

CMPS 312

Read Chapter 1 & 6



Views & Layout

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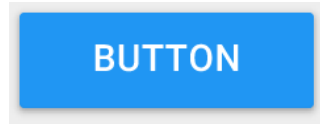
Outline

1. Views
2. Constraint Layout

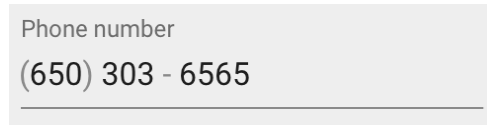
Views

View Examples

Button



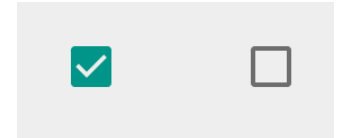
EditText



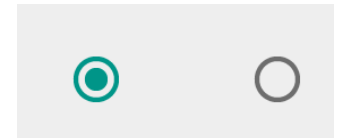
Slider



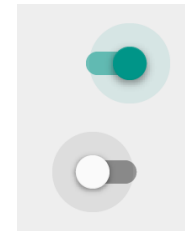
CheckBox



RadioButton



Switch



Views and ViewGroups

- **View = Widget = Control**
 - Examples: Button, Switch, Spinner, TextView, EditText
 - Advanced Views (covered later): RecyclerView & MapView
- **ViewGroup = Container**
 - Views that contain other views
 - Examples: LinearLayout, TableLayout, ScrollView
- **Common Attributes**
 - id (i.e. **android:id="@+id/myViewId"**)
 - Layout_width, layout_height
 - Values: match_parent (or 0dp), wrap_content, 16dp

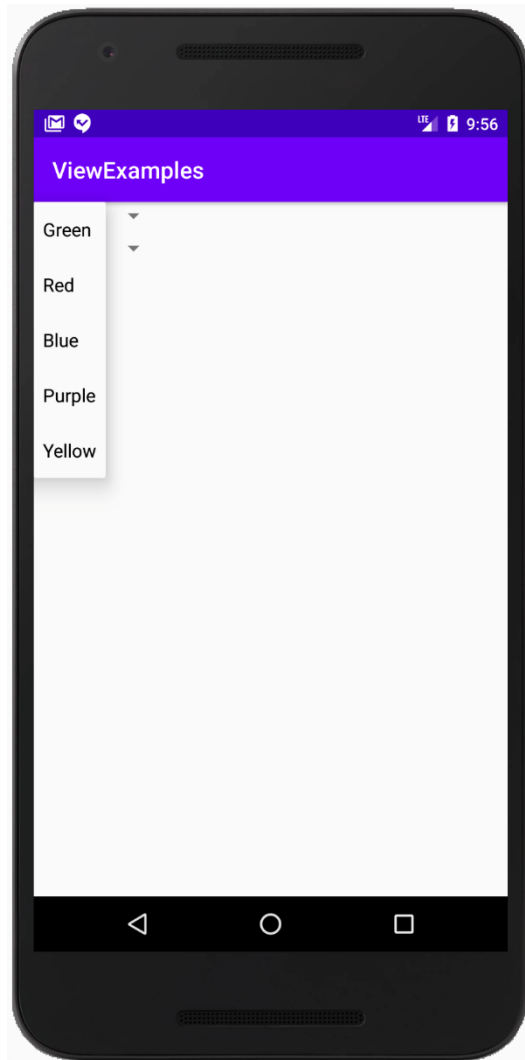
Views (Attributes and Listeners)

- TextView (text labels)
 - text, textAppearance
 - .setClickable(boolean) – make clickable
 - .setOnClickListener(View.OnClickListener)
- EditText (text fields)
 - inputType
 - .addTextChangedListener(TextWatcher)
- Button
 - text
 - .setOnClickListener(View.OnClickListener)
- ImageView (display image)
 - .setClickable(boolean) – make clickable
 - .setImageDrawable(Drawable) – set icon to display
 - .setOnClickListener(View.OnClickListener)

