Speech-based accessibility

Background

This module demonstrates the use of a UI element's *contentDescription* attribute to provide speech-based accessibility.

A working version of this app is available at: https://github.com/milk-modules/Apps/tree/master/accessible/DemoApp01

Prerequisite

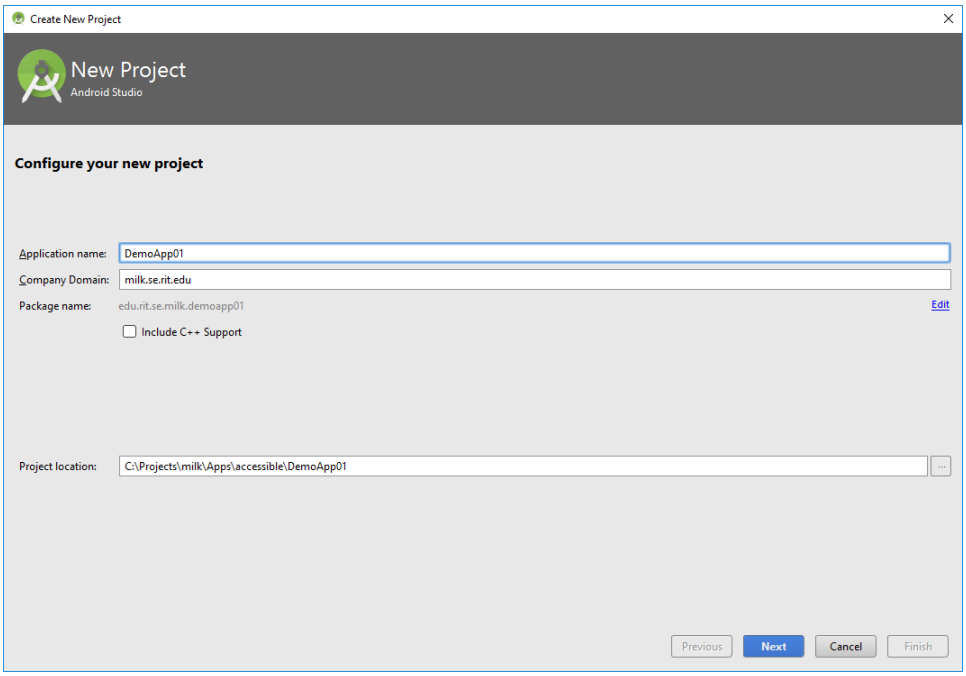
1. Android studio is installed on the development workstation
2. A working Android emulator is available for testing
3. TalkBack is enabled on the emulator.
    a. Details on installing and activating TalkBack: https://milk-modules.github.io/activities/general/Android_TalkBack_Install.pdf

