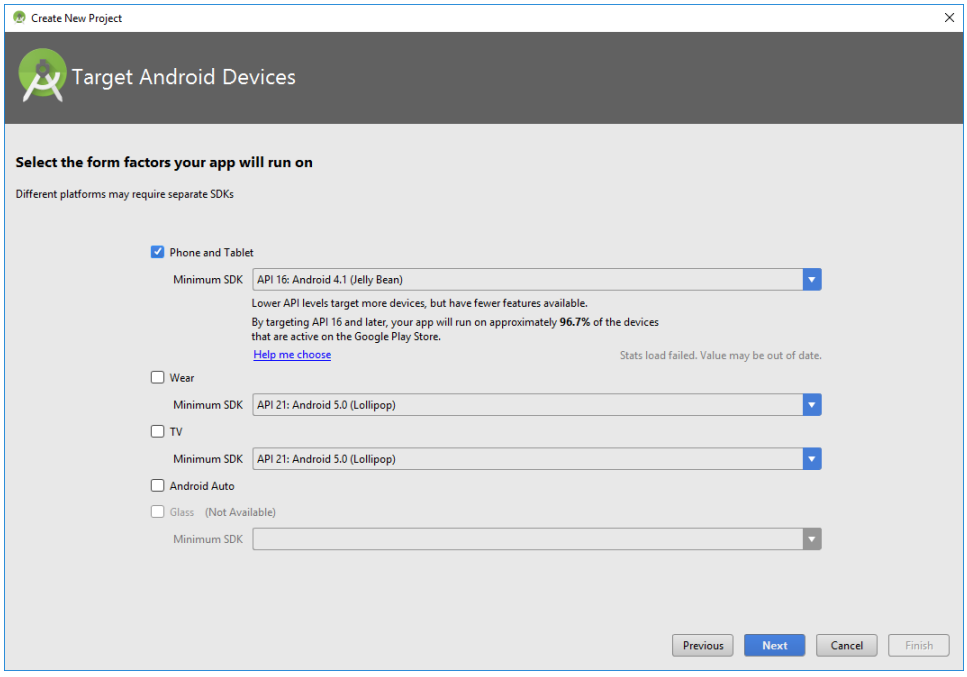
Activity Instructions

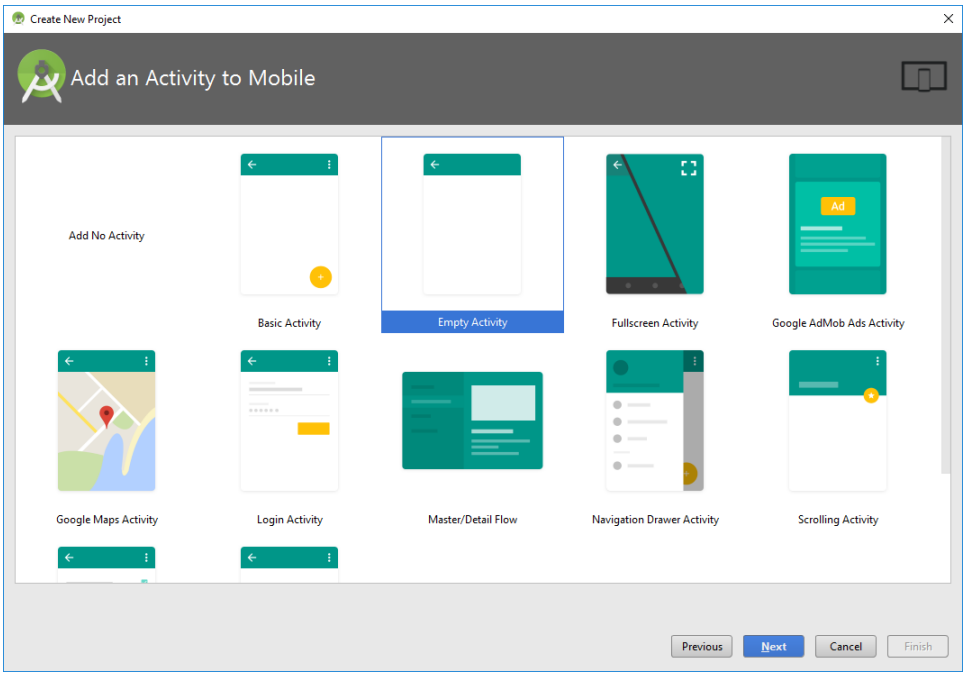
There two approaches that you can take to perform this activity:

