

# Unit Conversion App

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## Table of Contents

<b>1</b>	<b><i>Introduction</i></b> .....	<b>3</b>
1.2	Assumptions .....	3
1.3	App Overview .....	3
<b>2</b>	<b><i>App Structure</i></b> .....	<b>4</b>
<b>3</b>	<b><i>App Features</i></b> .....	<b>5</b>
3.1	Basic Features .....	5
3.1.1	Multiple Fragments .....	5
3.1.2	Unit Selection .....	5
3.2.3	Displaying Selected Units .....	5
3.2.4	Automatic Conversion .....	6
3.2	Advanced Features.....	7
3.2.1	Persistent storage / SQLite Database .....	7
3.2.2	Unit Categories .....	8
3.2.3	Add conversion .....	8
3.2.4	Remove conversion .....	8
3.2.5	Orientation and Screen Size .....	9
3.2.6	Dark Mode .....	10
<b>4</b>	<b><i>UI design</i></b> .....	<b>11</b>
4.1	Layout Structure .....	11
4.2	Selected Tab Highlight .....	11
4.3	Consistency .....	11
4.4	Number Pad .....	11
4.5	Text Field Hints and Toasts .....	12
4.6	Tablet Layout .....	12
<b>5</b>	<b><i>Areas for improvement</i></b> .....	<b>13</b>
5.1	Code Structure/database implementation .....	13
5.2	Better accessibility .....	13
5.3	Finishing touches .....	13
5.4	More Categories and Units .....	13
5.5	Responsiveness .....	13
5.6	Implementation issues .....	14
<b>6</b>	<b><i>Code Listing</i></b> .....	<b>14</b>
6.1	Kotlin files .....	14
6.2	Resource files .....	32

# 1 Introduction

This project is aiming to develop an Android Unit Conversion application in Android Studio using Kotlin. The minimum functionality the app should offer is the ability to convert between different units in categories such as distances, weights, speeds etc. The UI of this app should be split into two fragments, one fragment that will allow for selection of units (e.g., Yards to Miles), the other allowing the user to enter the values for the selected input units (e.g., 1760 yards), calculating and displaying the converted value (e.g., 1 mile) in the selected output units.

## 1.2 Assumptions

An assumption I made was that conversions of the same unit type such as Grams to Grams should not be allowed in the app as there isn't much point including this. Another assumption I made was that the user should be able to remove any of the preloaded conversions from the database as well as any custom conversions they might add. Also, the user cannot add conversions with the same name to one that already exists in the database.

## 1.3 App Overview

The user begins on the unit selection tab/fragment (shown in Figure 1 below) where they select the unit category (e.g., Distance) from the category spinner. This then fills the unit spinners with the appropriate unit options (e.g., Metres, Kilometres etc.) where the user can then select the 'From' and 'To' units. They will then proceed to the unit's conversion tab where their selected category and units will be displayed. In the labelled text field, they can enter the value for the 'From' unit using the provided number pad. The converted value will be automatically converted and displayed below in the selected 'To' unit text field.

Some more advanced features include adding and removing conversions from the database, a dark mode, the option for portrait and landscape viewing as well as smaller screens like phones or larger screens like tablets. All features will be discussed in greater detail throughout this report.

## 2 App Structure

The app uses a 4-tab structure with each tab having a corresponding fragment for each of the main processes in the app: unit selection, unit conversion, add conversion and remove conversion. The fragments are navigated using the tab layout placed at the top of the screen as can be seen in Figure 1. The decision was made to separate these processes in accordance with the briefing document as well as to separate the main actions keeping the app as simple and well-structured as possible. The tabs have been arranged in this order as it's the most likely flow the user will take through the app moving from left to right.

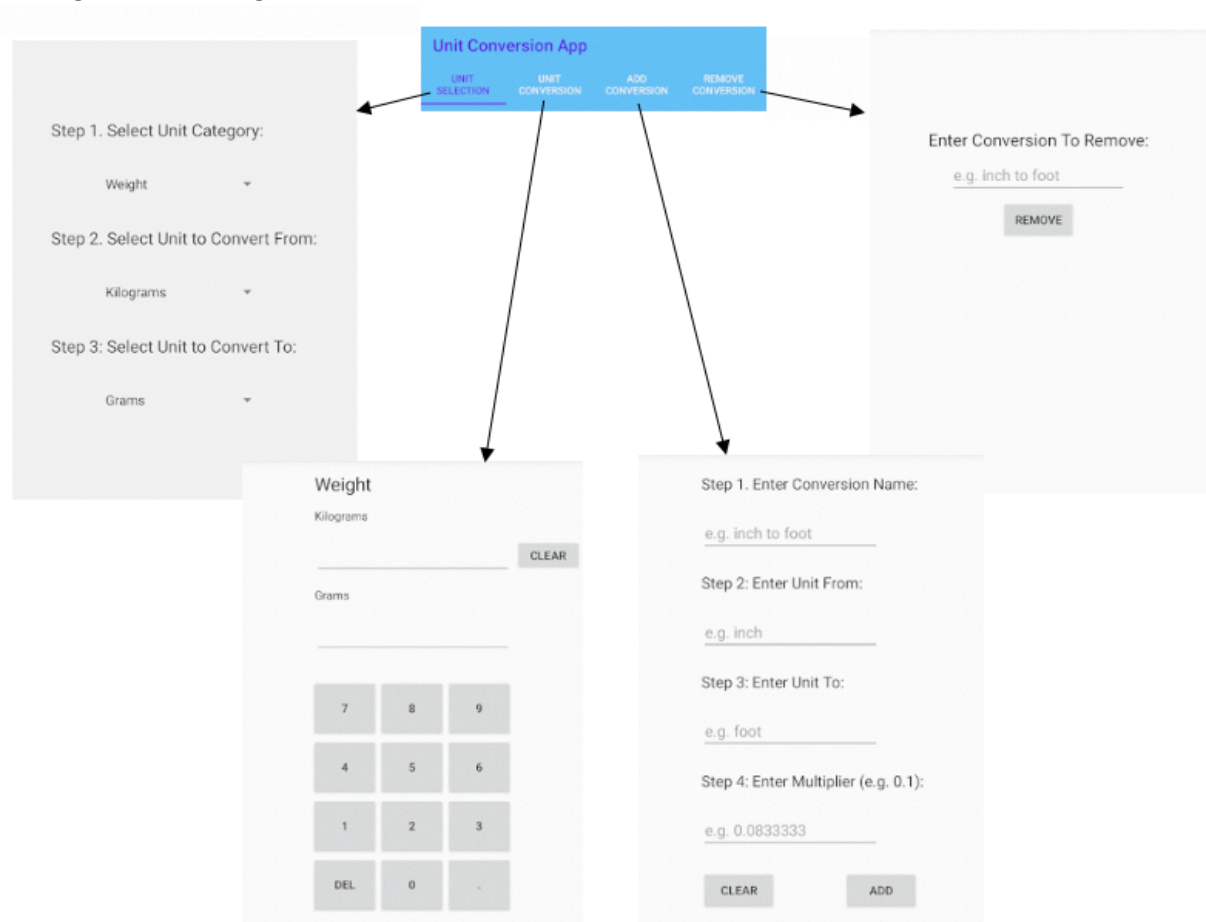


Figure 1: App Structure

## 3 App Features

This section will discuss the implementation of the key features of the app including the basic and advanced features from the brief as well as any additional features that were implemented.

### 3.1 Basic Features

#### 3.1.1 Multiple Fragments

As touched on above in the App Structure section, fragments were used to keep an organized structure within the app. Upon selecting a tab, the corresponding fragment is displayed. This was implemented using a Pager Adapter which assigns each fragment a number from 0 to 3. Each tab in the layout has a matching number so a listener is set up to display the correct fragment for the selected tab.

#### 3.1.2 Unit Selection

The user first selects the category of the desired units using a category spinner (more on this later). This then fills the unit spinners with the corresponding units. The user can then select the 'From' and 'To' units for the conversion they wish to carry out but are prevented from selecting the same unit twice as the assumption was made to now allow this. This was simply done by checking if the values in the spinners are the same and swapping their positions if so. The selected values are then 'post' (from spinner listener) to the data class (global) using an event bus to be made available to the conversion fragment.

```
data class startUnitSpinner(val selectedItem: String)
```

```
EventBus.getDefault().post(startUnitSpinner(value))
```

#### 3.2.3 Displaying Selected Units

Following on from above, in the conversion fragment the selected units are retrieved from the data class by the subscriber class that listens for an item change in the data class in the selection fragment. The spinner value can then be placed into the text view unit label as well as being used for the database query to find the multiplier.

```
/**
 * subscriber to the start unit spinner event bus data class
 * @param startSpinnerData Value selected in category spinner
 * **/
@Subscribe(threadMode = ThreadMode.MAIN)
fun listenItemChange(startSpinnerData: SelectionFragment.startUnitSpinner) {
    var itemSelected = startSpinnerData.selectedItem // get selected unit
    startSpinnerValue = itemSelected // store selected value for use in query
    startUnitLabel.text = itemSelected // set start unit label text
}
```

### 3.2.4 Automatic Conversion

Automatic conversion was implemented using the `doConversion` method. This method carries out a query of the database (more on database later) to find the multiplier needed to convert between the 'From' and 'To' units using the selected units as the query selection arguments. The user then types in the top text field using the provided number pad. Each time the user clicks a number button, the corresponding number is added to the end of the 'From' text field value, and the `doConversion` method is called calculating the new 'To' value.

The 'DEL' button is a back space deleting the most recent digit and a decimal place button. There is also a clear button which clears the full text field. These buttons cannot be used if the text field is empty.

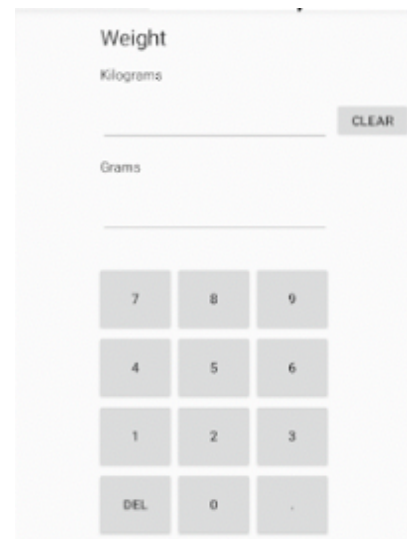


Figure 2: Conversion Fragment

(Apologies for the indentation of the calculation in the if statement below. I can't change it.)

```
/**
 * Method to carry out the conversion between the two units.
 * gets the multiplier from the database by querying the database to find the row where the
 * start and converted units
 * match the ones that are in the selection spinner
 * **/

private fun doConversion() {

    var where = "startUnit=? AND convertedUnit=?"
    var args = arrayOf(startSpinnerValue, convertedSpinnerValue)
    try {
        val uri = Uri.parse(CONTENT_URI.toString())
        val cursor = context!!.contentResolver.query(uri, null, where, args, null)
        if (cursor!!.count == 1) { // if the cursor count is one aka one row do..
            cursor.moveToFirst()
            val multiplier = cursor.getString(cursor.getColumnIndex("multiplier"))

            editTextConvertedUnit.setText(decimal.format((editTextStartUnit.text.toString().toDouble()) *
            multiplier.toDouble()).toString())

            cursor.close()
        }
    } catch (exception: Exception) {
        // report problem in pop-up window
        Toast.makeText(view?.context, "Invalid data - " + exception.message,
        Toast.LENGTH_SHORT).show()
    }
}
```

```
val button0 = view.findViewById<Button>(R.id.button0) // finds button 0 in layout
button0.setOnClickListener { // when its click do the following
    startUnitValue.append("0") // add a 0 to the start unit value
    doConversion() // call conversion method to do calculation
}
```

## 3.2 Advanced Features

### 3.2.1 Persistent storage / SQLite Database

The app uses persistent storage which retains the records in the database when the device loses power/app is closed and when the device is rotated or put in night mode. This was implemented using an SQLite database, storing the data on the devices local file system.

```
/**
 * Adds a conversion record to the database
 * @param code The unique code/name for referencing the row GramsToKilograms
 * @param startUnit The unit converting from eg metres grams
 * @param convertedUnit The unit converting to metres grams
 * @param multiplier The multiplier to give the converted value eg 0.001
 * @param category The category of the conversion eg weight, distance
 */
fun addConversion(code: String, startUnit: String, convertedUnit: String, multiplier: String,
category: String) {
    Log.v("adding conversion", "code $code startUnit $startUnit convertedUnit $convertedUnit
multiplier $multiplier category $category") // log the database entry
    val values = ContentValues() // set up variable to store the row for entry
    var uri = Uri.withAppendedPath(Provider.CONTENT_URI, code) // Uniform Resource Identifier
stores location of database

    //adding values to the values set
    values.put("code", code)
    values.put("startUnit", startUnit)
    values.put("convertedUnit", convertedUnit)
    values.put("multiplier", multiplier)
    values.put("category", category)

    val rows = cr.update(uri, values, "", null)// get count
    if (rows == 0) { // if rows = 0
        cr.insert(uri, values) } // insert the values to the content resolver
}
```

The code snippet above shows the code used to add a conversion to the database taking in the conversion data as parameters. The method puts these values into the ContentValues() variable which temporarily stores a set/row of data for entry to the database. This data is then inserted into the database at the given URI (Uniform Resource Identifier) using the content resolver. The URI stores the location of the database in the file system.

```
addConversion("GramsToKilograms", "Grams", "Kilograms", "0.001", "Weight")
addConversion("GramsToPounds", "Grams", "Pounds", "0.00220462", "Weight")
addConversion("GramsToStone", "Grams", "Stone", "0.000157473", "Weight")
```

The code above calls the addConversion method with the data to be entered to the database. These calls populate the app when it is first opened, then the data is stored persistently.