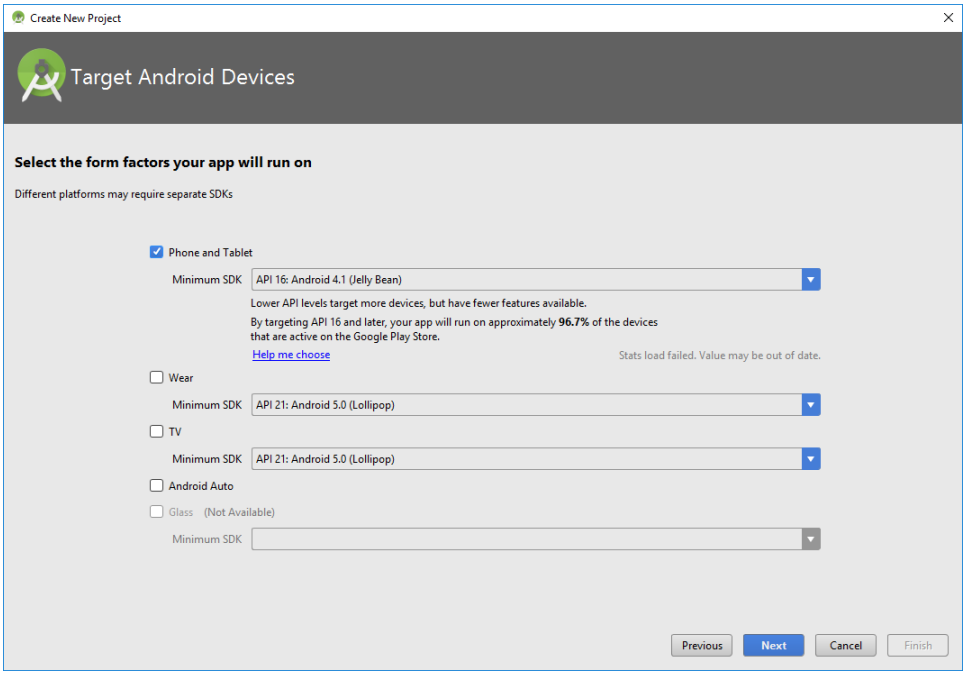
Activity Instructions

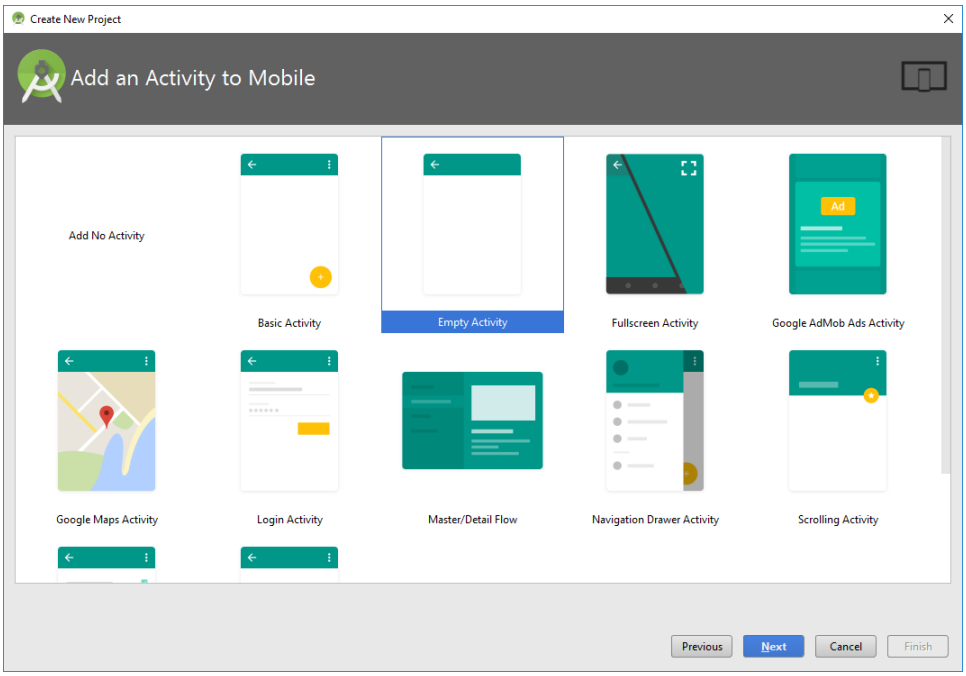
There two approaches that you can take to perform this activity:

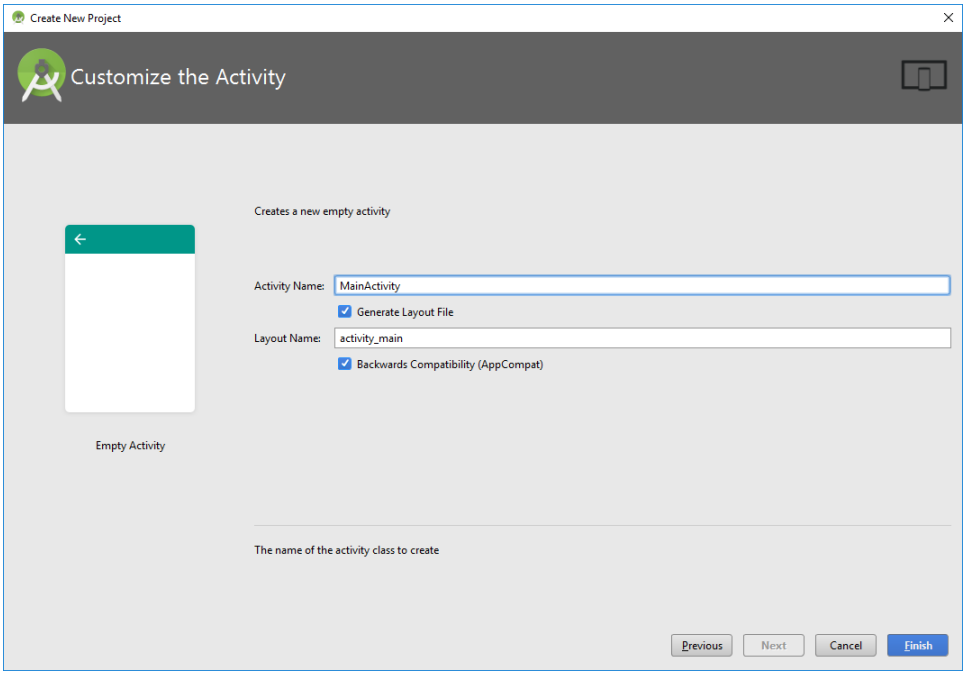
i. End-to-End development of the app by following all the below steps
ii. Using a pre-created version of this project and only applying the *contentDescription* functionality:
    a. Download the code for DemoApp01 from: https://github.com/milk-modules/Apps/tree/master/non-accessible
    b. Perform ONLY 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:
                - `text="&#60;&#60;--"`
                - `layout_width="wrap_content"`
                - `layout_height="wrap_content"`
                - `layout_alignParentTop="true"`
                - `layout_alignParentLeft="true"`
                - `layout_alignParentStart="true"`
                - `layout_marginTop="146dp"`
                - `id="@+id/buttonLeft"`
                - `background="@android:drawable/btn_default"`
                - `gravity="center"`
                - `layout_gravity="left|center"`
                - `layout_marginLeft="50dp"`

