

ConstraintLayout: Inside and Out



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ConstraintLayout

Child View

Child View

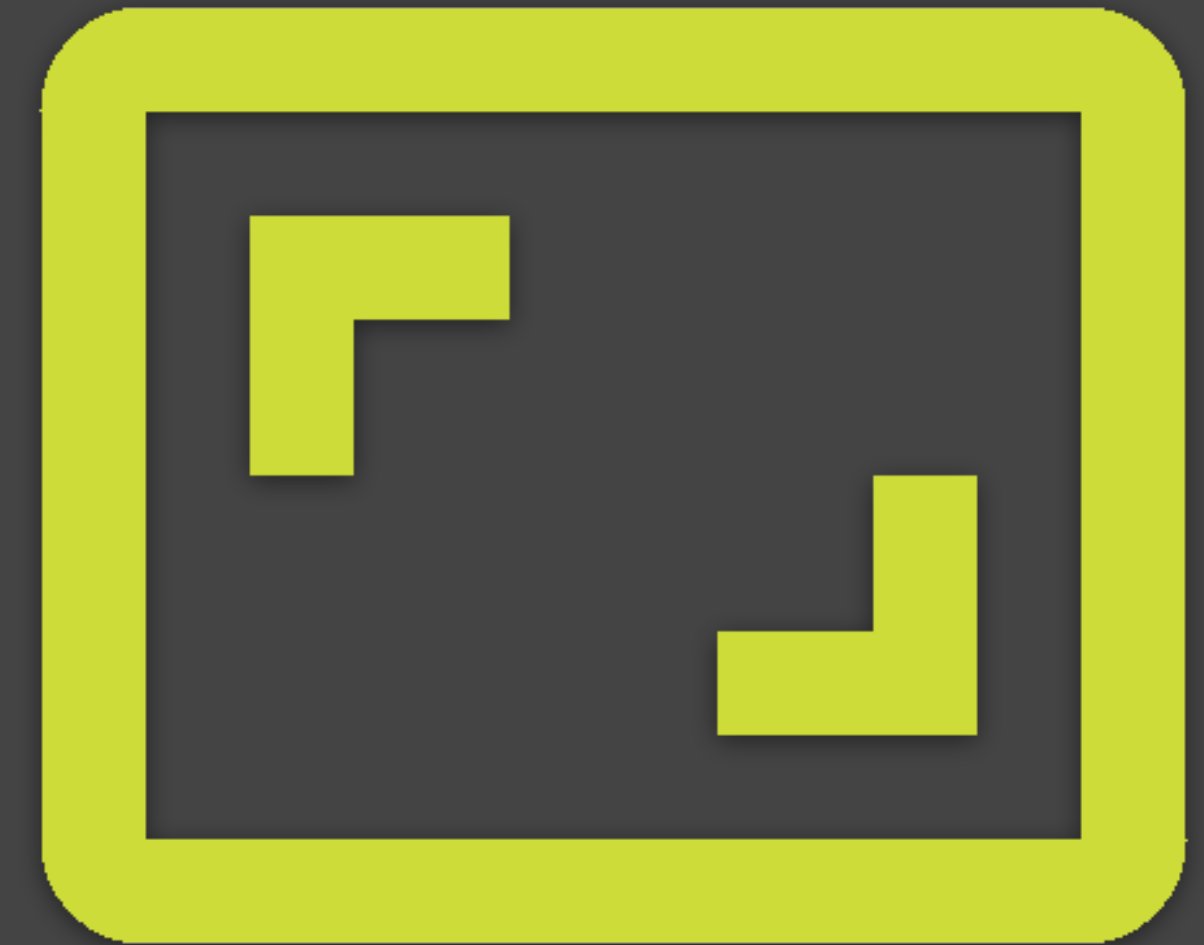
Child View



Positioning
Constraints



Internal
Mechanics



Sizing
Constraints



```
<android.support.constraint.ConstraintLayout
    ... >

<Button
    android:id="@+id/button_cancel"
    ...
    android:layout_marginBottom="16dp"
    android:layout_marginStart="16dp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintStart_toStartOf="parent"/>

<Button
    android:id="@+id/button_next"
    ...
    android:layout_marginBottom="16dp"
    android:layout_marginStart="16dp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintStart_toEndOf="@+id/button_cancel"/>

</android.support.constraint.ConstraintLayout>
```

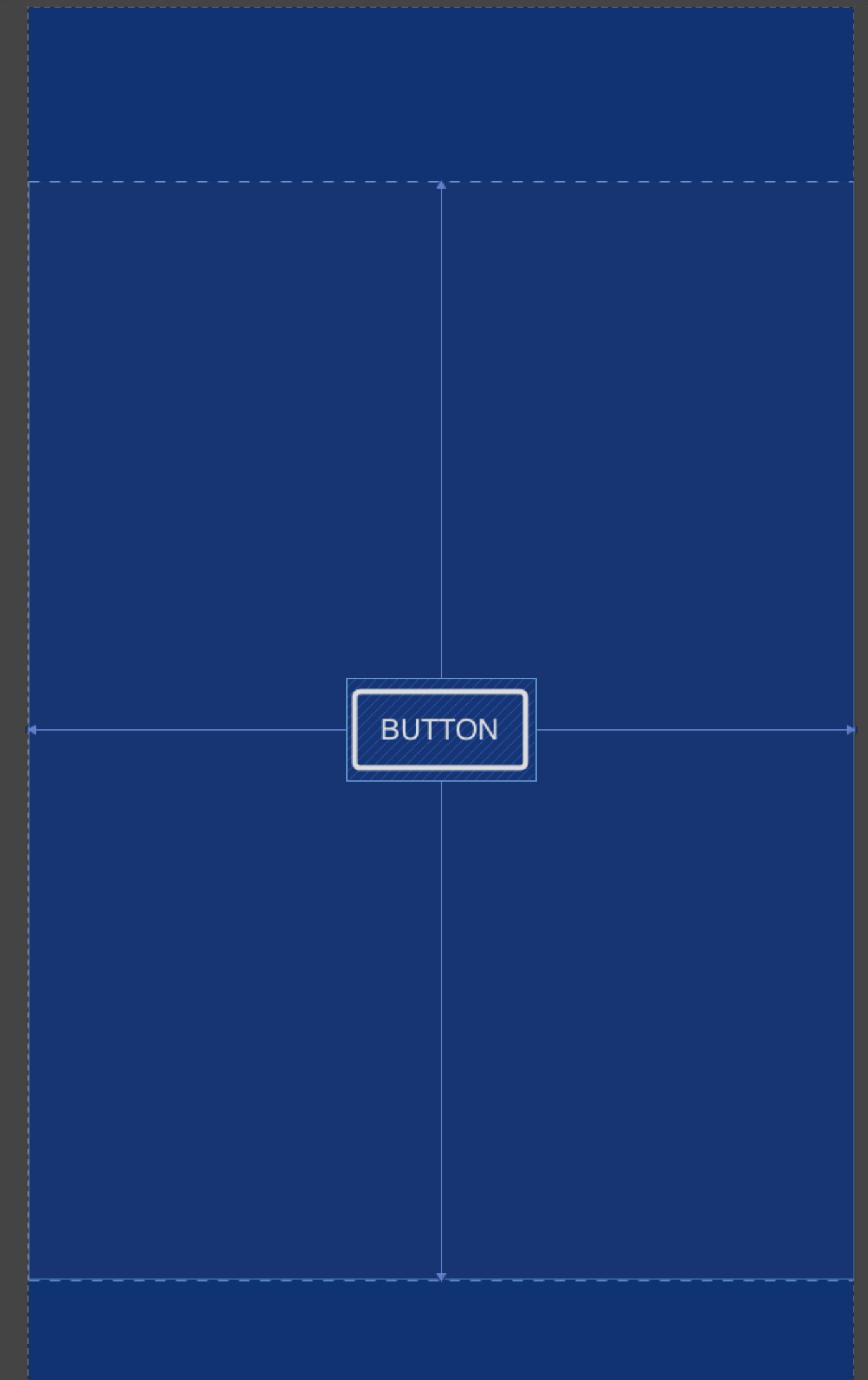




```
<android.support.constraint.ConstraintLayout
    ... >

<Button
    android:id="@+id/button"
    ...
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintEnd_toEndOf="parent"/>

</android.support.constraint.ConstraintLayout>
```