Here is an example of a row in the database showing its structure. Each column has its purpose within the program and there would be a row for every possible conversion.

code	startUnit	convertedUnit	multiplier	category
GramsToKilograms	Grams	Kilograms	0.001	Weight

### 3.2.2 Unit Categories

As the brief suggested, the app offers categories of units. In the selection fragment, the user first selects the category which populates the unit spinners with the corresponding units. This is done by querying the database to find the rows where the category matches the category selected. The results of this query are then stored in a cursor where using a while loop, it is possible to extract the require values, in this case the units, and fill the spinners using array adapter objects. The full code to populate the spinner using a query and cursor can be seen in the code listings for SelectionFragment.kt at the end of this report, but here is a snippet of the parameters for the query.

```
val where = "category=?"
val args = arrayOf(cat)
```

```
val cursor = context!!.contentResolver.query(uri, null, where, args, null)
```

### 3.2.3 Add conversion

The use of an SQLite database made this feature simple to implement by gathering the name, units and multiplier from the user through the text fields. Clicking the add button will validate and enter the user's data into the database using the same method addConversion as discussed above to populate the database on start up. Validation consists of checking if the suggested name already exists in the database, that the fields are not empty, and the units are not the same. If data is incorrect the app will toast the reason why. Also, the multiplier text field only allows numeric input and is limited to 10 digits.

Step 1: Enter Conversion Name:

e.g. inch to foot

Step 2: Enter Unit From:

e.g. inch

Step 3: Enter Unit To:

e.g. foot

Step 4: Enter Multiplier:

e.g. 0.0833333

CLEAR

ADD

Figure 3: Add Conversion Fragment

```
if(valid(conversionNameString, startUnitNameString, convertedUnitNameString,
multiplierValueString)){

    cr = context!!.contentResolver
    addConversion(conversionNameString, startUnitNameString,
convertedUnitNameString, multiplierValueString, conversionNameString)
```

### 3.2.4 Remove conversion

The user has the option to remove any conversion they want including the preloaded ones to customize the app more to their liking. This entry is also validated to ensure the text field is not empty and the record exists. The delete function is called which deletes the entry with the matching name. If the user enters a record that does not exist, then a toast message reports that.

```
if (conversionNameString.length != 0 && isPresent()) {
    try {
        cr = context!!.contentResolver

        var where = "code=?"
        var args = arrayOf(conversionNameString)
        cr.delete(CONTENT_URI, where, args)
```

Enter Conversion To Remove:

e.g. inch to foot

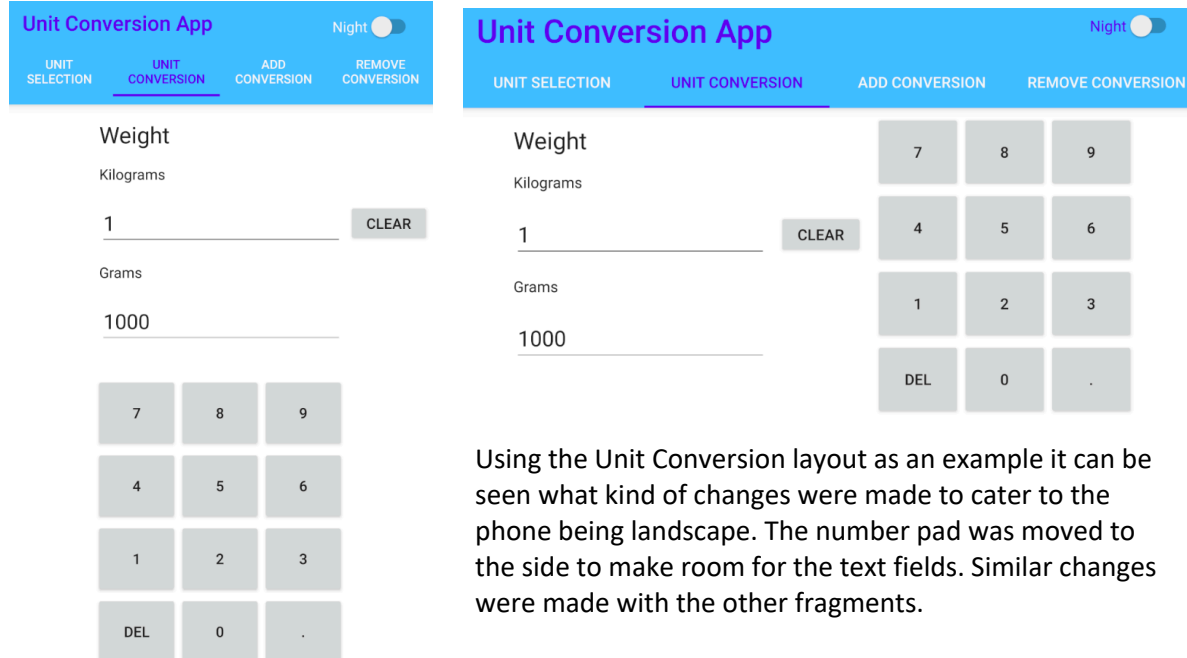
REMOVE

Figure 4: Remove Conversion  
Fragment



### 3.2.5 Orientation and Screen Size

The app has 4 variations of each fragment layout to cater for different viewing conditions. For phone portrait and landscape as well as tablet portrait and landscape, as can be shown in the following screenshots. All layouts have kept a very similar theme, so the different screens feel familiar to the user and are easy to use. Screenshots show the unit conversion layout as this is the layout that demonstrates the changes the best with labels, text fields, buttons and the number pad.



Using the Unit Conversion layout as an example it can be seen what kind of changes were made to cater to the phone being landscape. The number pad was moved to the side to make room for the text fields. Similar changes were made with the other fragments.

Figure 5: Unit Conversion Fragment Phone (5") Portrait vs. Landscape

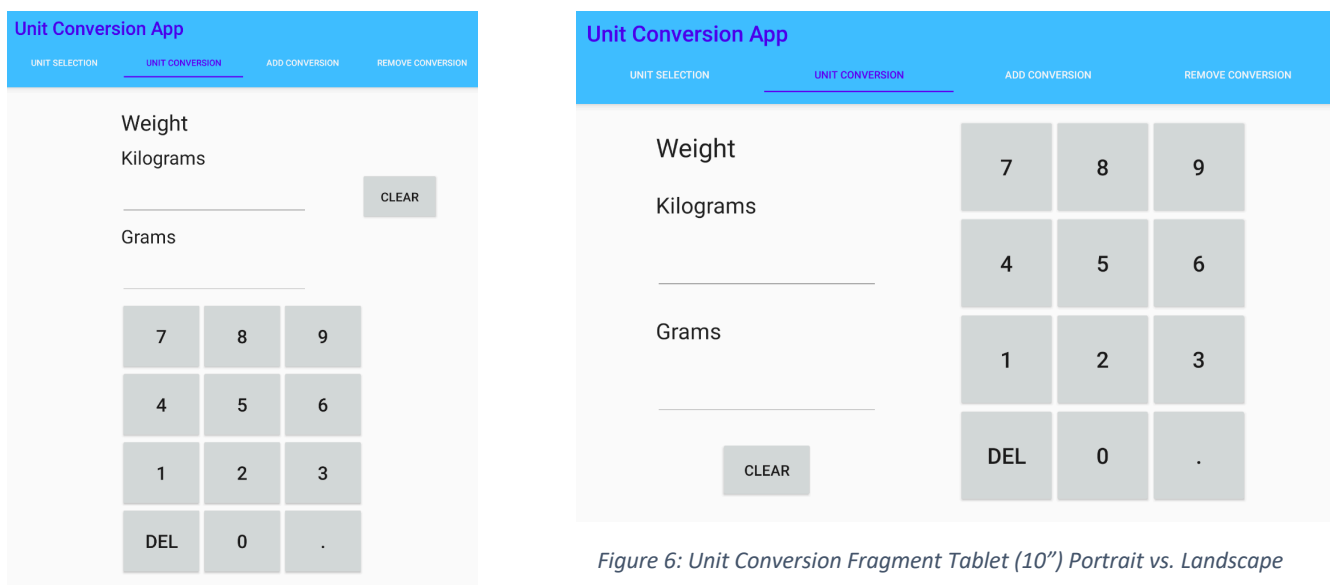


Figure 6: Unit Conversion Fragment Tablet (10") Portrait vs. Landscape

Values entered in any text fields or spinners are retained upon rotation as well as any custom conversions added by the user. This was implemented by calling `super.onCreate(savedInstanceState)` in the `onCreate` method and `super.onViewCreated(view, savedInstanceState)` on every fragment. On rotation, fragments are typically rebuilt from scratch disregarding any data the user has entered. But the code above rebuilds the fragment from the last saved state on creation. However, an issue was discovered late in the development process that upon rotation, the users selected units are reset. The selected category is stored but due to the way the unit spinners are populated they are reset. More will be mentioned in the areas for improvement section to the end.

### 3.2.6 Dark Mode

The app has the option to change to night mode which alters the colours of the app to adopt a dark theme. This is done using a switch in the top right of the screen in the toolbar. This feature was added late in the development process so the switch does not appear in all previous screenshots but can be seen below. A listener listens for when the switch is clicked then using a Boolean storing the current state of the switch, an if statement to check the state, the appropriate action is taken toggling night mode using app compat delegate that switches what colour file is used. There is an extra color.xml resource file storing the colours for the night theme for the toolbar, tab layout, fragment background, all text and hints etc. The reason for dark mode is that it's easier on the user's eyes, saves battery on the device and some would prefer this aesthetically.

```
nightModeSwitch = findViewById<Switch>(R.id.nightSwitch)

nightModeSwitch.setOnCheckedChangeListener{ compoundButton: CompoundButton, isChecked: Boolean ->
    if (isChecked) {
        AppCompatActivity.setDefaultNightMode(AppCompatActivity.MODE_NIGHT_YES)
    }
    else{
        AppCompatActivity.setDefaultNightMode(AppCompatActivity.MODE_NIGHT_NO)
    }
}
```

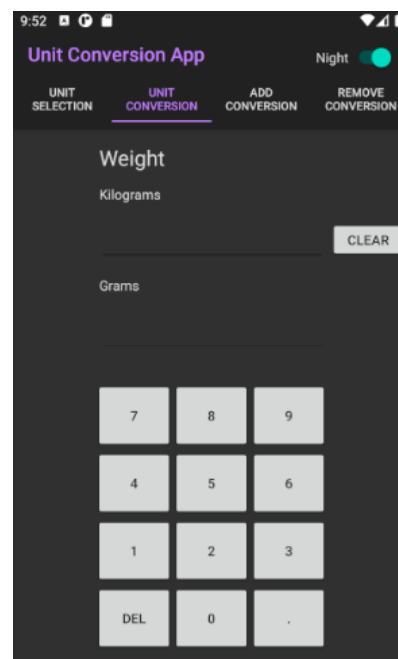
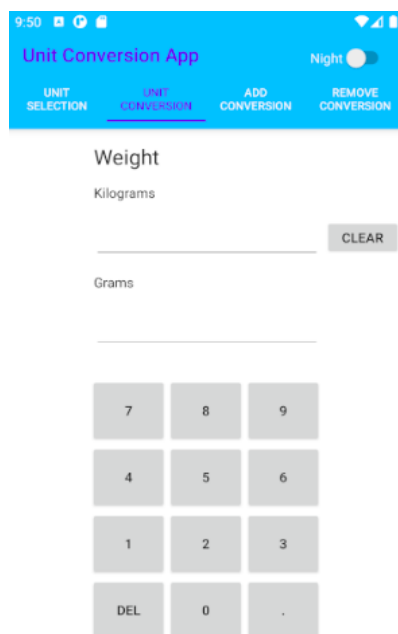


Figure 7: Light mode vs. Night mode

## 4 UI design

Discussed in this section is the implementation and reasoning behind any UI design decisions. Firstly, some general design choices were made such as the blue colouring of the toolbars and tabs. The default text colour was darkened to make it more contrasting and noticeable as the labels hold important information to aid with the usability of the app like the steps guiding the user. The status bar was set to the same colour as the header sections. All input like spinners, text fields and buttons are an appropriate size for the average finger.