Views (Attributes and Listeners)

- **Switch (on/off)**
 - `.setChecked(boolean)` – set check state
 - `.setOnCheckedChangeListener(CompoundButton.OnCheckedChangeListener)`
- **Spinner (dropdown list)**
 - `entries` or `.setAdapter(ArrayAdapter)` – specify list values
 - `.setSelection(int)` – specify selected item
 - `onItemSelectedListener(`
`AdapterView.OnItemSelectedListener)`
- **SearchView**
 - `queryHint` – Background text displayed when the field is empty
 - `iconifiedByDefault` – Display the field or just an icon until clicked
 - `.setIconified(boolean)` – make always visible
 - `.setOnQueryTextListener(SearchView.OnQueryTextListener)`

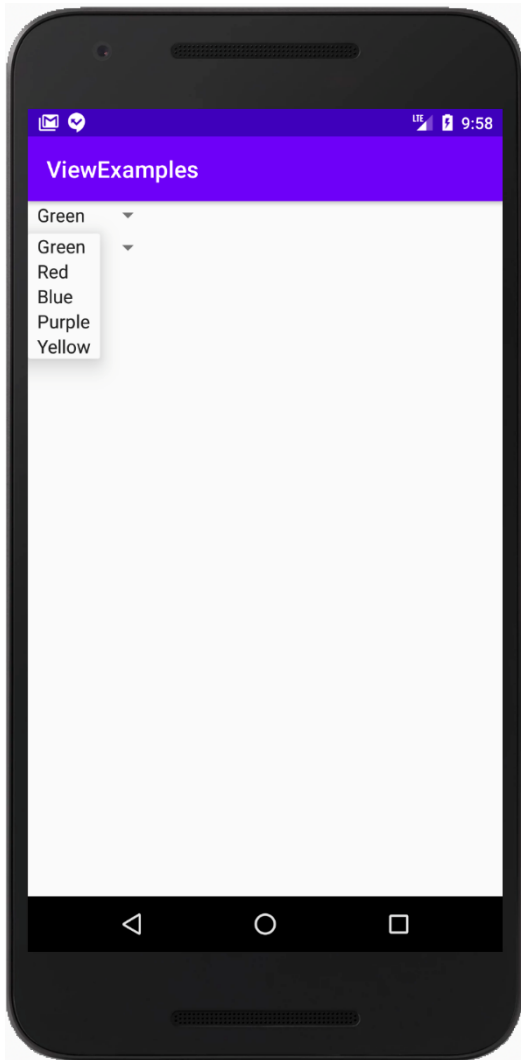
Setting Entries of a Spinner in the XML Layout File



```
<Spinner
    android:id="@+id/colorSelector1"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginEnd="32dp"
    android:layout_marginBottom="4dp"
    android:entries="@array/colorChoices"/>
```

```
strings.xml
1  <resources>
2      <string name="app_name">ViewExamples</string>
3
4      <string-array name="colorChoices">
5          <item>Green</item>
6          <item>Red</item>
7          <item>Blue</item>
8          <item>Purple</item>
9          <item>Yellow</item>
10     </string-array>
11
12 </resources>
```


Setting Entries of a Spinner in Code



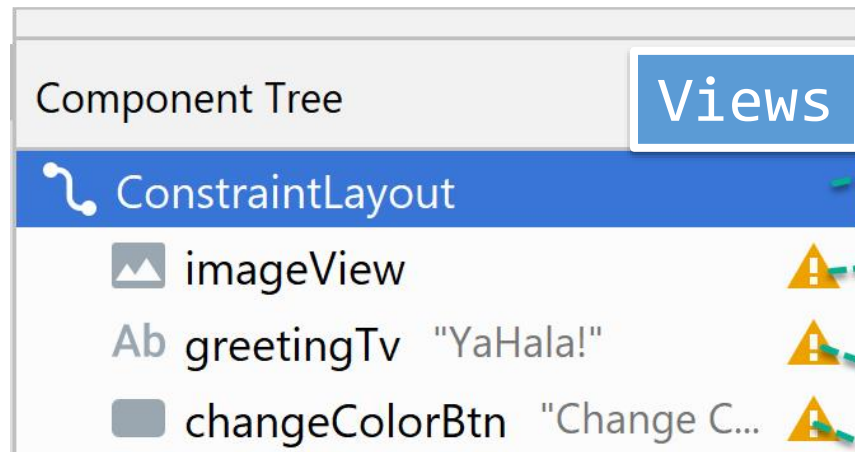
```
<Spinner
    android:id="@+id/colorSelector2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginEnd="32dp"
    android:layout_marginBottom="4dp"/>
```