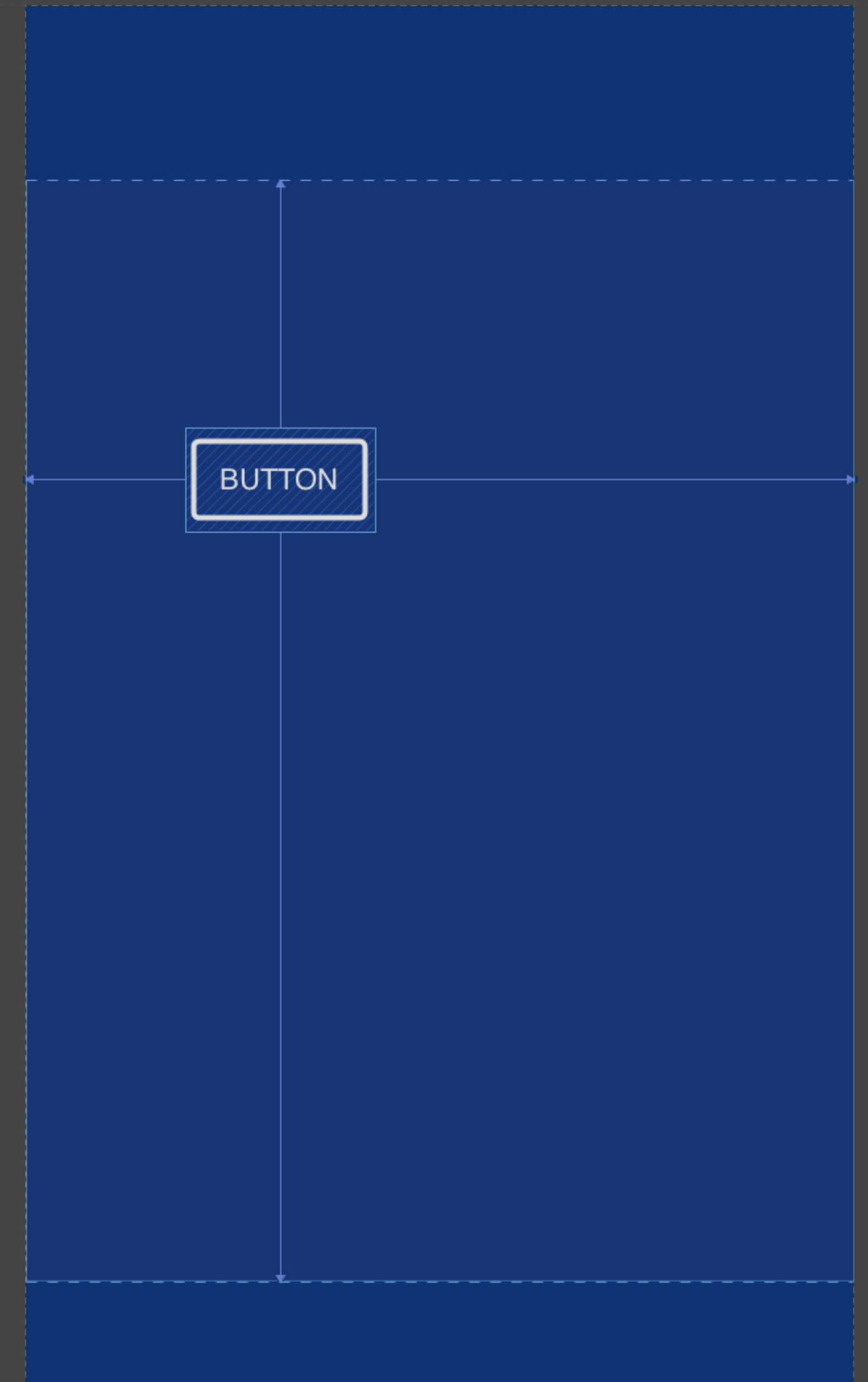




```
<android.support.constraint.ConstraintLayout
    ... >

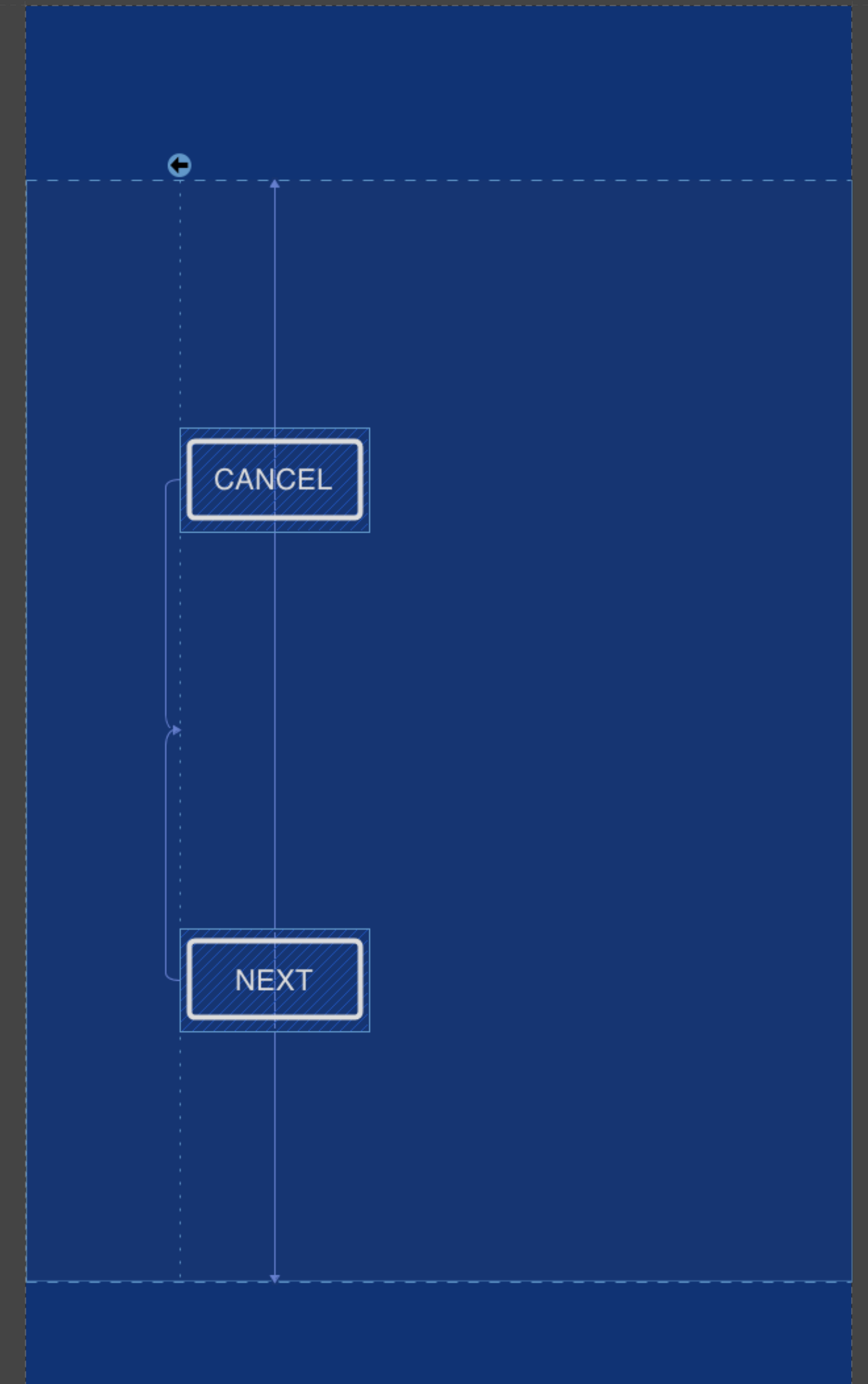
<Button
    android:id="@+id/button"
    ...
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.25"
    app:layout_constraintVertical_bias="0.25"/>

</android.support.constraint.ConstraintLayout>
```