Figure 8: status bar colouring

### 4.1 Layout Structure

All layouts use constraint layouts as I found these allow for more flexibility. Within the constraint layouts I used chains to provide the structure of the elements which I found to work very well. Chains allow you to link together multiple elements and easily control their positioning relative to one another.

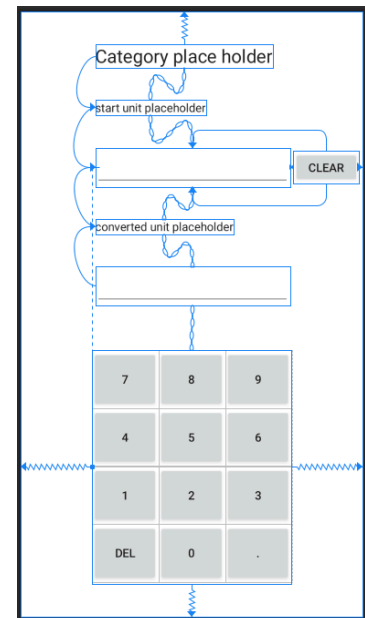


Figure 9: Layout Structure

### 4.2 Selected Tab Highlight

As can be seen in Figure 10, the selected tab is coloured purple compared to the white text of the unselected tabs. This as well as the underlining is used to make it obvious to the user where in the application they currently are. This was done using a colour resource.

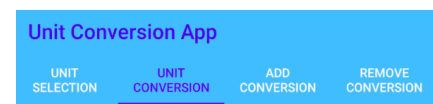


Figure 10: Tab layout

### 4.3 Consistency

All layouts are kept simple and consistent with minimal frills. The app's focus is on usability rather than over the top aesthetics, although not saying the UI is ugly or that no effort has gone into the aesthetics but being usable was the priority. The theme and style are kept the same to every screen to feel familiar and easy to use.

### 4.4 Number Pad

The number pad in the unit conversion fragment was used over the android number pad to give more of a calculator-like feel. Also, when viewing horizontally, the android keyboard covered the full screen which is frustrating if doing many conversions at once. This is not a problem in the fragments like add and remove conversions as they are not heavily used and also require full alphabetical keyboards, not just numbers. So, in summary the number pad aids usability and gives a better user experience as well as making the automatic conversion easier to implement.

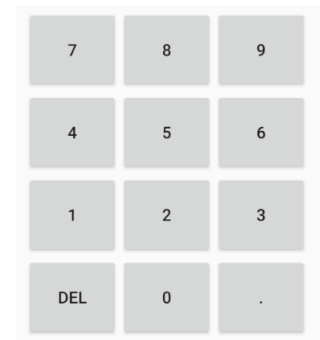


Figure 11: Number Pad

## 4.5 Text Field Hints and Toasts

In every text field there is a hint suggesting the type of input the user should be providing. This aids usability as they are less likely to enter incorrect data that will be rejected by the app's validation.

If the user tries to enter invalid data such as trying to remove a conversion that doesn't exist, a toast will guide them to entering the correct data.

Step 1. Enter Conversion Name:

e.g. inch to foot

Not found

Figure 12: Text Hints and Toasts

## 4.6 Tablet Layout

The tablet layout brought the most drastic changes the layouts. The main difference being that everything is bigger to better fill out the larger screen e.g., the text, text fields, buttons and spinners.



Step 1. Enter Conversion Name:

e.g. inch to foot

Step 2: Enter Unit From:

e.g. inch

Step 3: Enter Unit To:

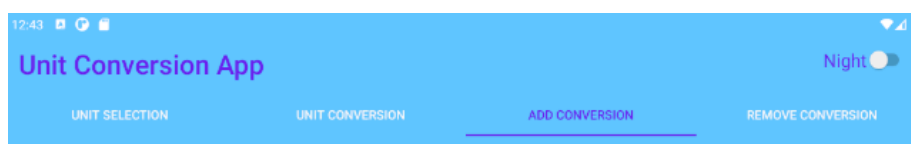
e.g. foot

Step 4: Enter Multiplier:

e.g. 0.0833333

CLEAR

ADD



Step 1. Enter Conversion Name: e.g. inch to foot

Step 2: Enter Unit From: e.g. inch

Step 3: Enter Unit To: e.g. foot

Step 4: Enter Multiplier: e.g. 0.0833333

CLEAR

ADD

Figure 13: Tablet Layout

## 5 Areas for improvement

Although overall I am happy with my implementation, there are many things I would choose to do if I had more time as well as some general critiques I have of the app/the development process.

### 5.1 Code Structure/database implementation

Given more time, I would have like to use a shared model view to implement the application as I this would be a cleaner way of communication between fragments. Also, I would have like to organize my database implementation better into more appropriate classes by perhaps keeping the insert, delete, query etc. methods in a databaseMethods class. The creation and population of the database in a database helper class and another separate class for the database contract. An implementation like this was attempted and was very close to working but I reached a sticking point and decided to move on to another SQLite database implementation using URIs and this was more successful and offers the same functionality.

### 5.2 Better accessibility

I would have liked to provide some more accessibility options such as allowing the text size to be increase, a greater variety of colour schemes to accommodate better for people with learning difficulties. This could be done by using a cream/yellow background for some types of dyslexia for example.

### 5.3 Finishing touches

- I would have liked to have added more finishing touches to the application such as adding icons next to text to visually show the categories and some actions throughout the app too e.g., a rubbish bin in the remove button when removing a conversion and a rule next to the distance category.
- Add labels next to the text fields in the conversion tab e.g., Km, Ft, M etc... The fields are labelled with the units, but it would have been a nice touch.
- Rather than adding customer conversion into the category spinner, perhaps have a separate spinner for the user custom conversions. Also being able to remove these easily by selecting them and clicking delete.
- Use of a scroll view on the add conversion fragment would have made entering the data a little bit easier as you wouldn't need to close the keyboard before selecting the next text field.
- Add loading symbols or show a skeleton layout when the app is loading something.
- The option to restore the default database or undo a removal

### 5.4 More Categories and Units

More units like millimetres, centimetres, ounces etc. and more categories e.g., currency, volume etc. Perhaps gathering the current exchange rate from the internet. This would require an internet connection adding another level of complexity to the app.

### 5.5 Responsiveness

At some points when using the app, it is not as seamless of an experience as I would like it to be. For example, when activating dark mode or rotating the screen, there is some delay which can get frustrating. I think this would be due to how I have structured the code and the workings of the database so given more time I would have like to improve upon this aspect of the app.

## 5.6 Implementation issues

I believe the app is functional but there are few small issues I have had when trying to increase the text size of the spinners and the tabs for the tablet layouts. I tried using style tag in the style.xml file as well as inline styling and programmatically to increase the size of the tab text but for some reason, it would only increase the size of the first tab, and not the other tabs which looked odd, so I removed it. The spinner text would simply not increase at all or change to the colour I wanted (only an issue in night mode). So, given more time I would have like to figure this issue out.

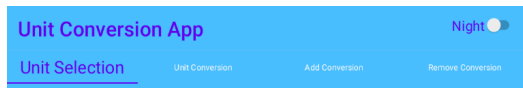


Figure 12: Tab Text Size Issue



Figure 13: Spinner styling issue

After recording the demo and submitting, an issue was found where the users selected units are not retained in the spinners upon rotation. As mentioned earlier, the category selection is retained but the unit spinners are not. Given more time I would have liked to restructure my code to fix this problem. Also, I believe this issue would be solved by using a shared model view like mentioned above. I attempted another possible solution using the `onSavedInstanceState` and `onRestoreInstanceState` methods to put/save the current variables in a bundle to be restores on a change of state, but I had no success with this.

## 6 Code Listing

## 6.1 Kotlin files

6.1.1 MainActivity.kt	Manages tab layout, page adapter and database population
6.1.2 SelectionFragment.kt	Fragment containing the selection of category and units
6.1.3 ConversionFragment.kt	Fragment handling the conversion of values
6.1.4 AddConversionFragment.kt	Fragment handling the code to add conversions
6.1.5 RemoveConversionFragment.kt	Fragment handling removal of conversions
6.1.6 Provider.kt	Content provider class manages the database
6.1.7 PageAdapter.kt	Handling the switching between fragments

### 6.1.1 MainActivity.kt

[illegible]

```

database
* **/
class MainActivity : AppCompatActivity() { // working hardcoded with ifs.

    // initialise content resolver used for inserting data to database
    private lateinit var cr: ContentResolver
    @SuppressWarnings("UseSwitchCompatOrMaterialCode")
    private lateinit var nightModeSwitch: Switch
    /**
     * Adds a conversion record to the database
     * @param code The unique code/name for referencing the row GramsToKilograms
     * @param startUnit The unit converting from eg metres grams
     * @param convertedUnit The unit converting to metres grams
     * @param multiplier The multiplier to give the converted value eg 0.001
     * @param category The category of the conversion eg weight, distance
     */
    fun addConversion(code: String, startUnit: String, convertedUnit: String, multiplier:
String, category: String) {
        Log.v("adding conversion", "code $code startUnit $startUnit convertedUnit
$convertedUnit multiplier $multiplier category $category") // log the database entry
        val values = ContentValues() // set up variable to store the row for entry
        var uri = Uri.withAppendedPath(Provider.CONTENT_URI, code) // Uniform Resource
Identifier stores location of database

        //adding values to the values set
        values.put("code", code)
        values.put("startUnit", startUnit)
        values.put("convertedUnit", convertedUnit)
        values.put("multiplier", multiplier)
        values.put("category", category)

        val rows = cr.update(uri, values, "", null) // get count
        if (rows == 0) {
            cr.insert(uri, values) } // insert the values to the content resolver/database
    }

    @RequiresApi(Build.VERSION_CODES.LOLLIPOP) // status bar required lollipop api
    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState) // load saved state on create used for restoring
data after orientation
        setContentView(R.layout.activity_main) // set content view to activity main layout
file

        //set up toolbar variable
        val toolbar = findViewById<Toolbar>(R.id.toolbar)
        setSupportActionBar(toolbar)

        // set up tab layout finding it by id in layout
        val tabLayout = findViewById<TabLayout>(R.id.tab_layout)
        tabLayout.tabGravity = TabLayout.GRAVITY_FILL

        // set up night mode switch variable
        nightModeSwitch = findViewById<Switch>(R.id.nightSwitch)

        window.statusBarColor = ContextCompat.getColor(this, R.color.headerColour) // set
status bar to match header colour

        // set up page adapter for tabs and fragments
        val viewPager = findViewById<ViewPager>(R.id.pager)
        val adapter = PagerAdapter(supportFragmentManager,
            tabLayout.tabCount)
        viewPager.adapter = adapter

        // listen for tab changes and change to fragment number corresponding with tab number
        viewPager.addOnPageChangeListener(TabLayout.TabLayoutOnPageChangeListener(tabLayout))
        tabLayout.addOnTabSelectedListener(object : TabLayout.OnTabSelectedListener {
            override fun onTabSelected(tab: TabLayout.Tab) {
                viewPager.currentItem = tab.position
            }
            override fun onTabUnselected(tab: TabLayout.Tab) {}
            override fun onTabReselected(tab: TabLayout.Tab) {}
        })

        // when night mode switch is checked, check the current state and toggle the night