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

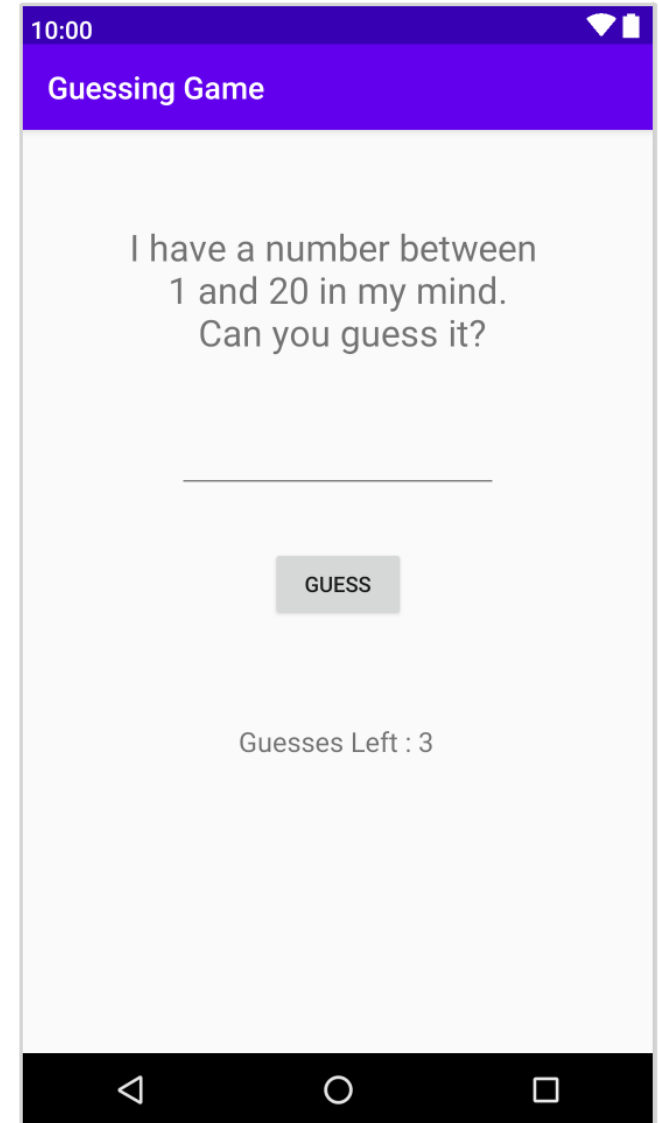
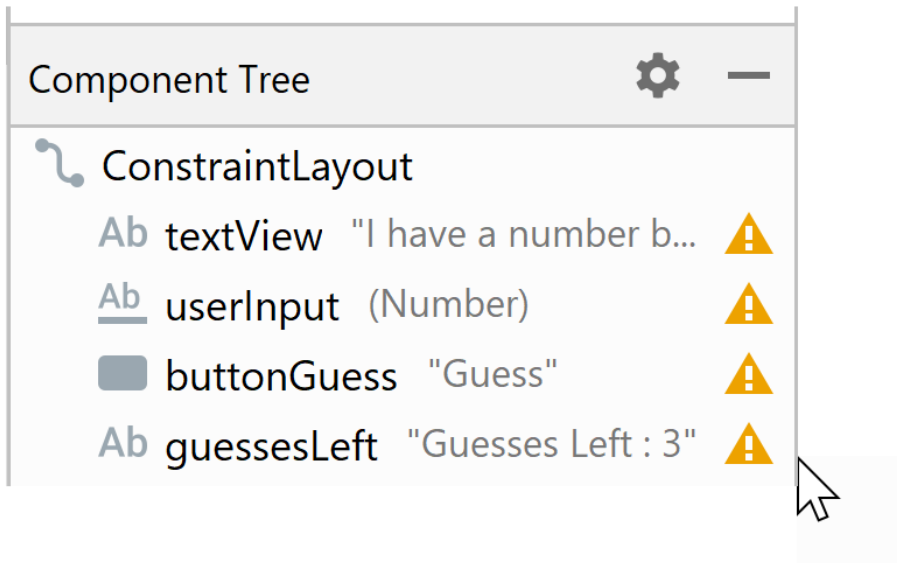
    Spinner colorSelector2 = findViewById(R.id.colorSelector2);
    ArrayAdapter<CharSequence> adapter =
        ArrayAdapter.createFromResource(context: this,
            R.array.colorChoices, android.R.layout.simple_spinner_item);
    colorSelector2.setAdapter(adapter);
}
```

App 1 - Color Changer

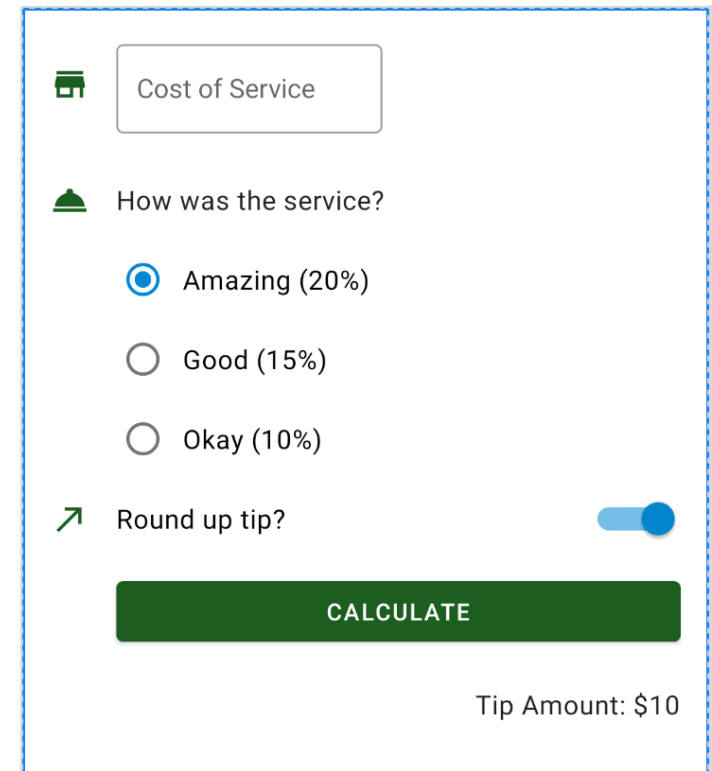
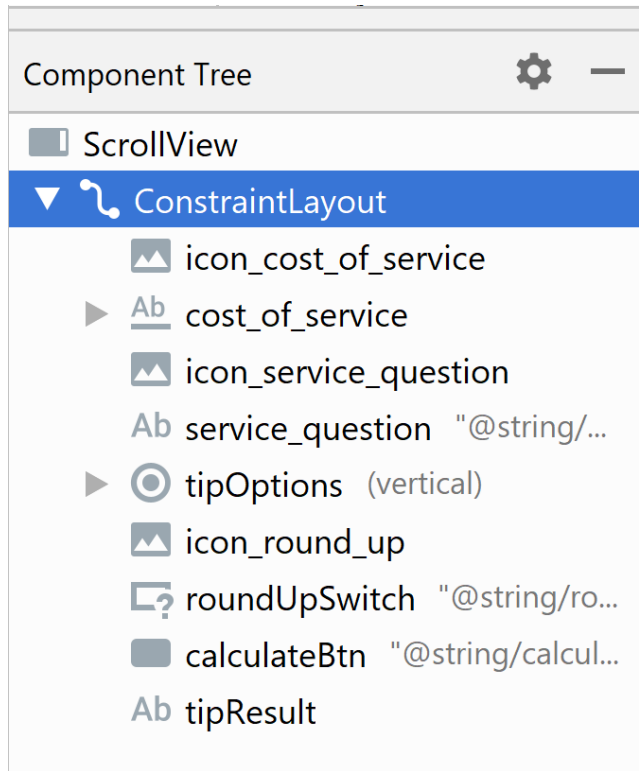
App that contains Text reading “YaHala!”, an Image and a **Button** that randomly changes text’s color with every click



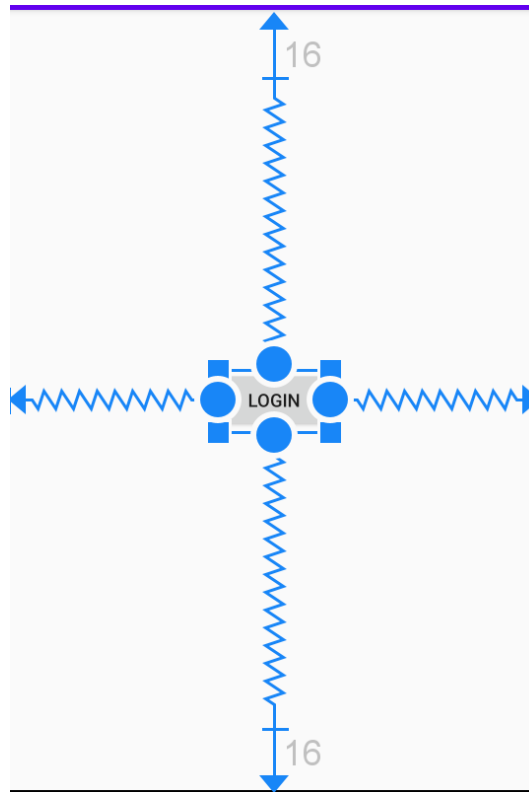
App 2 – Guessing Game



App 3 – Tips Calculator



Constraint Layout



Layouts