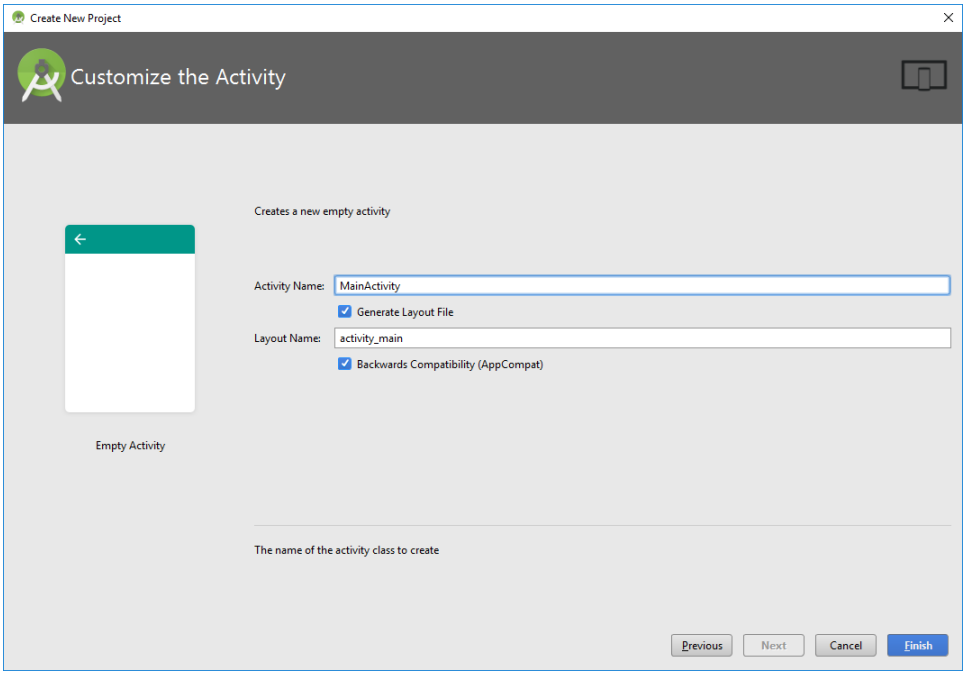
i. End-to-End development of the app by following all the below steps
ii. Using a pre-created version of this project and only resizing of the UI elements:
    a. Download the code for DemoApp03 from: https://github.com/milk-modules/Apps/tree/master/non-accessible
    b. Perform ONLY step #3

1. Project Creation
    a. Follow the screens below to create a new project:


Create New Project
New Project
Android Studio
Configure your new project
Application name:
DemoApp01
Company Domain:
milk.se.rit.edu
Package name:
edu.rit.se.milk.demoapp01
Edit
Include C++ Support
Project location:
C:\Projects\milk\Apps\accessible\DemoApp01
Previous
Next
Cancel
Finish


Create New Project
Target Android Devices
Select the form factors your app will run on
Different platforms may require separate SDKs
Phone and Tablet
Minimum SDK
API 16: Android 4.1 (Jelly Bean)
Lower API levels target more devices, but have fewer features available.
By targeting API 16 and later, your app will run on approximately 96.7% of the devices that are active on the Google Play Store.
Help me choose
Stats load failed. Value may be out of date.
Wear
Minimum SDK
API 21: Android 5.0 (Lollipop)
TV
Minimum SDK
API 21: Android 5.0 (Lollipop)
Android Auto
Glass (Not Available)
Minimum SDK
Previous
Next
Cancel
Finish





2. Construct User Interface
    a. From the Palette tool window, add the following UI controls into the screen layout.
        i. Update the following properties of the existing Relative Layout:
            - `layout_width="match_parent"`
            - `layout_height="match_parent"`
        ii. Within the existing Relative Layout add:

1. **Switch**
    - Update the following properties:
        - `text="Alternate Rendering"`
        - `layout_width="match_parent"`
        - `layout_height="wrap_content"`
        - `id="@+id/switchAccessibility"`
        - `focusable="false"`
2. **Relative Layout**:
    - Update the following properties:
        - `layout_width="match_parent"`
        - `layout_height="wrap_content"`
        - `id="@+id/layoutContents"`
        - `layout_weight="100"`
    - Add the following UI controls:
        i. **Button**:
            - Update the following properties:
                - `android:text="Yes"`
                - `android:layout_width="50dp"`
                - `android:layout_height="35dp"`
                - `android:layout_alignParentTop="true"`
                - `android:layout_alignParentLeft="true"`
                - `android:layout_alignParentStart="true"`
                - `android:layout_marginTop="146dp"`
                - `android:id="@+id/buttonLeft"`
                - `android:background="@android:drawable/btn_default"`
                - `android:gravity="center"`
                - `android:layout_gravity="left|center"`
                - `android:layout_marginLeft="130dp"`

        ii. TextView:
            - Update the following properties:
                - `android:text="Is this the greatest app of all time?"`
                - `android:layout_width="match_parent"`
                - `android:layout_height="wrap_content"`
                - `android:id="@+id/textView"`
                - `android:textAppearance="@android:style/TextAppearance.DeviceDefault.Medium"`
                - `android:layout_above="@+id/buttonRight"`
                - `android:layout_marginBottom="36dp"`