Guidelines





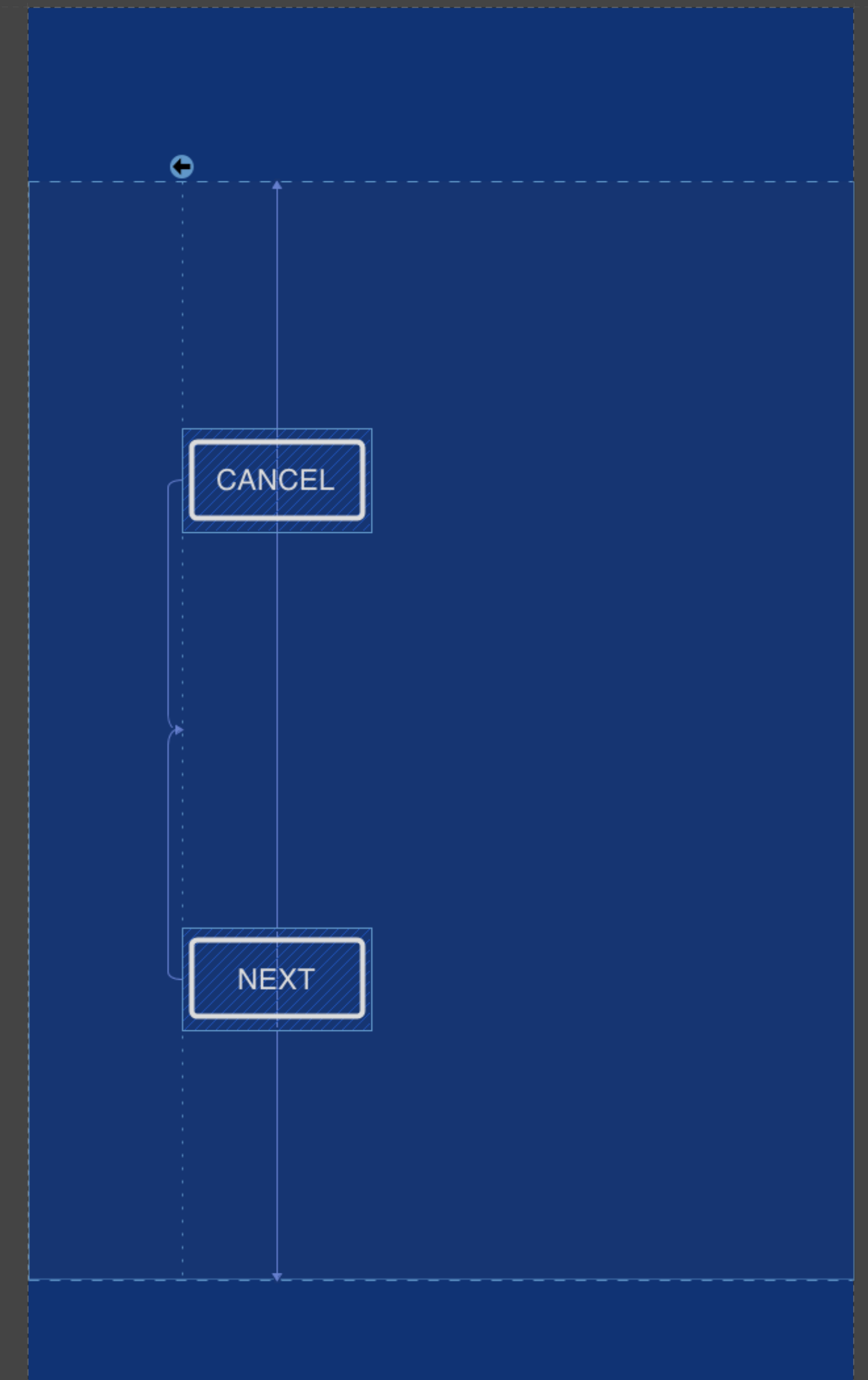
```
<android.support.constraint.ConstraintLayout
    ... >

    <android.support.constraint.Guideline
        android:id="@+id/guideline"
        ...
        android:orientation="vertical"
        app:layout_constraintGuide_percent="0.25"/>

    <Button
        android:id="@+id/button_cancel"
        ...
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="@+id/guideline"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.25"/>

    <Button
        android:id="@+id/button_next"
        ...
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="@+id/guideline"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.75"/>

</android.support.constraint.ConstraintLayout>
```