```

```

mode accordingly
    nightModeSwitch.setOnCheckedChangeListener{ compoundButton: CompoundButton,
isChecked: Boolean ->
    if (isChecked) {
        AppCompatActivity.setDefaultNightMode(AppCompatActivity.MODE_NIGHT_YES)
    }
    else{
        AppCompatActivity.setDefaultNightMode(AppCompatActivity.MODE_NIGHT_NO)
    }
}

//set up context resolver for given context
cr = contentResolver

// populate database with conversions using add method entering the values for each
row
//weight
addConversion("GramsToKilograms", "Grams", "Kilograms", "0.001", "Weight")
addConversion("GramsToPounds", "Grams", "Pounds", "0.00220462", "Weight")
addConversion("GramsToStone", "Grams", "Stone", "0.000157473", "Weight")

addConversion("KilogramsToGrams", "Kilograms", "Grams", "1000", "Weight")
addConversion("KilogramsToPounds", "Kilograms", "Pounds", "2.20462", "Weight")
addConversion("KilogramsToStone", "Kilograms", "Stone", "0.157473", "Weight")

addConversion("PoundsToGrams", "Pounds", "Grams", "453.592", "Weight")
addConversion("PoundsToKilograms", "Pounds", "Kilograms", "0.453592", "Weight")
addConversion("PoundsToStone", "Pounds", "Stone", "0.0714286", "Weight")

addConversion("StoneToGrams", "Stone", "Grams", "6350.29", "Weight")
addConversion("StoneToKilograms", "Stone", "Kilograms", "6.35029", "Weight")
addConversion("StoneToPounds", "Stone", "Pounds", "14", "Weight")

//distance
addConversion("MetresToKilometres", "Metres", "Kilometres", "0.001", "Distance")
addConversion("MetresToYards", "Metres", "Yards", "1.09361", "Distance")
addConversion("MetresToMiles", "Metres", "Miles", "0.000621371", "Distance")

addConversion("KilometresToMetres", "Kilometres", "Metres", "1000", "Distance")
addConversion("KilometresToYards", "Kilometres", "Yards", "1093.61", "Distance")
addConversion("KilometresToMiles", "Kilometres", "Miles", "0.621371", "Distance")

addConversion("YardsToMetres", "Yards", "Metres", "0.9144", "Distance")
addConversion("YardsToKilometres", "Yards", "Kilometres", "0.0009144", "Distance")
addConversion("YardsToMiles", "Yards", "Miles", "0.000568182", "Distance")

addConversion("MilesToMetres", "Miles", "Metres", "1609.34", "Distance")
addConversion("MilesToKilometres", "Miles", "Kilometres", "1.60934", "Distance")
addConversion("MilesToYards", "Miles", "Yards", "1760", "Distance")

//speed
addConversion("MPHTOKPH", "MPH", "KPH", "1.60934", "Speed")
addConversion("MPHTOMS", "MPH", "MS", "0.44704", "Speed")

addConversion("KPH TOMPH", "KPH", "MPH", "0.621371", "Speed")
addConversion("KPH TOMS", "KPH", "MS", "0.277778", "Speed")

addConversion("MSTOMPH", "MS", "MPH", "2.23694", "Speed")
addConversion("MSTOKPH", "MS", "KPH", "3.6", "Speed")

//time
addConversion("SecondsToMinutes", "Seconds", "Minutes", "0.0166667", "Time")
addConversion("SecondsToHours", "Seconds", "Hours", "0.000277778", "Time")

addConversion("MinutesToSeconds", "Minutes", "Seconds", "60", "Time")
addConversion("MinutesToHours", "Minutes", "Hours", "0.0166667", "Time")

addConversion("HoursToSeconds", "Hours", "Seconds", "3600", "Time")
addConversion("HoursToMinutes", "Hours", "Minutes", "60", "Time")
}

```

## 6.1.2 SelectionFragment.kt



```

package uk.ac.stir.cs.andriodproject

import android.net.Uri
import android.os.Bundle
import android.view.LayoutInflater
import android.view.View
import android.view.ViewGroup
import android.widget.AdapterView
import android.widget.AdapterView.Adapter
import android.widget.ArrayAdapter
import android.widget.Spinner
import android.widget.Toast
import androidx.fragment.app.Fragment
import org.greenrobot.eventbus.EventBus
import java.util.*

/**
 * Fragment containing the selection of category and units
 * **/
class SelectionFragment : Fragment() {

    // set up database uri
    val PROVIDER_NAME = "uk.ac.stir.cs.andriodproject.Conversion"
    val DATABASE_TABLE = "modules"
    val CONTENT_URI: Uri = Uri.parse("content://$PROVIDER_NAME/$DATABASE_TABLE")

    // setup spinner data classes for event buses
    data class unitCategorySpinner(val selectedItem: String)
    data class startUnitSpinner(val selectedItem: String)
    data class convertedUnitSpinner(val selectedItem: String)

    //initialise variables to store data on spinner positions and values
    var startSpinnerVal = ""
    var convertedSpinnerVal = ""

    // start category will always be weight so it is initialised for filling the units
    spinners
    var cat : String = "Weight"

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState) // on fragment creation load saved instance state.
    }

    override fun onCreateView(inflater: LayoutInflater, container: ViewGroup?,
        savedInstanceState: Bundle?): View? {
        return inflater.inflate(R.layout.selection_fragment, container, false) //set up
        selection fragment layout
    }

    override fun onViewCreated(view: View, savedInstanceState: Bundle?) {
        super.onViewCreated(view, savedInstanceState) // load saved state

        // set up spinner variable to reference the corresponding spinner in the layout using
        its id
        val unitCategorySpinner : Spinner = view.findViewById(R.id.spinnerCategory)
        val startUnitSpinner : Spinner = view.findViewById(R.id.spinnerStartUnit)
        val convertedUnitSpinner : Spinner = view.findViewById(R.id.spinnerConvertedUnit)

        //listener to handle category spinner item selection
        unitCategorySpinner.onItemSelectedListener = object :
        AdapterView.OnItemSelectedListener {
            override fun onItemSelected(parent: AdapterView<*>, view: View?, position: Int,
            id: Long) {

                val value : String = parent.getItemAtPosition(position).toString() // get
                value at current spinner position
                cat = value // store value in global variable
                populateUnitSpinner(startUnitSpinner, convertedUnitSpinner) // adjust the
                unit selection spinners as when category change, so does unit selection
                EventBus.getDefault().post(unitCategorySpinner(value)) // post selected
                category to data class using event bus
            }

            override fun onNothingSelected(parent: AdapterView<*>) {}
        }
    }

```

```

    }

    // listener to handle start unit spinner item selection
    startUnitSpinner.onItemSelectedListener = object : AdapterView.OnItemSelectedListener {
        override fun onItemSelected(parent: AdapterView<*>, view: View?, position: Int,
id: Long) {
            startSpinnerVal = parent.getItemAtPosition(position).toString() // store
spinner value

            // if value selected is the same as the converted unit spinner then change
the value
            // of this spinner to the value next to it checking that it is not out of
bounds
            if(startSpinnerVal == convertedSpinnerVal && position <=1){
                convertedUnitSpinner.setSelection(position + 1)
            }
            else if (startSpinnerVal == convertedSpinnerVal && position >1){
                convertedUnitSpinner.setSelection(position - 1)
            }

            val value : String = parent.getItemAtPosition(position).toString()
            EventBus.getDefault().post(startUnitSpinner(value)) // post selected unit to
event bus for unit labels in conversion fragment
        }

        override fun onNothingSelected(parent: AdapterView<*>) {}
    }

    // listener to handle converted unit selection. Same as above but for converted unit
spinner
    convertedUnitSpinner.onItemSelectedListener = object :
AdapterView.OnItemSelectedListener {
        override fun onItemSelected(parent: AdapterView<*>, view: View?, position: Int,
id: Long) {

            convertedSpinnerVal = parent.getItemAtPosition(position).toString()

            if(startSpinnerVal == convertedSpinnerVal && position <=1){
                startUnitSpinner.setSelection(position + 1)
            }
            else if (startSpinnerVal == convertedSpinnerVal && position >1){
                startUnitSpinner.setSelection(position - 1)
            }
            val value : String = parent.getItemAtPosition(position).toString()
            EventBus.getDefault().post(convertedUnitSpinner(value))

        }

        override fun onNothingSelected(parent: AdapterView<*>) {}
    }

    populateSpinner(unitCategorySpinner)// populate category spinner
    populateUnitSpinner(startUnitSpinner, convertedUnitSpinner) // populate unit spinners
}

/**
 * method to populate the category spinner. retrieving the category values from the
database
 * @param spinner The category spinner
 *
 */
private fun populateSpinner(spinner: Spinner) {
    try { // try to retrieve category data
        val uri = Uri.parse(CONTENT_URI.toString()) // declare uri of database table
        val cursor = context!!.contentResolver.query(uri, null, null, null, null) //
declare cursor to store the result of the database query

        val result = ArrayList<String>() // array to store results/categories
        while(cursor?.moveToNext()!!) { // while cursor has another value
            val item = cursor.getString(cursor.getColumnIndex("category")) // get values
in category column
            if(!result.contains(item)) // If the category is not in the list(DISTINCT

```

```

didn't seem to work)
        result.add(item) // add the item to the results array
    }
    cursor.close()
    // array adapter storing the results for input into the category spinner
    val adapter: ArrayAdapter<String> = ArrayAdapter<String>(context!!,
android.R.layout.simple_spinner_dropdown_item, result)
    spinner.adapter = adapter

    } catch (exception: Exception) { // if the above cause exception then toast error
message
        // report problem in pop-up window
        Toast.makeText(view?.context, "Invalid data - " + exception.message,
Toast.LENGTH_SHORT).show()
    }
}

/**
 * method to populate the units spinners. retrieving the unit values from the database
 * @param startSpinner THE start unit spinner
 * @param categorySpinner THE converted unit spinner
 *
 * */
private fun populateUnitSpinner(startSpinner: Spinner, convertedSpinner: Spinner) {
    // where category equals selected category (selection and arguments for query)
    val where = "category=?"
    val args = arrayOf(cat)

    try { // try the following
        val uri = Uri.parse(CONTENT_URI.toString()) // database uri
        val cursor = context!!.contentResolver.query(uri, null, where, args, null) //
cursor storing query results with selection and args

        // following section finds units where the start and converted units are of the
selected category and adds them to the spinners
        // as above for category
        val startResult = ArrayList<String>()
        val convertedResult = ArrayList<String>()
        while(cursor?.moveToNext()!!) {
            val startUnit = cursor.getString(cursor.getColumnIndex("startUnit"))
            val convertedUnit =
cursor.getString(cursor.getColumnIndex("convertedUnit"))
            if(!startResult.contains(startUnit)) {
                startResult.add(startUnit)
            }
            if(!convertedResult.contains(convertedUnit)) {
                convertedResult.add(convertedUnit)
            }
        }
        cursor.close()

        val startAdapter: ArrayAdapter<String> = ArrayAdapter<String>(context!!,
android.R.layout.simple_spinner_dropdown_item, startResult)
        val convertedAdapter: ArrayAdapter<String> = ArrayAdapter<String>(context!!,
android.R.layout.simple_spinner_dropdown_item, convertedResult)
        startSpinner.adapter = startAdapter
        convertedSpinner.adapter = convertedAdapter

    } catch (exception: Exception) { // if this cause and exception toast and error
message
        // report problem in pop-up
        Toast.makeText(
            view?.context,
            "Invalid data - " + exception.message,
            Toast.LENGTH_SHORT
        ).show()
    }
}
}

```

### 6.1.3 ConversionFragment.kt

```

package uk.ac.stir.cs.andriodproject

import android.net.Uri
import android.os.Bundle
import android.view.LayoutInflater
import android.view.View
import android.view.ViewGroup
import android.widget.Button
import android.widget.EditText
import android.widget.TextView
import android.widget.Toast
import androidx.fragment.app.Fragment
import kotlinx.android.synthetic.main.conversion_fragment.*
import org.greenrobot.eventbus.EventBus
import org.greenrobot.eventbus.Subscribe
import org.greenrobot.eventbus.ThreadMode
import java.text.DecimalFormat

/**
 * Fragment handling the conversion of values of selected units
 * **/
class ConversionFragment : Fragment() {

    private val decimal = DecimalFormat("###.#####")

    // initialize unit label variables
    lateinit var startUnitLabel : TextView
    lateinit var convertedUnitLabel : TextView
    lateinit var categoryUnitLabel : TextView

    // initialise text field variables
    lateinit var startUnitValue : EditText
    lateinit var convertedUnitValue : EditText

    // initialize variables to hold selected category and units from selection fragment
    private var startSpinnerValue : String = ""
    private var convertedSpinnerValue : String = ""
    private var categorySpinnerValue : String = ""

    // set up database uri
    val PROVIDER_NAME = "uk.ac.stir.cs.andriodproject.Conversion"
    val DATABASE_TABLE = "modules"
    val CONTENT_URI: Uri = Uri.parse("content://$PROVIDER_NAME/$DATABASE_TABLE")

    // on start register from the event bus
    override fun onStart() {
        super.onStart()
        EventBus.getDefault().register(this)
    }

    // on stop unregister from the event bus
    override fun onStop() {
        super.onStop()
        EventBus.getDefault().unregister(this)
    }

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState) // on fragment creation load saved state
    }

    override fun onCreateView(inflater: LayoutInflater, container: ViewGroup?,
        savedInstanceState: Bundle?): View? {
        return inflater.inflate(R.layout.conversion_fragment, container, false) // load the
        conversion fragment layout
    }

    override fun onViewCreated(view: View, savedInstanceState: Bundle?) {
        super.onViewCreated(view, savedInstanceState)

        // declare labels to corresponding text view in the layout
        startUnitLabel = view.findViewById(R.id.textViewStartUnitLabel)
        convertedUnitLabel = view.findViewById(R.id.textViewConvertedUnitLabel)
        categoryUnitLabel = view.findViewById(R.id.categoryLabel)

        // declare the text fields to the corresponding edit texts in the layout