- android:textStyle="normal|bold"
- android:textAlignment="center"
- android:layout_alignParentLeft="false"
- android:layout_alignParentStart="false"
- android:layout_alignParentRight="false"
- android:layout_alignParentEnd="false"
- android:gravity="center_horizontal""

iii. **Button:**

- Update the following properties:
  - android:text="No"
  - android:layout_width="45dp"
  - android:layout_height="35dp"
  - android:id="@+id/buttonRight"
  - android:layout_gravity="right"
  - android:background="@android:drawable/btn_default"
  - android:gravity="center"
  - android:layout_alignTop="@+id/buttonLeft"
  - android:layout_alignParentRight="true"
  - android:layout_alignParentEnd="true"
  - android:layout_marginRight="130dp"

3. **Relative Layout**

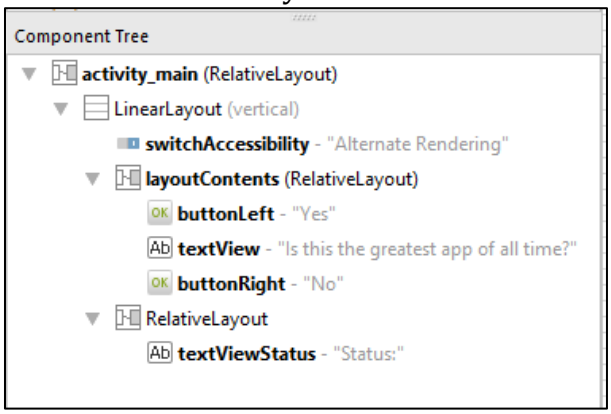
- Update the following properties:
  - layout_width="match_parent"
  - layout_height="wrap_content"
  - layout_weight="1"
- Add the following UI controls:

i. **TextView**:

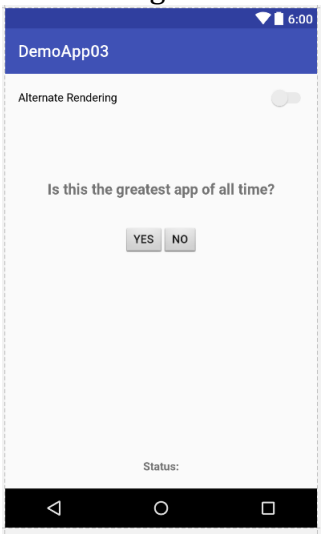
- Update the following properties:
- layout_width="match_parent"
- layout_height="wrap_content"
- id="@+id/textViewStatus"
- layout_alignParentTop="true"
- layout_alignParentLeft="true"
- layout_alignParentStart="true"
- textAlignment="center"
- textStyle="normal|bold"
- layout_alignParentRight="true"
- layout_alignParentEnd="true"

- `text="Status:"`
- `gravity="bottom"`

Following is the hierarchical layout of the controls on the screen:



Following is the rendering of controls on the screen:

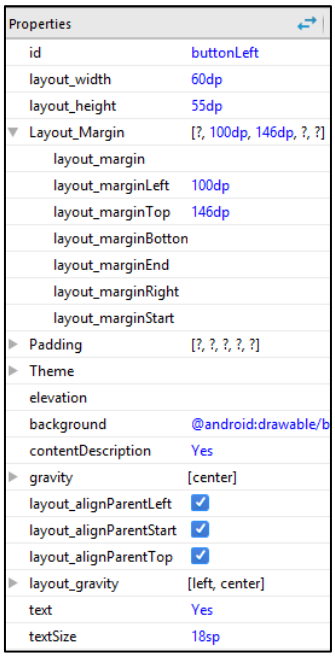


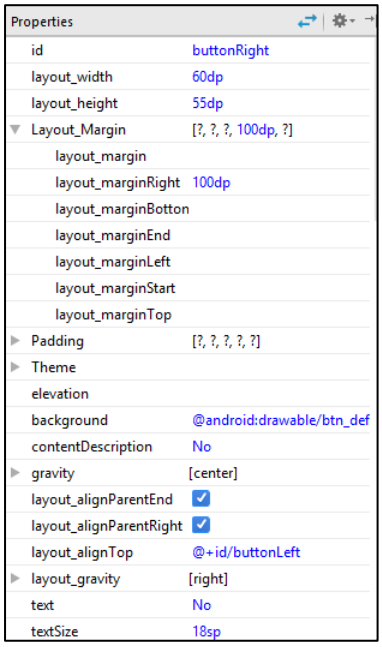
3. <u>Resize & Respace Buttons</u>
   The recommend size for touch targets should be at least 48 x 48 dp. There should also be a spacing of 8dp or more between the targets.