View Sizing



Wrap Content

`android:layout_width="wrap_content"`



Fixed Size

`android:layout_width="72dp"`



Match Parent

`android:layout_width="match_parent"`

LAYOUT PANCAKE

LAYOUT PANCAKE



View Sizing



Wrap Content

```
android:layout_width="wrap_content"
```



Fixed Size

```
android:layout_width="72dp"
```



Match Constraint ("any size")

```
android:layout_width="0dp"
```

LAYOUT PANCAKE

LAYOUT PANCAKE

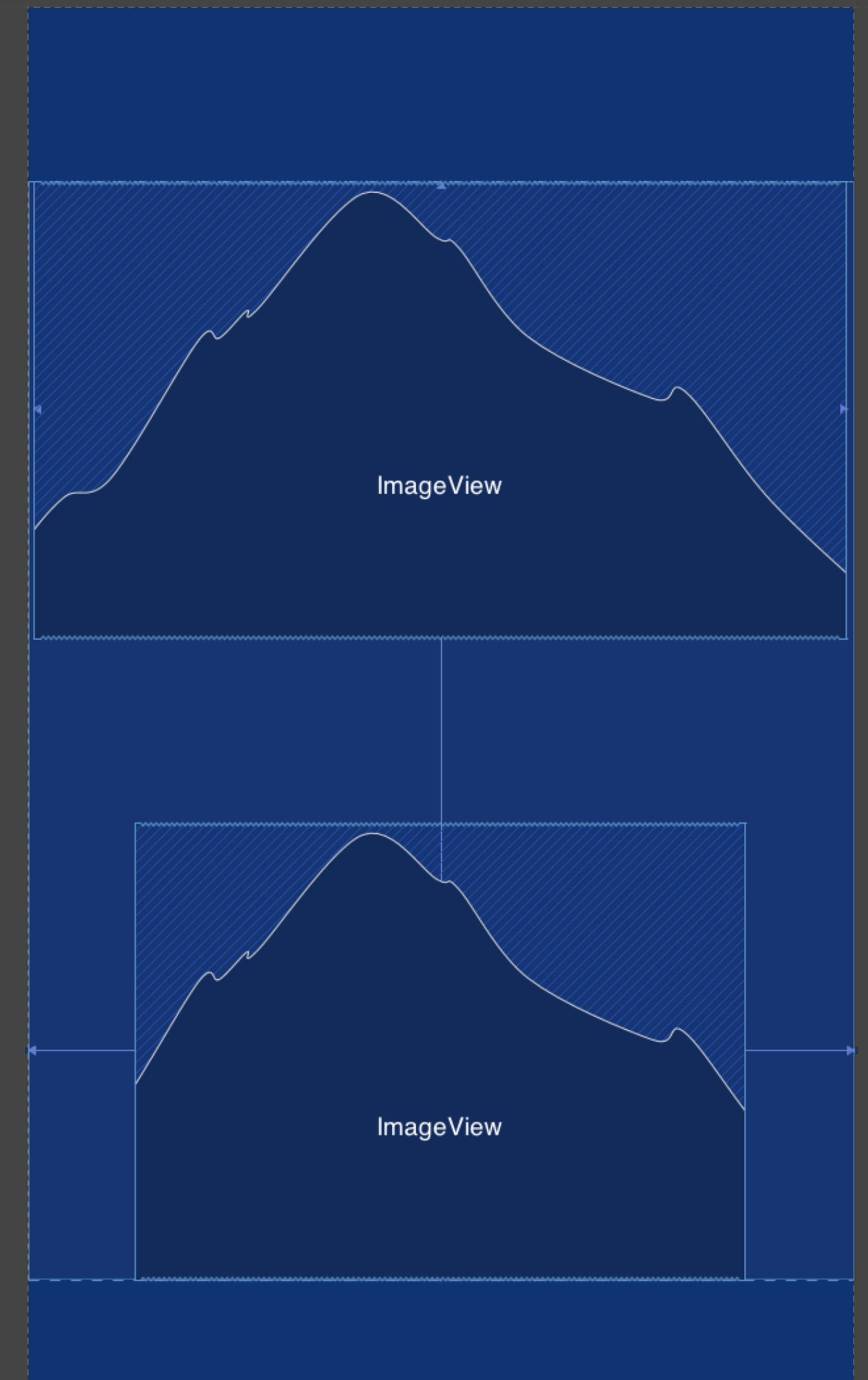


```
<android.support.constraint.ConstraintLayout
    ... >

    <ImageView
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        app:layout_constraintDimensionRatio="16:9"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"/>

    <ImageView
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        app:layout_constraintDimensionRatio="4:3"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"/>

</android.support.constraint.ConstraintLayout>
```





```
<android.support.constraint.ConstraintLayout  
    ... >
```

```
<ImageView
```

```
    android:id="@+id/image_banner"  
    android:layout_width="0dp"  
    android:layout_height="0dp"  
    app:layout_constraintDimensionRatio="H,16:9"  
    app:layout_constraintLeft_toLeftOf="parent"  
    app:layout_constraintRight_toRightOf="parent"  
    app:layout_constraintTop_toTopOf="parent"/>
```