```

```

startUnitValue = view.findViewById(R.id.editTextStartUnit)
convertedUnitValue = view.findViewById(R.id.editTextConvertedUnit)
//convertedUnitValue.isEnabled = false // set the converted value to unclickable

// declare clear button linked to the clear button in the layout
val clearButton = view.findViewById<View>(R.id.clearButton) as Button
// button listener \to check when clicked. sets the text values to empty strings,
clearing them
clearButton.setOnClickListener{

    try{
        startUnitValue.setText("") // clear text fields
        convertedUnitValue.setText("")
    }catch (exception: Exception){
        Toast.makeText(view.context, "Cleared", Toast.LENGTH_SHORT).show() // toast
        cleared
    }
}

// buttons to from the number pad to type in the values
// the buttons add the corresponding number to the 'from' value.
// calls the doConversion method which automatically calculates the converted value
val button0 = view.findViewById<Button>(R.id.button0)
button0.setOnClickListener {
    startUnitValue.append("0")
    doConversion()
}

val button1 = view.findViewById<Button>(R.id.button1)
button1.setOnClickListener {
    startUnitValue.append("1")
    doConversion()
}

val button2 = view.findViewById<Button>(R.id.button2)
button2.setOnClickListener {
    startUnitValue.append("2")
    doConversion()
}

val button3 = view.findViewById<Button>(R.id.button3)
button3.setOnClickListener {
    startUnitValue.append("3")
    doConversion()
}

val button4 = view.findViewById<Button>(R.id.button4)
button4.setOnClickListener {
    startUnitValue.append("4")
    doConversion()
}

val button5 = view.findViewById<Button>(R.id.button5)
button5.setOnClickListener {
    startUnitValue.append("5")
    doConversion()
}

val button6 = view.findViewById<Button>(R.id.button6)
button6.setOnClickListener {
    startUnitValue.append("6")
    doConversion()
}

val button7 = view.findViewById<Button>(R.id.button7)
button7.setOnClickListener {
    startUnitValue.append("7")
    doConversion()
}

val button8 = view.findViewById<Button>(R.id.button8)
button8.setOnClickListener {
    startUnitValue.append("8")

```

```

        doConversion()
    }

    val button9 = view.findViewById<Button>(R.id.button9)
    button9.setOnClickListener {
        startUnitValue.append("9")
        doConversion()
    }
    // button for decimal place. cannot be placed unless there is already a number typed
    val buttonDecimal = view.findViewById<Button>(R.id.buttonDot)
    buttonDecimal.setOnClickListener {
        if (startUnitValue.length() != 0) {
            startUnitValue.append(".")
        }
        doConversion()
    }
}

// delete button, removes the end value in the 'from' unit text box(providing it is
not already empty)
val buttonDel = view.findViewById<Button>(R.id.buttonDel)
buttonDel.setOnClickListener {

    if (startUnitValue.length() != 0) {
        startUnitValue.text.delete(startUnitValue.length() - 1,
startUnitValue.length())
    }
    else{
        convertedUnitValue.setText("")
    }
    doConversion()
}
}

/**
 * Method to carry out the conversion between the two units.
 * gets the multiplier from the database by searching the database to find the row where
the start and converted units
 * match the ones that are in the selection spinner
 * **/
private fun doConversion() {

    var where = "startUnit=? AND convertedUnit=?"
    var args = arrayOf(startSpinnerValue, convertedSpinnerValue)
    try {
        val uri = Uri.parse(CONTENT_URI.toString())
        val cursor = context!!.contentResolver.query(uri, null, where, args, null)
        if (cursor!!.count == 1) { // if the cursor count is one aka one row do..
            cursor.moveToFirst()
            val multiplier = cursor.getString(cursor.getColumnIndex("multiplier")) //
store the multiplier

            // set the converted text field to contain the converted value(start value of
type start unit * multiplier = converted value of type converted unit)
            editTextConvertedUnit.setText(decimal.format((editTextStartUnit.text.toString().toDouble()) *
multiplier.toDouble()).toString())

            cursor.close()
        } else {
            throw Exception("invalid data")
        }
    } catch (exception: Exception) {
        // report problem in pop-up window
        Toast.makeText(view?.context, "Invalid data - " + exception.message,
Toast.LENGTH_SHORT).show()
    }
}

/**
 * subscriber to the category spinner event bus data class
 * @param unitSpinnerData Value selected in category spinner
 * **/
@Subscribe(threadMode = ThreadMode.MAIN)
fun listenItemChange(unitSpinnerData: SelectionFragment.unitCategorySpinner){

```

```

        var itemSelected = unitSpinnerData.selectedItem // store the selected category
        categorySpinnerValue = itemSelected // store selected category
        categoryUnitLabel.text = itemSelected // set category label
    }

    /**
     * subscriber to the start unit spinner event bus data class
     * @param startSpinnerData Value selected in category spinner
     */
    @Subscribe(threadMode = ThreadMode.MAIN)
    fun listenItemChange(startSpinnerData: SelectionFragment.startUnitSpinner) {
        var itemSelected = startSpinnerData.selectedItem // get selected unit
        startSpinnerValue = itemSelected // store selected unit for use in query
        startUnitLabel.text = itemSelected // set start unit label
    }

    /**
     * subscriber to the converted unit spinner event bus data class
     * @param convertedSpinnerData Value selected in category spinner
     */
    @Subscribe(threadMode = ThreadMode.MAIN)
    fun listenItemChange(convertedSpinnerData: SelectionFragment.convertedUnitSpinner){
        var itemSelected = convertedSpinnerData.selectedItem // get selected to unit
        convertedSpinnerValue = itemSelected // store selected unit for use in query
        convertedUnitLabel.text = itemSelected // set start unit label
    }
}

```

#### 6.1.4 AddConversionFragment.kt

```

package uk.ac.stir.cs.andriodproject

import android.content.ContentResolver
import android.content.ContentValues
import android.net.Uri
import android.net.wifi.WifiConfiguration.AuthAlgorithm.strings
import android.os.Bundle
import android.util.Log
import android.view.LayoutInflater
import android.view.View
import android.view.ViewGroup
import android.widget.Button
import android.widget.EditText
import android.widget.Toast
import androidx.fragment.app.Fragment

/**
 * class handling the fragment used to add conversions. taking in the user data and adding it
 * to the database
 */
class AddConversionFragment : Fragment() {

    // init text field variables
    lateinit var conversionName : EditText
    lateinit var startUnitName: EditText
    lateinit var convertedUnitName : EditText
    lateinit var multiplierValue : EditText

    // init database uri
    val PROVIDER_NAME = "uk.ac.stir.cs.andriodproject.Conversion"
    val DATABASE_TABLE = "modules"
    val CONTENT_URI: Uri = Uri.parse("content://$PROVIDER_NAME/$DATABASE_TABLE")
    //init content resolver
    private lateinit var cr: ContentResolver

    override fun onCreateView(inflater: LayoutInflater, container: ViewGroup?,
        savedInstanceState: Bundle?): View? {
        return inflater.inflate(R.layout.add_conversion, container, false) // set up add
        conversion layout
    }

    /**
     * Adds a conversion record to the database

```

```

    * @param code The unique code/name for referencing the row GramsToKilograms
    * @param startUnit The unit converting from eg metres grams
    * @param convertedUnit The unit converting to metres grams
    * @param multiplier The multiplier to give the converted value eg 0.001
    * @param category The category of the conversion eg weight, distance
    */
    private fun addConversion(code: String, startUnit: String, convertedUnit: String,
multiplier: String, category: String) {
        Log.v("adding module", "code $code startUnit $startUnit convertedUnit $convertedUnit
multiplier $multiplier category $category")
        val values = ContentValues()
        var uri = Uri.withAppendedPath(Provider.CONTENT_URI, code)

        // store row of data in content values variable
        values.put("code", code)
        values.put("startUnit", startUnit)
        values.put("convertedUnit", convertedUnit)
        values.put("multiplier", multiplier)
        values.put("category", category)

        val rows = cr.update(uri, values, "", null)
        if (rows == 0) { // insert row into the database
            cr.insert(uri, values) }
    }

    override fun onViewCreated(view: View, savedInstanceState: Bundle?) {
        super.onViewCreated(view, savedInstanceState)

        // declare edit text variables to reference the corresponding ones in the layout
        conversionName = view.findViewById(R.id.editTextAddConversionName)
        startUnitName = view.findViewById(R.id.editTextAddConversionStartUnit)
        convertedUnitName = view.findViewById(R.id.editTextAddConversionConvertedUnit)
        multiplierValue = view.findViewById(R.id.editTextAddConversionMultiplier)

        val addButton = view.findViewById<View>(R.id.addButton) as Button // declare button
variable linked to the add button in the layout

        //when add button is clicked
        addButton.setOnClickListener{
            // declare a string version of the values in the text fields
            var conversionNameString : String = conversionName.text.toString()
            var startUnitNameString : String = startUnitName.text.toString()
            var convertedUnitNameString : String = convertedUnitName.text.toString()
            var multiplierValueString : String = multiplierValue.text.toString()

            // if all data entries are valid (validated by the valid() method)
            if(valid(conversionNameString, startUnitNameString, convertedUnitNameString,
multiplierValueString)){

                cr = context!!.contentResolver // set content resolver to the content
resolver of context
                addConversion(conversionNameString, startUnitNameString,
convertedUnitNameString, multiplierValueString, conversionNameString) // add conversion to
database

                Toast.makeText(
                    view?.context,
                    "Added",
                    Toast.LENGTH_SHORT
                ).show() // toast that the conversion has been added successfully
                conversionName.setText("") // clear text fields after
                startUnitName.setText("")
                convertedUnitName.setText("")
                multiplierValue.setText("")
            }
        }

        // if clear button is clicked clear all text fields
        val clearButton = view.findViewById<View>(R.id.clearAllButton) as Button // declare
button variable linked to the add button in the layout
        clearButton.setOnClickListener{
            try {

```



```

        conversionName.setText("")
        startUnitName.setText("")
        convertedUnitName.setText("")
        multiplierValue.setText("")
    }catch (exception: Exception){ // if already cleared then toast its cleared
        Toast.makeText(view.context, "Cleared already", Toast.LENGTH_SHORT).show()
    }
}

/**
 *method used to validate the user input. Checking there are no empty values and that the
too and from values are not the same
 * @param name Given name of the conversion
 * @param startUnit The from unit of the conversino
 * @param convertedUnit the to unit of the conversion
 * @param multiplier the multiplier value
 * @return valid A boolean declaring if the entry is valid or not
 * **/
private fun valid(name: String, startUnit: String, convertedUnit: String, multiplier:
String) : Boolean{

    var valid = true

    // a text fields cant be empty as all data is required for the app to work
    if(name == "" || startUnit == "" || convertedUnit == "" || multiplier == ""){ // if
any fields are empty
        valid = false // set validation to false
        Toast.makeText(
            view?.context,
            "Fill all text fields.",
            Toast.LENGTH_SHORT
        ).show() // toast that they must enter all fields
    }

    // units cant be the same as conversions such as grams to grams are not allowed
    if(startUnit == convertedUnit){ // if units are the same
        valid = false
        Toast.makeText(
            view?.context,
            "Units cannot be the same",
            Toast.LENGTH_SHORT
        ).show() // toast error mesage
    }

    if(isPresent()){ // check if the conversion already exists. cannot have two of the
same named conversions
        valid = false
    }
    return valid // return if valid or not
}

/**
 * Function carries out a query of the database to discover if the suggested conversion
name is already in the database
 * @return found, Boolean stating if the name was found or not
 * **/
private fun isPresent() : Boolean{

    var found = false

    val where = "code=?"
    val args = arrayOf(conversionName.text.toString())
    try {
        val uri = Uri.parse(CONTENT_URI.toString())
        val cursor = context!!.contentResolver.query(uri, null, where, args, null)
        if (cursor!!.count > 0) { // if the cursor count is one aka one row do..
            Toast.makeText(
                view?.context,
                "Already Present, Rename.",
                Toast.LENGTH_SHORT
            ).show()
            found = true
            cursor.close()

```

```

    }
    } catch (exception: Exception) {
        // report problem in pop-up window
        Toast.makeText(view?.context, "Invalid data - " + exception.message,
            Toast.LENGTH_SHORT).show()
    }
    return found
}
}
}

```

### 6.1.5 RemoveConversionFragment.kt

```

package uk.ac.stir.cs.andriodproject

import android.content.ContentResolver
import android.net.Uri
import android.os.Bundle
import android.util.Log
import android.view.LayoutInflater
import android.view.View
import android.view.ViewGroup
import android.widget.Button
import android.widget.EditText
import android.widget.Toast
import androidx.fragment.app.Fragment
import kotlinx.android.synthetic.main.conversion_fragment.*

/**
 * Fragment handling the removal of a database entry/conversion
 */
class RemoveConversionFragment : Fragment() {

    // init text field variable
    private lateinit var conversionName : EditText

    // init content resolver
    private lateinit var cr: ContentResolver

    // set up database uri
    private val PROVIDER_NAME = "uk.ac.stir.cs.andriodproject.Conversion"
    private val DATABASE_TABLE = "modules"
    private val CONTENT_URI: Uri = Uri.parse("content://$PROVIDER_NAME/$DATABASE_TABLE")

    override fun onCreateView(inflater: LayoutInflater, container: ViewGroup?,
        savedInstanceState: Bundle?): View? {
        return inflater.inflate(R.layout.remove_conversion, container, false) // set remove
        conversion layout
    }

    override fun onViewCreated(view: View, savedInstanceState: Bundle?) {
        super.onViewCreated(view, savedInstanceState)

        conversionName = view.findViewById(R.id.editTextRemoveConversion) // declare text
        field variable to corresponding edit text in the layout

        // set remove button to correspond to the one in the layout
        val removeButton = view.findViewById<View>(R.id.removeButton) as Button
        // if button is clicked
        removeButton.setOnClickListener {
            val conversionNameString : String = conversionName.text.toString() // string
            version of above
            // if the text field isnt empty try and remove the given name using the .delete
            method
            // in the database to delete the row with matching code
            if (conversionNameString.length != 0 && isPresent()) {
                try {
                    cr = context!!.contentResolver

                    var where = "code=?"
                    var args = arrayOf(conversionNameString)
                    cr.delete(CONTENT_URI, where, args)
                    conversionName.setText("")
                }
            }
        }
    }
}