        ii. TextView
            - Update the following properties:
                - `text="Tap the Back or Next button to proceed"`
                - `layout_width="match_parent"`
                - `layout_height="wrap_content"`
                - `id="@+id/textView"`
                - `textAppearance="@android:style/TextAppearance.DeviceDefault.Medium"`
                - `layout_above="@+id/buttonRight"`
                - `layout_marginBottom="36dp"`
                - `textStyle="normal|bold"`
                - `textAlignment="center"`
                - `layout_alignParentLeft="false"`
                - `layout_alignParentStart="false"`
                - `layout_alignParentRight="false"`
                - `layout_alignParentEnd="false"`

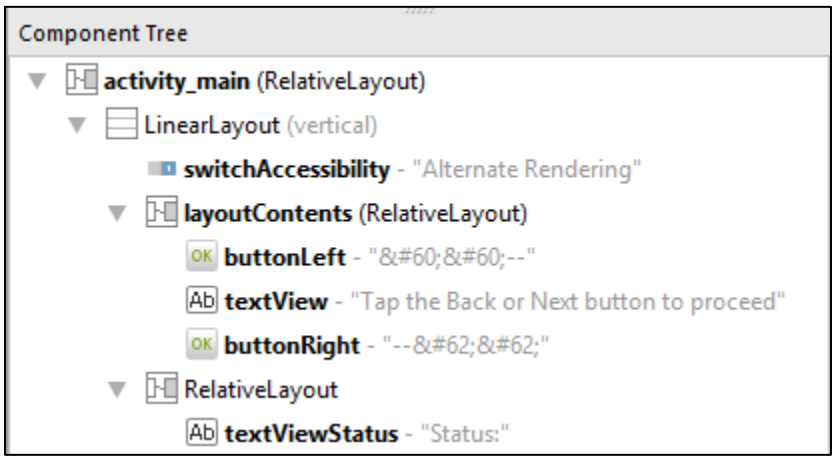
- `gravity="center_horizontal"`

iii. **Button**

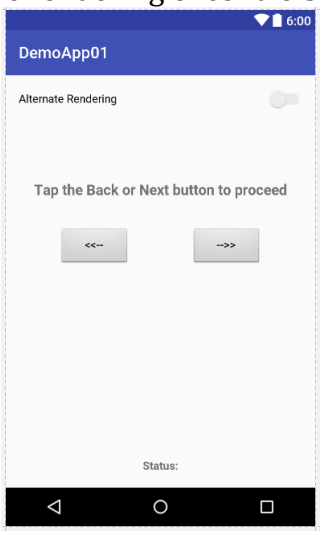
- Update the following properties:
  - `text="--&#62;&#62;"`
  - `layout_width="wrap_content"`
  - `layout_height="wrap_content"`
  - `id="@+id/buttonRight"`
  - `layout_gravity="right"`
  - `background="@android:drawable/btn_default"`
  - `gravity="center"`
  - `layout_alignTop="@+id/buttonLeft"`
  - `layout_alignParentRight="true"`
  - `layout_alignParentEnd="true"`
  - `layout_marginRight="50dp"`

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:

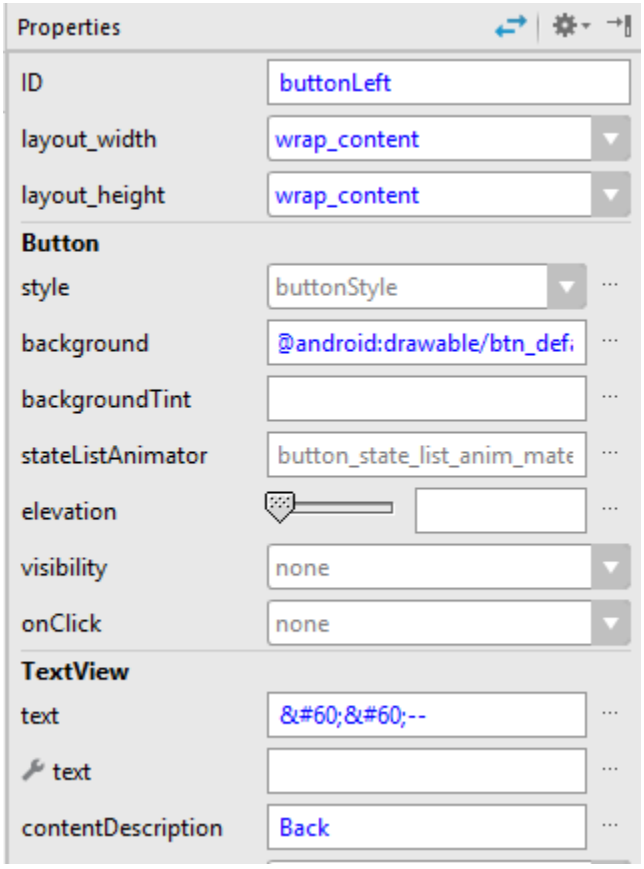


Following is the rendering of controls on the screen:

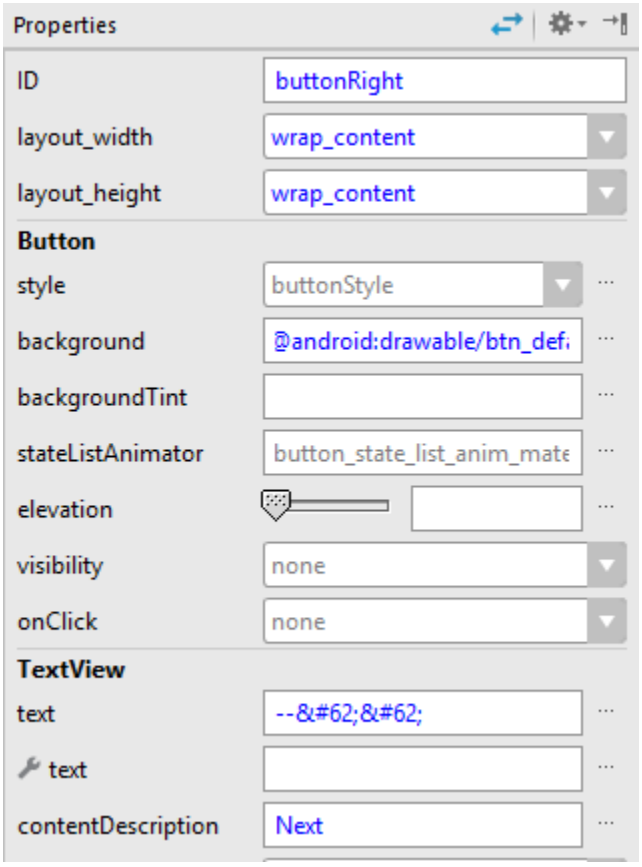


3. <u>Set Content Description</u>
   The "contentDescription" property of a control is utilized for accessibility purposes. The text associated with this property defines the content of this control and is used by Android's TalkBack feature.

   Select the Button with id "buttonLeft". Set contentDescription to "Back"



Select the Button with id “buttonRight”. Set contentDescription to “Next”



4. Code

Open MainActivity.java and add the following code:

a. Declare the following variables:

```
public class MainActivity extends AppCompatActivity {

    Button buttonLeft, buttonRight;
    TextView textStatus;
    Switch switchRendering;
    RelativeLayout layoutCover;
```

b. Add the following code inside the **onCreate** method:

```
@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);

    switchRendering.setOnCheckedChangeListener(new CompoundButton.OnCheckedChangeListener() {
        @Override
        public void onCheckedChanged(CompoundButton buttonView, boolean isChecked){
            if (isChecked) {
                layoutCover.setBackgroundColor(Color.BLACK);
                buttonLeft.setBackgroundColor(Color.BLACK);
                buttonRight.setBackgroundColor(Color.BLACK);
            }
            else
            {
                layoutCover.setBackgroundColor(Color.TRANSPARENT);
                buttonLeft.setBackgroundResource(android.R.drawable.btn_default);
                buttonRight.setBackgroundResource(android.R.drawable.btn_default);
            }
        }
    });


    buttonLeft.setOnClickListener(
            new View.OnClickListener() {
                @Override
                public void onClick(View v) {
                    textStatus.setText("Button Tapped: Back (Left)");
                }
            }
    );

    buttonRight.setOnClickListener(
            new View.OnClickListener() {
                @Override
                public void onClick(View v) {
                    textStatus.setText("Button Tapped: Next (Right)");
                }
            }
    );
}
```

The above code achieves the following:

1. Handles the onCheckedChange event of the Switch control to:
    a. Set the color of all the controls to Black so that none of the controls are visible when the switch is checked (i.e. set to “On”)
    b. Sets the colors of all the controls to their original colors when the switch is unchecked (i.e. set to “Off”)