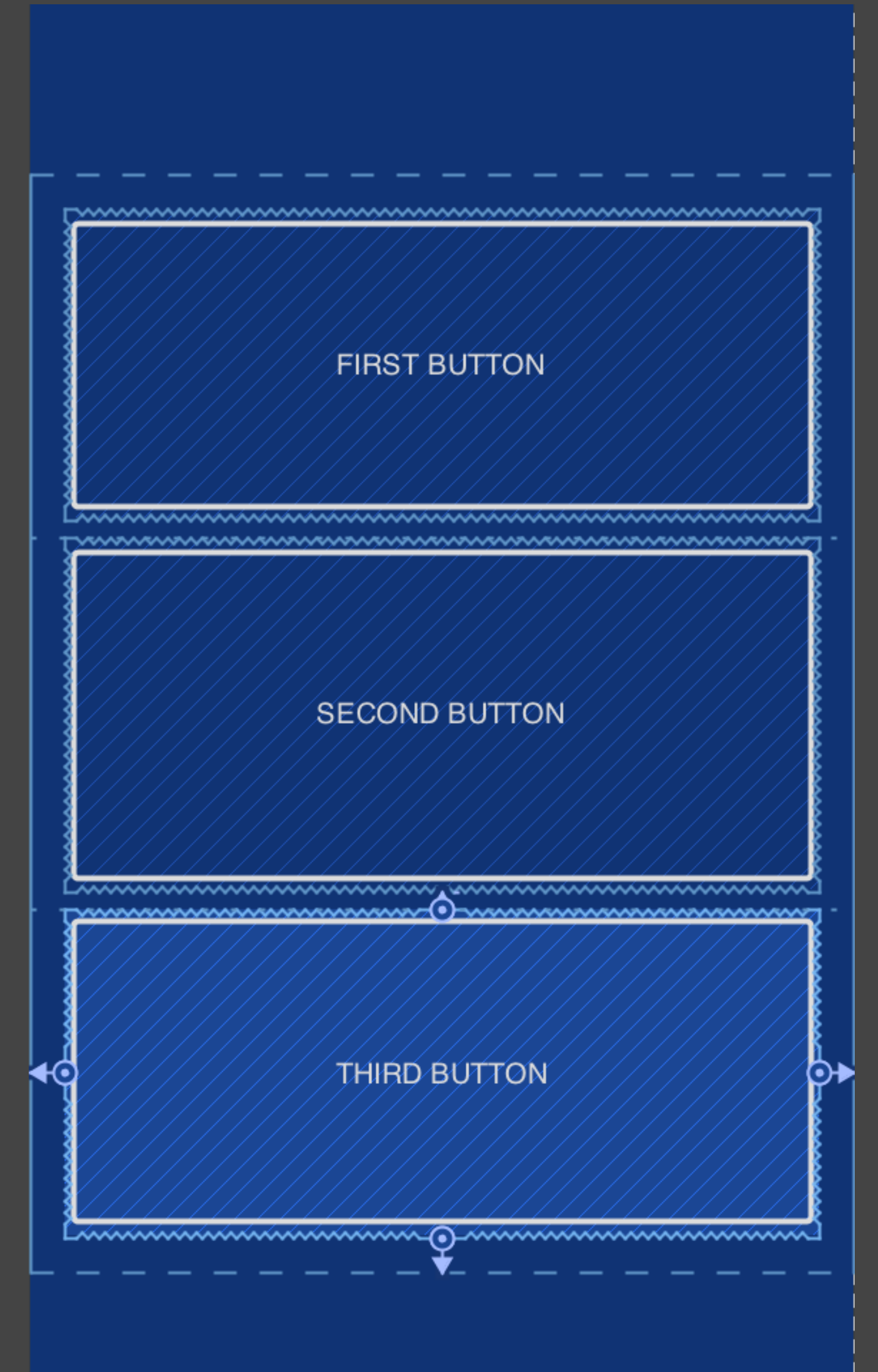
```
<ImageView
```

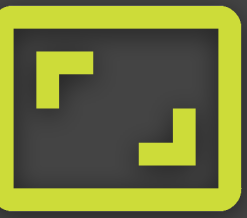
```
    android:id="@+id/image_portrait"  
    android:layout_width="0dp"  
    android:layout_height="0dp"  
    app:layout_constraintDimensionRatio="H,16:9"  
    app:layout_constraintBottom_toBottomOf="parent"  
    app:layout_constraintLeft_toLeftOf="parent"  
    app:layout_constraintTop_toBottomOf="@+id/image_banner"/>
```

```
</android.support.constraint.ConstraintLayout>
```