- Layout automatically **controls** the **size** and **placement** of views to create a **Responsive UI**
 - Frees programmer from handling/hardcoding the sizing and positioning of UI elements
 - **Responsive UI** = When the screen is resized, the UI components reorganize themselves based on the rules of the layout

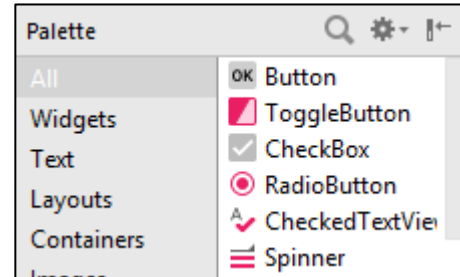
Constraint Layout

- ConstraintLayout: Allows building a Responsive UI by connecting views with constraints
 - Position a view relative others including the parent
 - Need to add at least one horizontal and one vertical constraint
 - Constraint is a connection to another view, parent layout, or invisible Guideline / Barrier
 - Uses constraints to determine the position and alignment of UI elements
 - Allows positioning UI elements in various ways: relative, centered, using **flow**

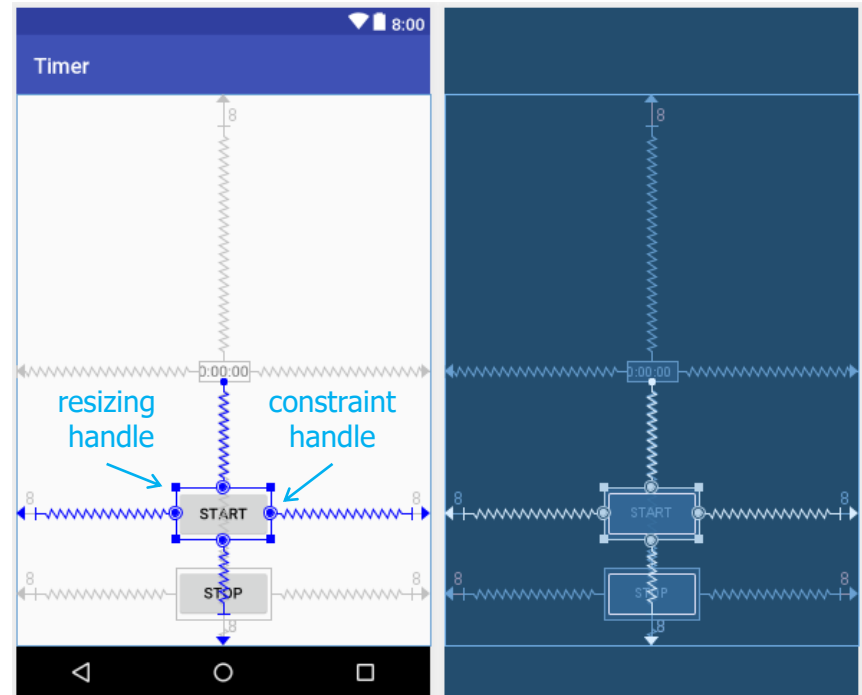
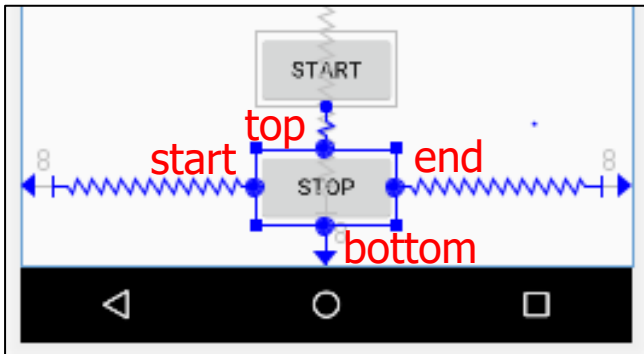
Defining Constraints

Steps

1. Drop a view to the editor
2. Connect constraint handles
(e.g., top/bottom/left/right)

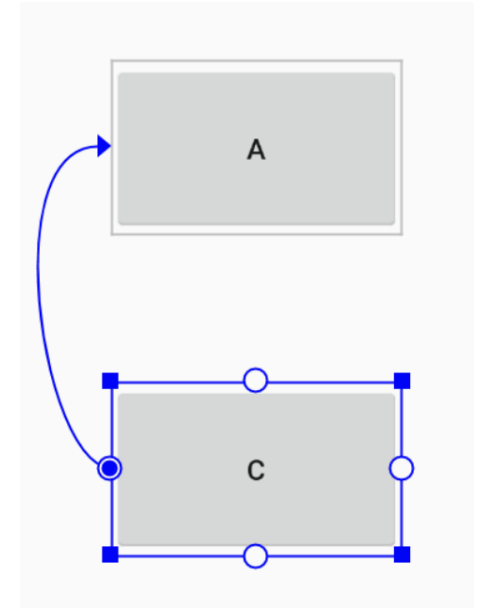


At least **one horizontal** and **one vertical** constraint



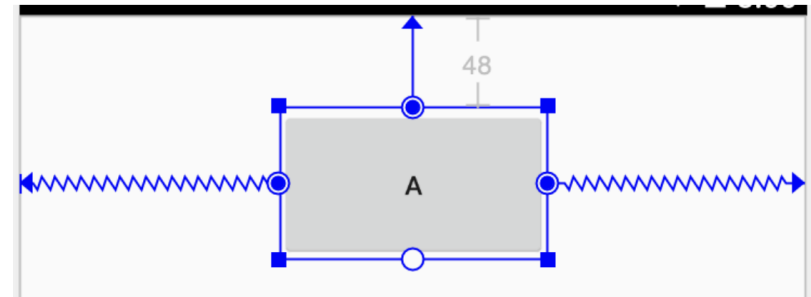
Alignment

- Align the edge of a view to the same edge of another view.
- The left side of C is aligned to the left side of A. If you want to align the view centers, create a constraint on both sides



Bias

- If you add opposing constraints on a view, the constraint lines become like a **spring** to indicate the opposing forces.