```

```

        Log.v("Removing conversion", "code $conversionNameString")
        Toast.makeText(
            view?.context,
            "Removed",
            Toast.LENGTH_SHORT
        ).show()
    } catch (e: Exception) {
        Toast.makeText(
            view?.context,
            "Error removing" + e.message,
            Toast.LENGTH_SHORT
        ).show()
    }
}

}

}

}

/**
 * Function carries out a query of the database to discover if the suggested conversion
name is already in the database
 * @return found, Boolean stating if the name was found or not
 * **/
private fun isPresent() : Boolean{

    var found = true

    var where = "code=?"
    var args = arrayOf(conversionName.text.toString())
    try {
        val uri = Uri.parse(CONTENT_URI.toString())
        val cursor = context!!.contentResolver.query(uri, null, where, args, null)
        if (cursor!!.count == 0) { // if the cursor count is one aka one row do..
            found = false
            Toast.makeText(
                view?.context,
                "Not found",
                Toast.LENGTH_SHORT
            ).show()
            cursor.close()
        } else {

        }
    } catch (exception: Exception) {
        // report problem in pop-up window
        Toast.makeText(view?.context, "Invalid data - " + exception.message,
Toast.LENGTH_SHORT).show()
    }
    return found
}

}
}

```

## 6.1.6 Provider.kt

```

package uk.ac.stir.cs.andriodproject

import android.content.*
import android.database.Cursor
import android.database.SQLException
import android.database.sqlite.SQLiteDatabase
import android.database.sqlite.SQLiteOpenHelper
import android.database.sqlite.SQLiteQueryBuilder
import android.net.Uri
import android.text.TextUtils
/**
 * provider class that manages the access to the database.
 * **/
class Provider : ContentProvider() {
    lateinit private var contentResolver: ContentResolver // init content resolver
    lateinit private var conversionsDatabase: SQLiteDatabase // init sqlite database
    lateinit private var uriMatcher: UriMatcher //content provider name

    /**
     * function used to delete a table row

```

```

    * @param uri the uri of the database(file location)
    * @param selection which rows
    * @param arguments where the values are equal to....
    */
    override fun delete(uri: Uri, selection: String?, arguments: Array<String>?): Int {
        var count = 0
        when (uriMatcher.match(uri)) {
            ALL_CONVERSIONS -> count = conversionsDatabase.delete(DATABASE_TABLE, selection,
arguments) // delete whole table
            ONE_CONVERSION -> { // delete a row where the code matches
                var code = uri.pathSegments[1]
                code = "code = '$code'"
                if (!TextUtils.isEmpty(selection)) code += " AND ($selection)"
                count = conversionsDatabase.delete(DATABASE_TABLE, code, arguments)
            }
            else -> throw IllegalArgumentException("Unknown URI '$uri'")
        }
        contentResolver.notifyChange(uri, null) // notify the content resolver of the change
        return count
    }

    /**
     * get the type
     * @param uri file location
     */
    override fun getType(uri: Uri): String? {
        val mimeType: String
        mimeType = when (uriMatcher.match(uri)) {
            ALL_CONVERSIONS -> "vnd.uk.ac.stir.cs.cursor.dir/modules"
            ONE_CONVERSION -> "vnd.uk.ac.stir.cs.cursor.item/modules"
            else -> throw IllegalArgumentException("Invalid URI '$uri'")
        }
        return mimeType
    }

    /**
     * function to insert a row into the database
     * @param uri database file location
     * @param values the content values storing a row of data
     */
    override fun insert(uri: Uri, values: ContentValues?): Uri? {
        val newUri: Uri
        val rowIdentifier = conversionsDatabase.insert(DATABASE_TABLE, "", values)
        if (rowIdentifier > 0) {
            newUri = ContentUris.withAppendedId(CONTENT_URI, rowIdentifier)
            contentResolver.notifyChange(newUri, null)
        } else throw SQLException("Failed to insert row into '$uri'")
        return newUri
    }

    /**
     * creating the writeable database
     */
    override fun onCreate(): Boolean {
        uriMatcher = UriMatcher(UriMatcher.NO_MATCH)
        uriMatcher.addURI(PROVIDER_NAME, "modules", ALL_CONVERSIONS)
        uriMatcher.addURI(PROVIDER_NAME, "modules/*", ONE_CONVERSION)
        val context = context
        contentResolver = context!!.contentResolver
        val databaseHelper = DatabaseHelper(context)
        conversionsDatabase = databaseHelper.writableDatabase
        return conversionsDatabase != null
    }

    /**
     * method used to query the database to retrieve information that is required
     * @param uri file location
     * @param projection list of columns to return
     * @param selection which rows to return
     * @param arguments the values you want to check for
     * @param sortOrder how to order the rows
     * @return cursor storing the query results
     */
    override fun query(uri: Uri, projection: Array<String>?, selection: String?,

```

```

        arguments: Array<String>?, sortOrder: String?): Cursor? {
    var so = sortOrder
    val sqlBuilder = SQLiteQueryBuilder()
    sqlBuilder.tables = DATABASE_TABLE
    if (uriMatcher.match(uri) == ONE_CONVERSION) {
        val code = uri.pathSegments[1]
        sqlBuilder.appendWhere("code = '$code'")
    }

    if (so == null || so == "") {
        so = "code"
    }
    val cursor = sqlBuilder.query(conversionsDatabase, projection, selection,
        arguments, null, null, sortOrder)
    cursor.setNotificationUri(contentResolver, uri)
    return cursor
}

/**
 * function to update the database with given values at given location
 * **/
override fun update(uri: Uri, values: ContentValues?, selection: String?,
    arguments: Array<String>?): Int {
    var count = 0
    when (uriMatcher.match(uri)) {
        ALL_CONVERSIONS -> count = conversionsDatabase.update(DATABASE_TABLE, values,
selection,
        arguments)
        ONE_CONVERSION -> {
            var code = uri.pathSegments[1]
            code = "code = '$code'"
            if (!TextUtils.isEmpty(selection)) code += " AND ($selection)"
            count = conversionsDatabase.update(DATABASE_TABLE, values, code,
                arguments)
        }
        else -> throw IllegalArgumentException("Unknown URI $uri")
    }
    contentResolver.notifyChange(uri, null)
    return count
}

/**
 * companion object declaring some important information
 * **/
companion object {
    const val DATABASE_TABLE = "modules"
    const val PROVIDER_NAME = "uk.ac.stir.cs.andriodproject.Conversion"
    /** Content provider URI */
    @JvmField
    val CONTENT_URI = Uri.parse("content://" + PROVIDER_NAME + "/" + DATABASE_TABLE)

    /** URI code for all conversions */
    private const val ALL_CONVERSIONS = 1

    /** URI code for one conversions */
    private const val ONE_CONVERSION = 2
}

/**
 * internal class for the database helper used to define the structure of the database
 * **/
internal class DatabaseHelper(context: Context?) : SQLiteOpenHelper(context, DATABASE_NAME,
    null, DATABASE_VERSION) {

    /**
     * on create execute the sql to create the table in the given database
     * **/
    override fun onCreate(database: SQLiteDatabase) {
        database.execSQL(
            "CREATE TABLE IF NOT EXISTS " + Provider.DATABASE_TABLE + "(" +
                "id INTEGER PRIMARY KEY AUTOINCREMENT, " +
                "code TEXT NOT NULL," +
                "startUnit TEXT NOT NULL," +

```

```

        "convertedUnit TEXT NOT NULL," +
        "multiplier TEXT NOT NULL," +
        "category TEXT NOT NULL" +
        ");"
    )
}

/**
 *on upgrade drop the old table and create the new one
 */
override fun onUpgrade(database: SQLiteDatabase, oldVersion: Int,
    newVersion: Int) {
    database.execSQL("DROP TABLE IF EXISTS " + Provider.DATABASE_TABLE)
    onCreate(database)
}

/**
 * companion object storing the database name and version
 */
companion object {
    val DATABASE_NAME = "conversionsDatabase"
    val DATABASE_VERSION = 1
}
}

```

### 6.1.7 PageAdapter.kt

```

package uk.ac.stir.cs.andriodproject

import androidx.fragment.app.Fragment
import androidx.fragment.app.FragmentManager
import androidx.fragment.app.FragmentStatePagerAdapter

/**
 * class handles the swithcing of fragments based on which tab has been selected
 */
internal class PagerAdapter(fragmentManager: FragmentManager?, private val mNumOfTabs:
    Int) : FragmentStatePagerAdapter(fragmentManager!!,
    BEHAVIOR_RESUME_ONLY_CURRENT_FRAGMENT) {
    override fun getItem(position: Int): Fragment {
        return when (position) {
            0 -> SelectionFragment()
            1 -> ConversionFragment()
            2 -> AddConversionFragment()
            3 -> RemoveConversionFragment()
            else -> Fragment()
        }
    }
    override fun getCount(): Int {
        return mNumOfTabs
    }
}
}

```



## 6.2 Resource files

6.2.1 activity_main.xml	Toolbar, tab layout and night switch. Phone, Portrait
6.2.2 activity_main.xml (land)	
6.2.3 activity_main.xml (xlarge)	
6.2.4 activity_main.xml(land-xlarge)	
6.2.5 selection_fragment.xml	Category and unit spinners
6.2.6 selection_fragment.xml (land)	
6.2.7 selection_fragment.xml (xlarge)	
6.2.8 selection_fragment.xml(land-xlarge)	
6.2.9 conversion_fragment.xml	Units labels, text fields, clear and number pad
6.2.10 conversion_fragment.xml (land)	
6.2.11 conversion_fragment.xml (xlarge)	
6.2.12 conversion_fragment.xml (land-xlarge)	
6.2.13 add_conversion.xml	Labels, text fields, add and clear buttons
6.2.14 add_conversion.xml (land)	
6.2.15 add_conversion.xml (xlarge)	
6.2.16 add_conversion.xml (land-xlarge)	
6.2.17 remove_conversion.xml	Label, text fields and remove button
6.2.18 remove_conversion.xml (land)	
6.2.19 remove_conversion.xml (xlarge)	
6.2.20 remove_conversion.xml (land-xlarge)	
6.2.21 colors.xml	Light theme colours
6.2.22 colors.xml (night)	Night theme colours
6.2.23 strings.xml	String resources
6.2.24 styles.xml	Styles
6.2.25 AndroidManifest.xml	Manifest file

### 6.2.1 activity\_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
xmlns:app="http://schemas.android.com/apk/res-auto"
xmlns:tools="http://schemas.android.com/tools"
android:id="@+id/linearlayout"
android:layout_width="match_parent"
android:layout_height="match_parent"
tools:context=".MainActivity">

    <androidx.appcompat.widget.Toolbar
        android:id="@+id/toolbar"
        android:layout_width="0dp"
        android:layout_height="45dp"
        android:background="@color/headerColour"
        android:elevation="6dp"
        app:layout_constraintBottom_toTopOf="@+id/tab_layout"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:title="@string/app_name"
        app:titleTextColor="@color/colorPrimary"
        tools:targetApi="lollipop" />

    <com.google.android.material.tabs.TabLayout
```



```

        android:id="@+id/tab_layout"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:background="@color/headerColour"
        android:elevation="6dp"
        android:minHeight="?attr/actionBarSize"
        android:theme="@style/ThemeOverlay.AppCompat.Dark.ActionBar"
        app:layout_constraintBottom_toTopOf="@+id/pager"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.0"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/toolbar"
        app:tabIndicatorColor="@color/colorPrimary"
        app:tabSelectedTextColor="@color/colorPrimary"
        app:tabTextColor="@color/tabTextColour"
        tools:targetApi="lollipop">

        <com.google.android.material.tabs.TabItem
            android:id="@+id/tabItem4"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/tab_page1" />

        <com.google.android.material.tabs.TabItem
            android:id="@+id/tabItem3"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/tab_page2" />

        <com.google.android.material.tabs.TabItem
            android:id="@+id/tabItem2"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/tab_page3" />