Chains





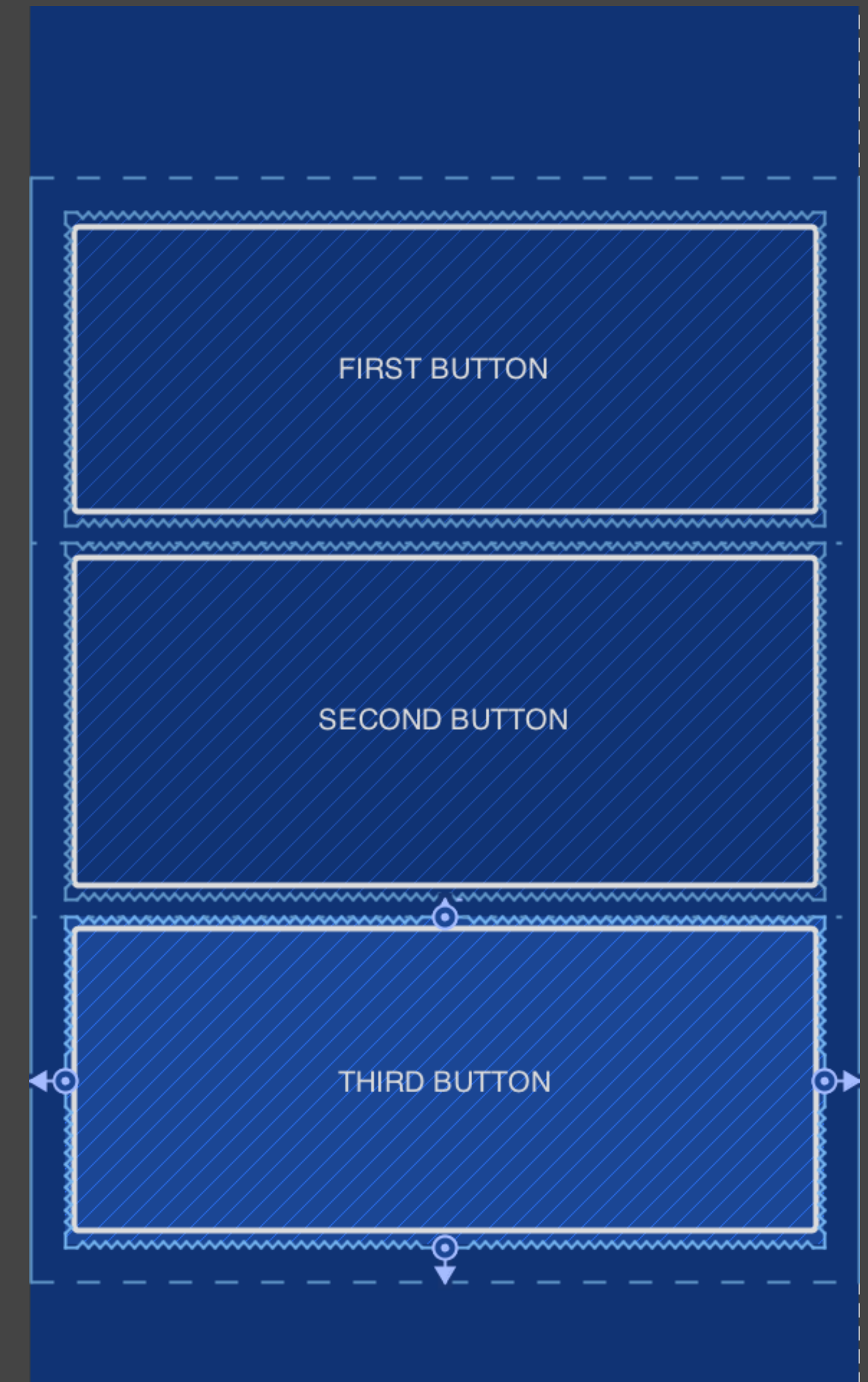
```
<android.support.constraint.ConstraintLayout
    ... >

    <Button
        android:id="@+id/button_first"
        ...
        app:layout_constraintBottom_toTopOf="@+id/button_second"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_weight="1.0" />

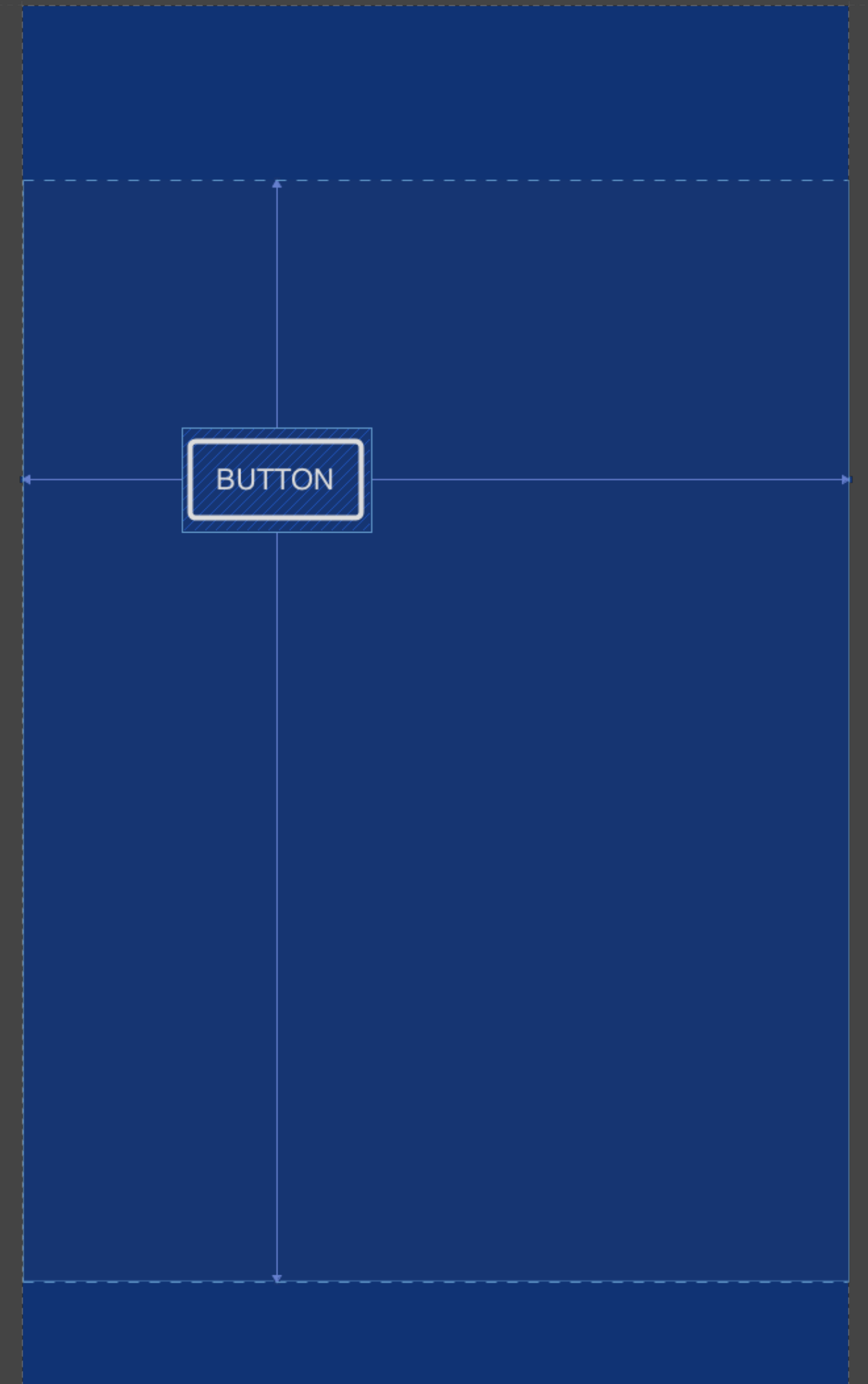
    <Button
        android:id="@+id/button_second"
        ...
        app:layout_constraintBottom_toTopOf="@+id/button_third"
        app:layout_constraintTop_toTopOf="@+id/button_first"
        app:layout_constraintVertical_weight="1.0" />

    <Button
        android:id="@+id/button_third"
        ...
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/button_second"
        app:layout_constraintVertical_weight="1.0" />

</android.support.constraint.ConstraintLayout>
```



ConstraintSet



```
ConstraintSet set = new ConstraintSet();

// Manual connect
set.connect(startId, ConstraintSet.LEFT, endId, ConstraintSet.LEFT, margin);
set.connect(...);
set.connect(...);

// From XML layout
set.clone(context, R.layout.layout_transition_1);

// From current state
set.clone(constraintLayout);

// Animate to a new set
ConstraintLayout mConstraintLayout = ...;
private void transitionTo(ConstraintSet constraintSet) {
    TransitionManager.beginDelayedTransition(mConstraintLayout);
    constraintSet.applyTo(mConstraintLayout);
}
```