- The view becomes centered between the two constraints with a bias of 50% by default.
- You can adjust the bias by dragging the view



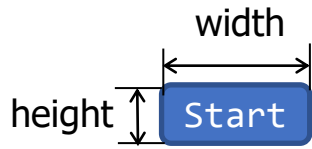
View Constraints Editor

Constraint Widget

Diagram illustrating the View Constraints Editor interface. The central widget is connected to four parent widgets (top, bottom, left, right) via lines with arrowheads. Each connection has a numeric value in a box: top (16), bottom (16), left (0), and right (0). A vertical slider on the left is labeled '50' and 'Constraint Bias'. A horizontal slider at the bottom is labeled '50'. A green callout 'Delete Constraint' points to the left connection. A green callout 'Margins' points to the right connection. A green callout 'Height / Width Mode' points to the bottom connection. A green callout 'Constraint Bias' points to the bottom slider.

▼ Constraints

- Start → StartOf **parent** (0dp)
- End → EndOf **parent** (0dp)
- Top → TopOf **parent** (16dp)
- Bottom → BottomOf **parent** (16dp)
- Horizontal Bias (0.5)

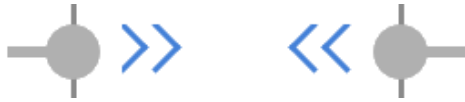


View Size



`layout_width="0dp"`

- The view expands to **match constraints** on each side (after accounting for the view's margins)
 - View will grow/shrink on resizing



`layout_width="wrap_content"`

- The view expands as needed to **fit** its contents

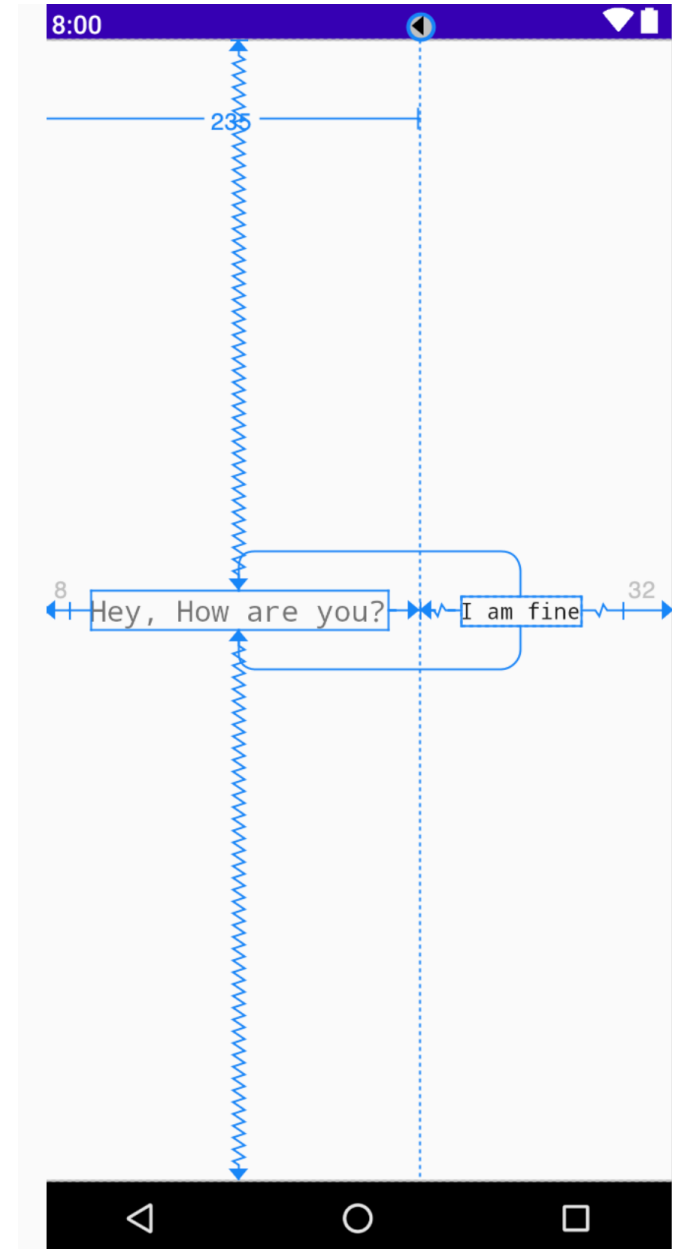


`layout_width="200dp"`

- **Fixed** size (e.g., 200dp density-independent pixels)

Guideline