        <com.google.android.material.tabs.TabItem
            android:id="@+id/tabItem"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/tab_page4" />

    </com.google.android.material.tabs.TabLayout>

    <androidx.viewpager.widget.ViewPager
        android:id="@+id/pager"
        android:layout_width="wrap_content"
        android:layout_height="0dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/tab_layout">

    </androidx.viewpager.widget.ViewPager>

    <Switch
        android:id="@+id/nightSwitch"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginBottom="5dp"
        android:text="@string/nightMode"
        android:translationZ="90dp"
        android:textColor="@color/tabTextColour"
        app:layout_constraintBottom_toTopOf="@+id/tab_layout"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.95"
        app:layout_constraintStart_toStartOf="@+id/toolbar"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="1.0"
        tools:ignore="UseSwitchCompatOrMaterialXml" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

## 6.2.2 activity\_main.xml (land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
xmlns:app="http://schemas.android.com/apk/res-auto"
xmlns:tools="http://schemas.android.com/tools"
android:id="@+id/linearlayout2"
android:layout_width="match_parent"
android:layout_height="match_parent"
tools:context=".MainActivity">

    <androidx.appcompat.widget.Toolbar
        android:id="@+id/toolbar"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:background="@color/headerColour"
        android:elevation="6dp"
        app:layout_constraintBottom_toTopOf="@+id/tab_layout"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:title="@string/app_name"
        app:titleTextAppearance="@style/Toolbar.TitleText"
        app:titleTextColor="@color/colorPrimary"
        tools:targetApi="lollipop" />

    <com.google.android.material.tabs.TabLayout
        android:id="@+id/tab_layout"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:background="@color/headerColour"
        android:elevation="6dp"
        android:minHeight="?attr/actionBarSize"
        android:textSize="36sp"
        android:theme="@style/ThemeOverlay.AppCompat.Dark.ActionBar"
        app:layout_constraintBottom_toTopOf="@+id/pager"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/toolbar"
        app:tabIndicatorColor="@color/colorPrimary"
        app:tabSelectedTextColor="@color/colorPrimary"
        app:tabTextColor="@color/tabTextColour"
        tools:targetApi="lollipop">

        <com.google.android.material.tabs.TabItem
            android:id="@+id/tabItem16"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/tab_page1" />

        <com.google.android.material.tabs.TabItem
            android:id="@+id/tabItem15"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/tab_page2" />

        <com.google.android.material.tabs.TabItem
            android:id="@+id/tabItem14"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/tab_page3" />

        <com.google.android.material.tabs.TabItem
            android:id="@+id/tabItem13"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/tab_page4" />

    </com.google.android.material.tabs.TabLayout>

    <androidx.viewpager.widget.ViewPager
        android:id="@+id/pager"
        android:layout_width="wrap_content"
        android:layout_height="0dp"
        app:layout_constraintBottom_toBottomOf="parent"

```

```

        app:layout_constraintStart_toStartOf="@+id/tab_layout"
        app:layout_constraintTop_toBottomOf="@+id/tab_layout">

</androidx.viewpager.widget.ViewPager>

<Switch
    android:id="@+id/nightSwitch"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="40dp"
    android:layout_marginEnd="20dp"
    android:layout_marginRight="20dp"
    android:text="@string/nightMode"
    android:translationZ="90dp"
    android:textColor="@color/colorPrimary"
    app:layout_constraintBottom_toTopOf="@+id/toolbar"
    app:layout_constraintEnd_toEndOf="@+id/toolbar"
    app:layout_constraintTop_toTopOf="parent" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

### 6.2.3 activity\_main.xml (xlarge)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/linearLayout3"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <androidx.appcompat.widget.Toolbar
        android:id="@+id/toolbar"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:background="@color/headerColour"
        android:elevation="6dp"
        app:layout_constraintBottom_toTopOf="@+id/tab_layout"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:title="@string/app_name"
        app:titleTextAppearance="@style/Toolbar.TitleText"
        app:titleTextColor="@color/colorPrimary"
        tools:targetApi="lollipop" />

    <com.google.android.material.tabs.TabLayout
        android:id="@+id/tab_layout"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:background="@color/headerColour"
        android:elevation="6dp"
        android:minHeight="?attr/actionBarSize"
        android:textSize="36sp"
        android:theme="@style/ThemeOverlay.AppCompat.Dark.ActionBar"
        app:layout_constraintBottom_toTopOf="@+id/pager"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/toolbar"
        app:tabIndicatorColor="@color/colorPrimary"
        app:tabSelectedTextColor="@color/colorPrimary"
        app:tabTextColor="@color/tabTextColour"
        tools:targetApi="lollipop">

        <com.google.android.material.tabs.TabItem
            android:id="@+id/tabItem9"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/tab_page1" />

        <com.google.android.material.tabs.TabItem

```

```

        android:id="@+id/tabItem10"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/tab_page2" />

<com.google.android.material.tabs.TabItem
    android:id="@+id/tabItem11"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/tab_page3" />

<com.google.android.material.tabs.TabItem
    android:id="@+id/tabItem12"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/tab_page4" />
</com.google.android.material.tabs.TabLayout>

<androidx.viewpager.widget.ViewPager
    android:id="@+id/pager"
    android:layout_width="wrap_content"
    android:layout_height="0dp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintStart_toStartOf="@+id/tab_layout"
    app:layout_constraintTop_toBottomOf="@+id/tab_layout">

</androidx.viewpager.widget.ViewPager>

<Switch
    android:id="@+id/nightSwitch"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="55dp"
    android:layout_marginEnd="20dp"
    android:layout_marginRight="20dp"
    android:text="@string/nightMode"
    android:translationZ="90dp"
    android:textColor="@color/colorPrimary"
    android:textSize="20sp"
    app:layout_constraintBottom_toTopOf="@+id/toolbar"
    app:layout_constraintEnd_toEndOf="@+id/toolbar"
    app:layout_constraintTop_toTopOf="parent"
    tools:ignore="UseSwitchCompatOrMaterialXml" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

#### 6.2.4 activity\_main.xml (xlarge-land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/linearLayout4"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <androidx.appcompat.widget.Toolbar
        android:id="@+id/toolbar"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:background="@color/headerColour"
        android:elevation="6dp"
        app:layout_constraintBottom_toTopOf="@+id/tab_layout"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:title="@string/app_name"
        app:titleTextAppearance="@style/Toolbar.TitleText"
        app:titleTextColor="@color/colorPrimary"
        tools:targetApi="lollipop" />

    <com.google.android.material.tabs.TabLayout

```

```
android:id="@+id/tab_layout"
android:layout_width="0dp"
android:layout_height="wrap_content"
android:background="@color/headerColour"
android:elevation="6dp"
android:minHeight="?attr/actionBarSize"
android:textSize="36sp"
android:theme="@style/ThemeOverlay.AppCompat.Dark.ActionBar"
app:layout_constraintBottom_toTopOf="@+id/pager"
app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintStart_toStartOf="parent"
app:layout_constraintTop_toBottomOf="@+id/toolbar"
app:tabIndicatorColor="@color/colorPrimary"
app:tabSelectedTextColor="@color/colorPrimary"
app:tabTextColor="@color/tabTextColour"
tools:targetApi="lollipop">
```

```
<com.google.android.material.tabs.TabItem
    android:id="@+id/tabItem16"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/tab_page1" />
```

```
<com.google.android.material.tabs.TabItem
    android:id="@+id/tabItem15"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/tab_page2" />
```

```
<com.google.android.material.tabs.TabItem
    android:id="@+id/tabItem14"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/tab_page3" />
```

```
<com.google.android.material.tabs.TabItem
    android:id="@+id/tabItem13"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/tab_page4" />
```

```
</com.google.android.material.tabs.TabLayout>
```

```
<androidx.viewpager.widget.ViewPager
    android:id="@+id/pager"
    android:layout_width="wrap_content"
    android:layout_height="0dp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintStart_toStartOf="@+id/tab_layout"
    app:layout_constraintTop_toBottomOf="@+id/tab_layout">
```

```
</androidx.viewpager.widget.ViewPager>
```

```
<Switch
    android:id="@+id/nightSwitch"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="55dp"
    android:layout_marginEnd="20dp"
    android:layout_marginRight="20dp"
    android:text="@string/nightMode"
    android:translationZ="90dp"
    android:textSize="20sp"
    android:textColor="@color/colorPrimary"
    app:layout_constraintBottom_toTopOf="@+id/toolbar"
    app:layout_constraintEnd_toEndOf="@+id/toolbar"
    app:layout_constraintTop_toTopOf="parent"
    tools:ignore="UseSwitchCompatOrMaterialXml" />
```

```
</androidx.constraintlayout.widget.ConstraintLayout>
```

## 6.2.5 selection\_fragment.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <TextView
        android:id="@+id/textViewStartUnitLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/StartUnitLabel"
        android:textColor="@color/labelColour"
        android:textSize="20sp"
        app:layout_constraintBottom_toTopOf="@+id/spinnerStartUnit"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/spinnerCategory" />

    <Spinner
        android:id="@+id/spinnerCategory"
        android:layout_width="200dp"
        android:layout_height="50dp"
        android:color="@color/colorPrimary"
        app:layout_constraintBottom_toTopOf="@+id/textViewStartUnitLabel"
        app:layout_constraintEnd_toEndOf="@+id/spinnerStartUnit"
        app:layout_constraintStart_toStartOf="@+id/spinnerStartUnit"
        app:layout_constraintTop_toBottomOf="@+id/textViewUnitCatLabel" />

    <Spinner
        android:id="@+id/spinnerStartUnit"
        android:layout_width="200dp"
        android:layout_height="50dp"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/textViewConvertedUnitLabel"
        app:layout_constraintEnd_toEndOf="@+id/textViewStartUnitLabel"
        app:layout_constraintHorizontal_bias="0.491"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toBottomOf="@+id/textViewStartUnitLabel" />

    <Spinner
        android:id="@+id/spinnerConvertedUnit"
        android:layout_width="200dp"
        android:layout_height="50dp"
        android:layout_marginBottom="100dp"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="@+id/spinnerStartUnit"
        app:layout_constraintHorizontal_bias="0.0"
        app:layout_constraintStart_toStartOf="@+id/spinnerStartUnit"
        app:layout_constraintTop_toBottomOf="@+id/textViewConvertedUnitLabel" />

    <TextView
        android:id="@+id/textViewConvertedUnitLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/ConvertedUnitLabel"
        android:textColor="@color/labelColour"
        android:textSize="20sp"
        app:layout_constraintBottom_toTopOf="@+id/spinnerConvertedUnit"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toBottomOf="@+id/spinnerStartUnit" />

    <TextView
        android:id="@+id/textViewUnitCatLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="100dp"
        android:text="@string/UnitCategoryLab"
        android:textColor="@color/labelColour"
        android:textSize="20sp
```

```

        app:layout_constraintBottom_toTopOf="@+id/spinnerCategory"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_chainStyle="spread_inside" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

## 6.2.6 selection\_fragment.xml (land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
xmlns:app="http://schemas.android.com/apk/res-auto"
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"
android:layout_height="match_parent"
android:background="@color/fragBackground">

    <TextView
        android:id="@+id/textViewStartUnitLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/StartUnitLabel"
        android:textColor="@color/labelColour"
        android:textSize="20sp"
        app:layout_constraintBottom_toTopOf="@+id/spinnerStartUnit"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/spinnerCategory" />

    <Spinner
        android:id="@+id/spinnerCategory"
        android:layout_width="200dp"
        android:layout_height="40dp"
        app:layout_constraintBottom_toTopOf="@+id/textViewStartUnitLabel"
        app:layout_constraintEnd_toEndOf="@+id/spinnerStartUnit"
        app:layout_constraintStart_toStartOf="@+id/spinnerStartUnit"
        app:layout_constraintTop_toBottomOf="@+id/textViewUnitCatLabel" />

    <Spinner
        android:id="@+id/spinnerStartUnit"
        android:layout_width="200dp"
        android:layout_height="40dp"
        app:layout_constraintBottom_toTopOf="@+id/textViewConvertedUnitLabel"
        app:layout_constraintEnd_toEndOf="@+id/textViewStartUnitLabel"
        app:layout_constraintHorizontal_bias="0.491"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toBottomOf="@+id/textViewStartUnitLabel" />

    <Spinner
        android:id="@+id/spinnerConvertedUnit"
        android:layout_width="200dp"
        android:layout_height="40dp"
        android:layout_marginBottom="50dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="@+id/spinnerStartUnit"
        app:layout_constraintHorizontal_bias="0.0"
        app:layout_constraintStart_toStartOf="@+id/spinnerStartUnit"
        app:layout_constraintTop_toBottomOf="@+id/textViewConvertedUnitLabel" />

    <TextView
        android:id="@+id/textViewConvertedUnitLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/ConvertedUnitLabel"
        android:textColor="@color/labelColour"
        android:textSize="20sp"
        app:layout_constraintBottom_toTopOf="@+id/spinnerConvertedUnit"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toBottomOf="@+id/spinnerStartUnit" />

    <TextView
        android:id="@+id/textViewUnitCatLabel"
        android:layout_width="wrap_content"