ConstraintLayout

Child View

LayoutParams

Child View

LayoutParams

ConstraintLayout

Child View

ConstraintWidgetContainer

Child View

LayoutParams

LayoutParams

ConstraintWidget

ConstraintWidget

ConstraintAnchor

X

ConstraintAnchor

Y

ConstraintAnchor

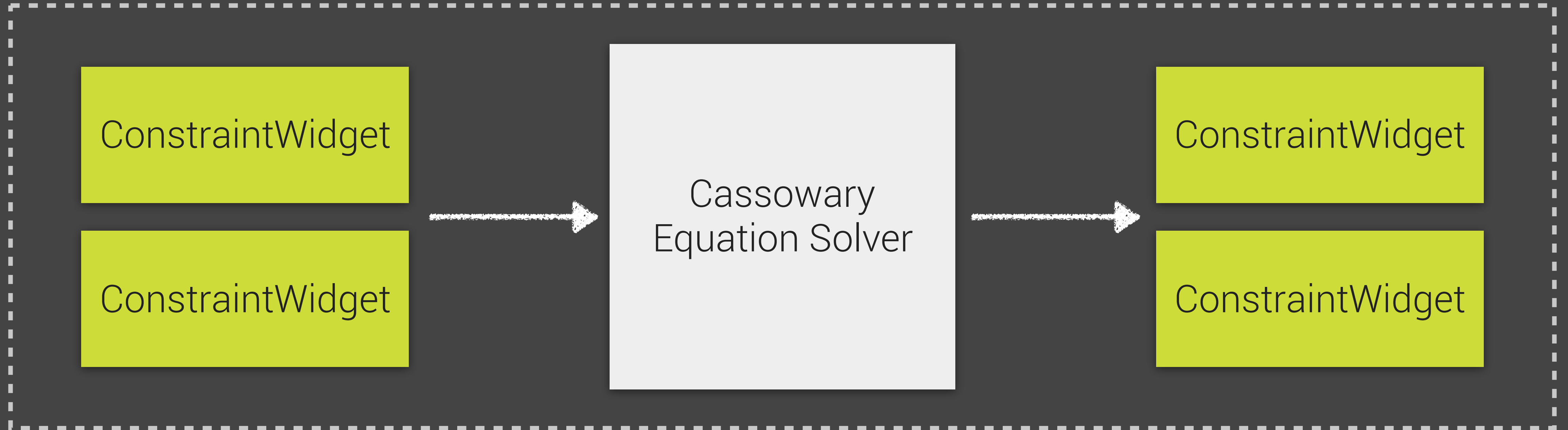
Width

ConstraintAnchor

Height

ConstraintWidget

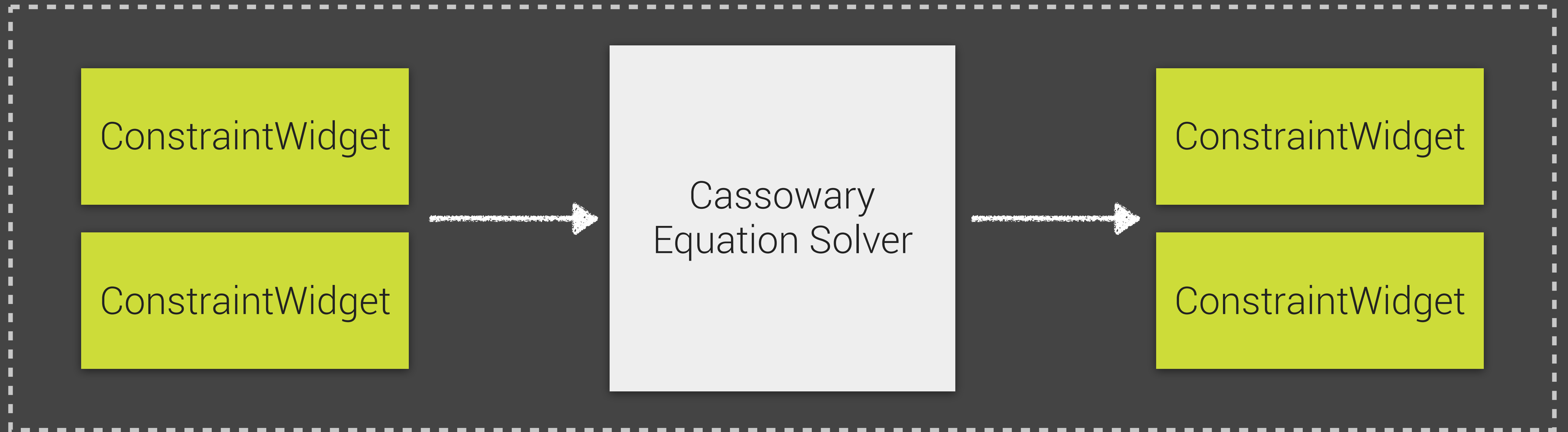
onMeasure()



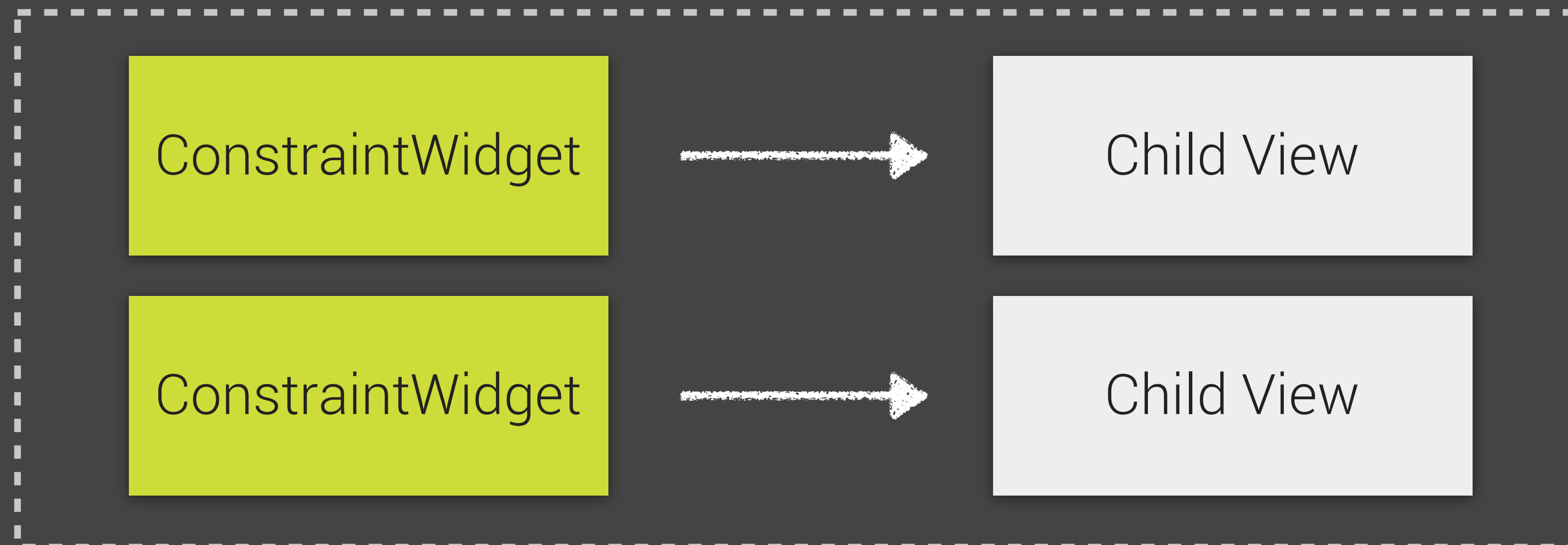
onLayout()



onMeasure()



onLayout()