- Add a vertical or horizontal **guideline** to which you can constrain views, and the guideline will be invisible to app users.
- Position the guideline within the layout based on either **dp** units or percent, relative to the layout's edge



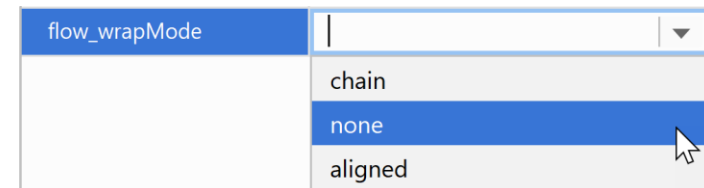
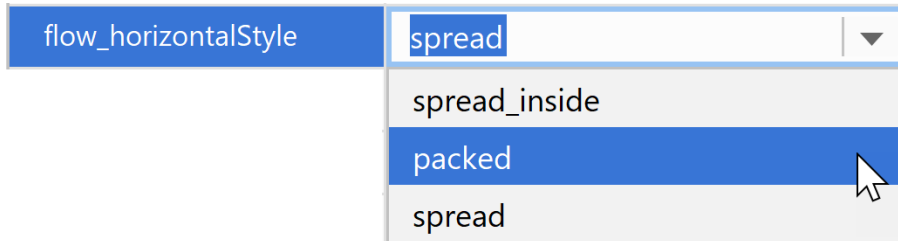
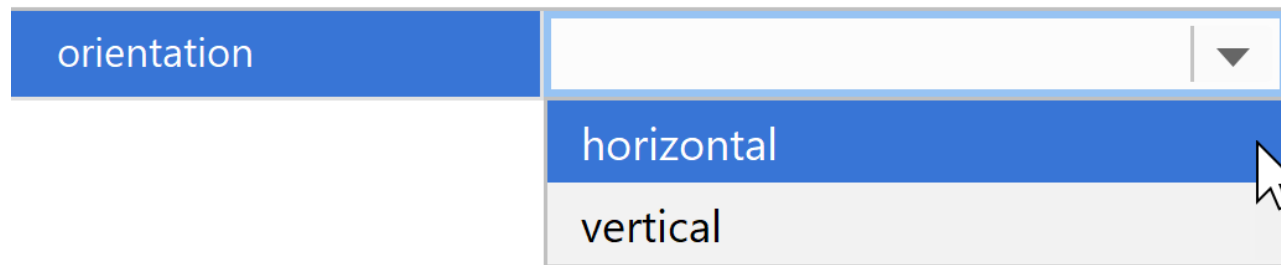
Barrier





```
<android.support.constraint.Barrier
    android:id="@+id/barrier"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    app:barrierDirection="start"
    app:constraint_referenced_ids="button1,button2" />
```

Flow

- Flow provides an efficient way to distribute space among items in the flow while accommodating different screen sizes



Summary

- ConstraintLayout enables responsive design
.. mastering it will take some time and effort   ...