   Select the Button with id “buttonLeft”. Update the following properties:
   - layout_width = 60dp
   - layout_height = 55dp
   - layout_marginLeft = 100dp
   - textSize = 18sp
   -

   Select the Button with id “buttonRight”. Update the following properties:
   - layout_width = 60dp

- layout_height = 55dp
- layout_marginRight = 100dp
- textSize = 18sp





4. Code

Open MainActivity.java and add the following code:

```
package edu.rit.se.milk.demoapp03;

import android.graphics.Color;
import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.support.v7.widget.ButtonBarLayout;
import android.view.Gravity;
import android.view.View;
import android.view.ViewGroup;
import android.widget.Button;
import android.widget.CompoundButton;
import android.widget.LinearLayout;
import android.widget.RelativeLayout;
import android.widget.Switch;
import android.widget.TextView;
import android.widget.RelativeLayout.LayoutParams;

import java.util.Random;
import java.util.Timer;
import java.util.TimerTask;

import static android.R.attr.button;
```

```
public class MainActivity extends AppCompatActivity {

    Button buttonLeft, buttonRight;
    TextView textStatus;
    Switch switchRendering;

    RelativeLayout layoutCover;

    Timer buttonMoveTimer;

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

        buttonLeft = (Button) findViewById(R.id.buttonLeft);
        buttonRight = (Button) findViewById(R.id.buttonRight);
        textStatus = (TextView) findViewById(R.id.textViewStatus);
        switchRendering = (Switch) findViewById(R.id.switchAccessibility);
        layoutCover = (RelativeLayout) findViewById(R.id.layoutContents);

        setupEventHandlers();
    }

    private void setupEventHandlers() {
        buttonLeft.setOnClickListener(
                new View.OnClickListener() {
                    @Override
                    public void onClick(View v) {
                        textStatus.setText("Button Tapped: \"Yes\"");
                    }
                }
        );

        buttonRight.setOnClickListener(
                new View.OnClickListener() {
                    @Override
                    public void onClick(View v) {
                        textStatus.setText("Button Tapped: \"No\"");
                    }
                }
        );

        switchRendering.setOnCheckedChangeListener(new
CompoundButton.OnCheckedChangeListener() {
            @Override
            public void onCheckedChanged(CompoundButton buttonView, boolean isChecked) {
                if (isChecked) {
                    // reset();
                    buttonMoveTimer = new Timer();
                    buttonMoveTimer.schedule(new TimerTask() {
                        @Override
                        public void run() {
                            runOnUiThread(new Runnable() {
                                @Override
                                public void run() {
                                    moveButton();
                                }
                            });
                        }
```

```
                }, 0, 50);
            } else {
                reset();
                buttonMoveTimer.cancel();
            }
        }
    });
}

private void reset() {
    setContentView(R.layout.activity_main);

    buttonLeft = (Button) findViewById(R.id.buttonLeft);
    buttonRight = (Button) findViewById(R.id.buttonRight);
    textStatus = (TextView) findViewById(R.id.textViewStatus);
    switchRendering = (Switch) findViewById(R.id.switchAccessibility);
    layoutCover = (RelativeLayout) findViewById(R.id.layoutContents);

    setupEventHandlers();
}

private void moveButton() {
    Random rand = new Random();
    int leftX = rand.nextInt(1) + 1;
    int rightX = rand.nextInt(2) + 1;
    int rightY = rand.nextInt(3) + 1;
    int leftY = rand.nextInt(4) + 1;

    int directionX = rand.nextInt(2) + 1;
    int directionY = rand.nextInt(2) + 1;

    if (directionX == 1) {
        buttonLeft.setX(buttonLeft.getX() + leftX);
        buttonLeft.setY(buttonLeft.getY() + leftY);

        buttonRight.setX(buttonRight.getX() - rightX);
        buttonRight.setY(buttonRight.getY() - rightY);
    } else {
        buttonLeft.setX(buttonLeft.getX() - leftX);
        buttonLeft.setY(buttonLeft.getY() - leftY);

        buttonRight.setX(buttonRight.getX() + rightX);
        buttonRight.setY(buttonRight.getY() + rightY);
    }


}
}
```

The above code achieves the following:

1. A timer to move the buttons
2. Handles the onCheckedChange event of the Switch control to:
    a. Move the buttons when the switch is checked (i.e. set to “On”)
    b. Reset the layout of the buttons when unchecked (i.e. set to “Off”)