Cassowary Equation Solver

Parent Constraints

Horizontal Constraints

Vertical Constraints

Size Constraints

Parent Constraints

$$L_P = X$$

$$R_P = L_P + W_P$$

$$T_P = y$$

$$B_P = T_P + h_P$$

Horizontal Constraints

$$R = L + W$$

$$L \geq L_P + m_L$$

$$R \leq R_P - m_R$$

$$L + R = L_P + R_P + m_L - m_R$$

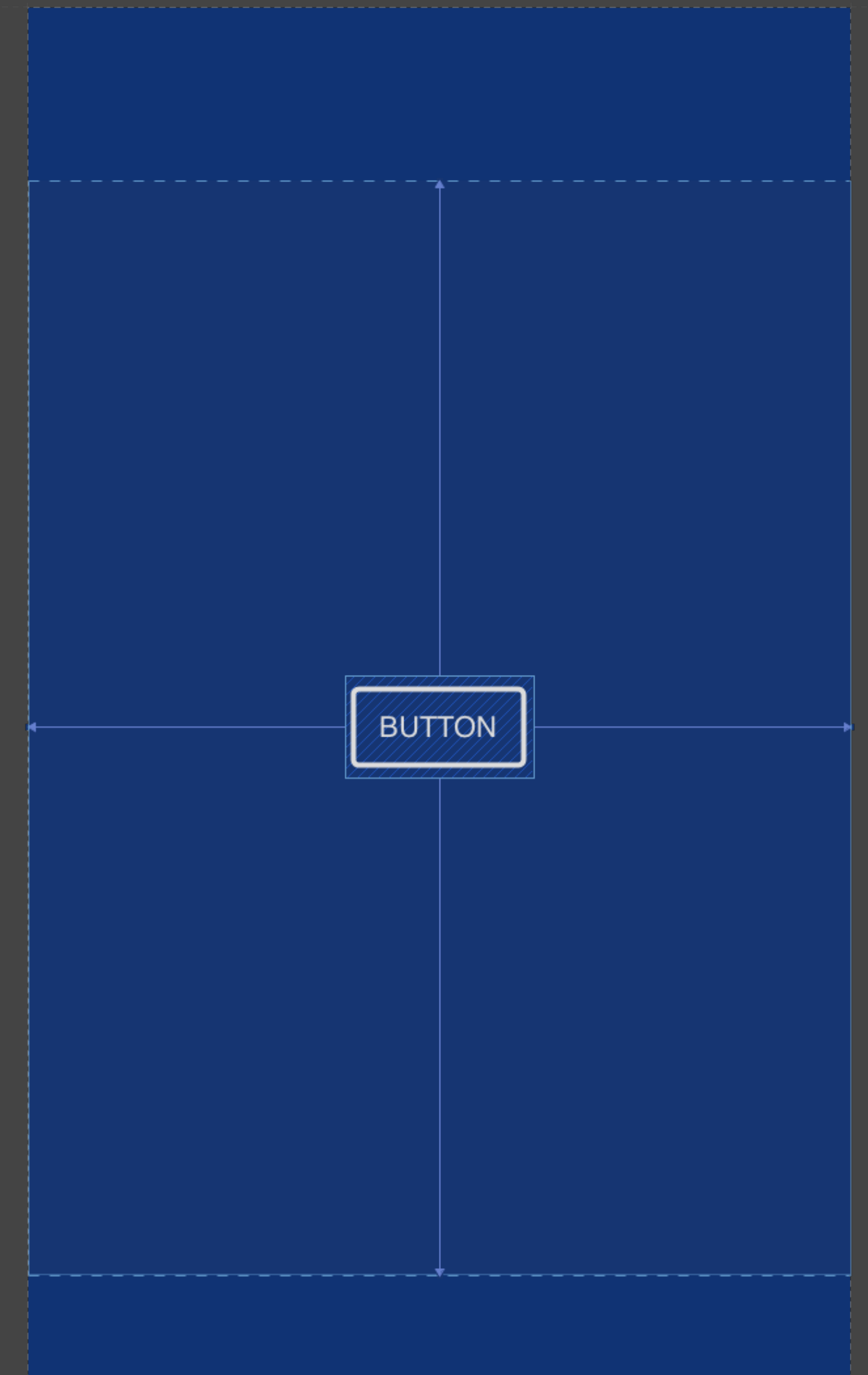
Vertical Constraints

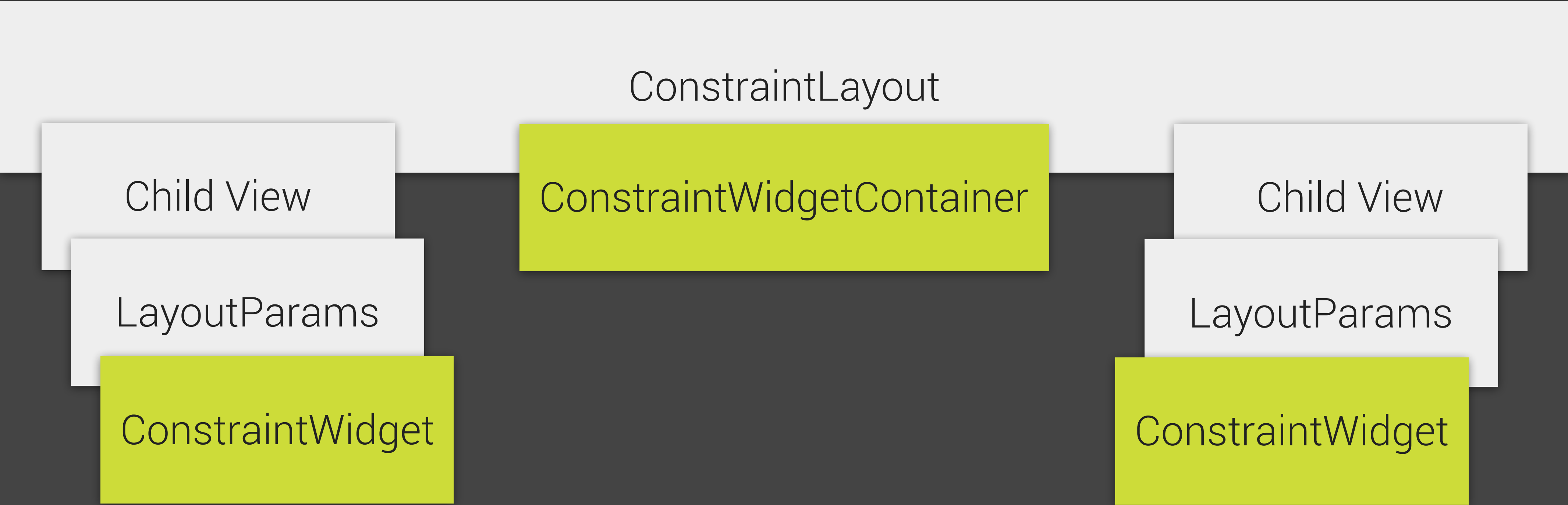
$$B = T + h$$

$$T \geq T_P + m_T$$

$$B \leq B_P - m_B$$

$$T + B = T_P + B_P + m_T - m_B$$





ConstraintLayout

Child View

Child View

ConstraintWidgetContainer

ConstraintWidget

ConstraintWidget



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+DaveSmithDev



milehighandroid.com

wiresareobsolete.com