```



```

        android:layout_height="wrap_content"
        android:layout_marginTop="50dp"
        android:text="@string/UnitCategoryLab"
        android:textColor="@color/labelColour"
        android:textSize="20sp"
        app:layout_constraintBottom_toTopOf="@+id/spinnerCategory"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_chainStyle="spread" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

### 6.2.7 selection\_fragment.xml (xlarge)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <TextView
        android:id="@+id/textViewStartUnitLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/StartUnitLabel"
        android:textColor="@color/labelColour"
        android:textSize="30sp"
        app:layout_constraintBottom_toTopOf="@+id/spinnerStartUnit"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/spinnerCategory" />

    <Spinner
        android:id="@+id/spinnerCategory"
        android:layout_width="300dp"
        android:layout_height="60dp"
        android:textSize="30sp"
        app:layout_constraintBottom_toTopOf="@+id/textViewStartUnitLabel"
        app:layout_constraintEnd_toEndOf="@+id/spinnerStartUnit"
        app:layout_constraintStart_toStartOf="@+id/spinnerStartUnit"
        app:layout_constraintTop_toBottomOf="@+id/textViewUnitCatLabel" />

    <Spinner
        android:id="@+id/spinnerStartUnit"
        android:layout_width="300dp"
        android:layout_height="60dp"
        android:textSize="30sp"
        app:layout_constraintBottom_toTopOf="@+id/textViewConvertedUnitLabel"
        app:layout_constraintEnd_toEndOf="@+id/textViewStartUnitLabel"
        app:layout_constraintHorizontal_bias="0.491"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toBottomOf="@+id/textViewStartUnitLabel" />

    <Spinner
        android:id="@+id/spinnerConvertedUnit"
        android:layout_width="300dp"
        android:layout_height="60dp"
        android:layout_marginBottom="100dp"
        android:textSize="30sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="@+id/spinnerStartUnit"
        app:layout_constraintHorizontal_bias="0.0"
        app:layout_constraintStart_toStartOf="@+id/spinnerStartUnit"
        app:layout_constraintTop_toBottomOf="@+id/textViewConvertedUnitLabel" />

    <TextView
        android:id="@+id/textViewConvertedUnitLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/ConvertedUnitLabel"
        android:textColor="@color/labelColour"

```



```

        android:textSize="30sp"
        app:layout_constraintBottom_toTopOf="@+id/spinnerConvertedUnit"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toBottomOf="@+id/spinnerStartUnit" />

<TextView
    android:id="@+id/textViewUnitCatLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="100dp"
    android:text="@string/UnitCategoryLab"
    android:textColor="@color/labelColour"
    android:textSize="30sp"
    app:layout_constraintBottom_toTopOf="@+id/spinnerCategory"
    app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_chainStyle="spread_inside" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

## 6.2.8 selection\_fragment.xml (xlarge-land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <TextView
        android:id="@+id/textViewStartUnitLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/StartUnitLabel"
        android:textColor="@color/labelColour"
        android:textSize="30sp"
        app:layout_constraintBottom_toTopOf="@+id/spinnerStartUnit"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/spinnerCategory" />

    <Spinner
        android:id="@+id/spinnerCategory"
        android:layout_width="300dp"
        android:layout_height="60dp"
        android:textSize="20sp"
        app:layout_constraintBottom_toTopOf="@+id/textViewStartUnitLabel"
        app:layout_constraintEnd_toEndOf="@+id/spinnerStartUnit"
        app:layout_constraintStart_toStartOf="@+id/spinnerStartUnit"
        app:layout_constraintTop_toBottomOf="@+id/textViewUnitCatLabel" />

    <Spinner
        android:id="@+id/spinnerStartUnit"
        android:layout_width="300dp"
        android:layout_height="60dp"
        android:textSize="20sp"
        app:layout_constraintBottom_toTopOf="@+id/textViewConvertedUnitLabel"
        app:layout_constraintEnd_toEndOf="@+id/textViewStartUnitLabel"
        app:layout_constraintHorizontal_bias="0.491"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toBottomOf="@+id/textViewStartUnitLabel" />

    <Spinner
        android:id="@+id/spinnerConvertedUnit"
        android:layout_width="300dp"
        android:layout_height="60dp"
        android:layout_marginBottom="100dp"
        android:textSize="20sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="@+id/spinnerStartUnit"
        app:layout_constraintHorizontal_bias="0.0"
        app:layout_constraintStart_toStartOf="@+id/spinnerStartUnit"
        app:layout_constraintTop_toBottomOf="@+id/textViewConvertedUnitLabel" />

```

```

<TextView
    android:id="@+id/textViewConvertedUnitLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/ConvertedUnitLabel"
    android:textColor="@color/labelColour"
    android:textSize="30sp"
    app:layout_constraintBottom_toTopOf="@+id/spinnerConvertedUnit"
    app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
    app:layout_constraintTop_toBottomOf="@+id/spinnerStartUnit" />

<TextView
    android:id="@+id/textViewUnitCatLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="100dp"
    android:text="@string/UnitCategoryLab"
    android:textColor="@color/labelColour"
    android:textSize="30sp"
    app:layout_constraintBottom_toTopOf="@+id/spinnerCategory"
    app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_chainStyle="spread_inside" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

## 6.2.9 conversion\_fragment.xml

```

<?xml version="1.0" encoding="utf-8"?>

<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <Button
        android:id="@+id/clearButton"
        android:layout_width="79dp"
        android:layout_height="40dp"
        android:text="@string/ClearButton"
        app:layout_constraintBottom_toBottomOf="@+id/editTextStartUnit"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toEndOf="@+id/editTextStartUnit"
        app:layout_constraintTop_toTopOf="@+id/editTextStartUnit" />

    <TextView
        android:id="@+id/categoryLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/categoryLabel"
        android:textSize="22sp"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/textViewStartUnitLabel"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toTopOf="parent" />

    <TextView
        android:id="@+id/textViewConvertedUnitLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="converted unit placeholder"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/editTextConvertedUnit"
        app:layout_constraintStart_toStartOf="@+id/editTextStartUnit"
        app:layout_constraintTop_toBottomOf="@+id/editTextStartUnit" />

    <TextView
        android:id="@+id/textViewStartUnitLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"

```

```
android:text="start unit placeholder"
android:textColor="@color/labelColour"
app:layout_constraintBottom_toTop0f="@+id/editTextStartUnit"
app:layout_constraintStart_toStart0f="@+id/editTextStartUnit"
app:layout_constraintTop_toBottom0f="@+id/categoryLabel" />
```

```
<EditText
    android:id="@+id/editTextStartUnit"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:inputType="numberDecimal"
    android:maxLength="10"
    android:focusable="false"
    android:textSize="20sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTop0f="@+id/textViewConvertedUnitLabel"
    app:layout_constraintEnd_toStart0f="@+id/clearButton"
    app:layout_constraintStart_toStart0f="@+id/tableLayout"
    app:layout_constraintTop_toBottom0f="@+id/textViewStartUnitLabel" />
```

```
<EditText
    android:id="@+id/editTextConvertedUnit"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginBottom="15dp"
    android:ems="10"
    android:inputType="numberDecimal"
    android:focusable="false"
    android:textSize="20sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTop0f="@+id/tableLayout"
    app:layout_constraintStart_toStart0f="@+id/textViewConvertedUnitLabel"
    app:layout_constraintTop_toBottom0f="@+id/textViewConvertedUnitLabel" />
```

```
<TableLayout
    android:id="@+id/tableLayout"
    android:layout_width="240dp"
    android:layout_height="283dp"
    app:layout_constraintBottom_toBottom0f="parent"
    app:layout_constraintEnd_toEnd0f="parent"
    app:layout_constraintStart_toStart0f="parent"
    app:layout_constraintTop_toBottom0f="@+id/editTextConvertedUnit">
```

```
<TableRow
    android:layout_width="match_parent"
    android:layout_height="match_parent">
```

```
    <Button
        android:id="@+id/button7"
        android:layout_width="80dp"
        android:layout_height="70dp"
        android:text="@string/button7" />
```

```
    <Button
        android:id="@+id/button8"
        android:layout_width="80dp"
        android:layout_height="70dp"
        android:text="@string/button8" />
```

```
    <Button
        android:id="@+id/button9"
        android:layout_width="80dp"
        android:layout_height="70dp"
        android:text="@string/button9" />
```

```
</TableRow>
```

```
<TableRow
    android:layout_width="match_parent"
    android:layout_height="match_parent">
```

```
    <Button
        android:id="@+id/button4"
        android:layout_width="80dp"
```

```

        android:layout_height="70dp"
        android:text="@string/button4" />

        <Button
            android:id="@+id/button5"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button5" />

        <Button
            android:id="@+id/button6"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button6" />
    </TableRow>

    <TableRow
        android:layout_width="match_parent"
        android:layout_height="match_parent">

        <Button
            android:id="@+id/button1"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button1" />

        <Button
            android:id="@+id/button2"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button2" />

        <Button
            android:id="@+id/button3"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button3" />
    </TableRow>

    <TableRow
        android:layout_width="match_parent"
        android:layout_height="match_parent">

        <Button
            android:id="@+id/buttonDel"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/buttonDel" />

        <Button
            android:id="@+id/button0"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button0" />

        <Button
            android:id="@+id/buttonDot"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/buttonDot" />
    </TableRow>

</TableLayout>
</androidx.constraintlayout.widget.ConstraintLayout>

```

#### 6.2.10 conversion\_fragment.xml (land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"

```

```

android:background="@color/fragBackground">

<TextView
    android:id="@+id/categoryLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/categoryLabel"
    android:textSize="22sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/textViewStartUnitLabel"
    app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
    app:layout_constraintTop_toTopOf="parent" />

<TableLayout
    android:id="@+id/tableLayout"
    android:layout_width="240dp"
    android:layout_height="280dp"
    android:layout_marginEnd="50dp"
    android:layout_marginRight="50dp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toEndOf="@+id/clearButton"
    app:layout_constraintTop_toTopOf="parent">

    <TableRow
        android:layout_width="match_parent"
        android:layout_height="match_parent">

        <Button
            android:id="@+id/button7"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button7" />

        <Button
            android:id="@+id/button8"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button8" />

        <Button
            android:id="@+id/button9"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button9" />
    </TableRow>

    <TableRow
        android:layout_width="match_parent"
        android:layout_height="match_parent">

        <Button
            android:id="@+id/button4"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button4" />

        <Button
            android:id="@+id/button5"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button5" />

        <Button
            android:id="@+id/button6"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button6" />
    </TableRow>

    <TableRow
        android:layout_width="match_parent"
        android:layout_height="match_parent">

```

```

        <Button
            android:id="@+id/button1"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button1" />

        <Button
            android:id="@+id/button2"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button2" />

        <Button
            android:id="@+id/button3"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button3" />
    </TableRow>

    <TableRow
        android:layout_width="match_parent"
        android:layout_height="match_parent">

        <Button
            android:id="@+id/buttonDel"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/buttonDel" />

        <Button
            android:id="@+id/button0"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/button0" />

        <Button
            android:id="@+id/buttonDot"
            android:layout_width="80dp"
            android:layout_height="70dp"
            android:text="@string/buttonDot" />
    </TableRow>

</TableLayout>

<TextView
    android:id="@+id/textViewStartUnitLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="start unit placeholder"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/editTextStartUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextStartUnit"
    app:layout_constraintTop_toBottomOf="@+id/categoryLabel" />

<EditText
    android:id="@+id/editTextConvertedUnit"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginBottom="40dp"
    android:ems="10"
    android:inputType="numberDecimal"
    android:focusable="false"
    android:textSize="20sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintStart_toStartOf="@+id/textViewConvertedUnitLabel"
    app:layout_constraintTop_toBottomOf="@+id/textViewConvertedUnitLabel" />

<EditText
    android:id="@+id/editTextStartUnit"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginStart="40dp"

```

```

        android:layout_marginLeft="40dp"
        android:ems="10"
        android:inputType="numberDecimal"
        android:focusable="false"
        android:textSize="20sp"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/textViewConvertedUnitLabel"
        app:layout_constraintEnd_toStartOf="@+id/clearButton"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/textViewStartUnitLabel" />

<TextView
    android:id="@+id/textViewConvertedUnitLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="converted unit placeholder"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/editTextConvertedUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextStartUnit"
    app:layout_constraintTop_toBottomOf="@+id/editTextStartUnit" />

<Button
    android:id="@+id/clearButton"
    android:layout_width="79dp"
    android:layout_height="40dp"
    android:text="@string/ClearButton"
    app:layout_constraintBottom_toBottomOf="@+id/editTextStartUnit"
    app:layout_constraintEnd_toStartOf="@+id/tableLayout"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toEndOf="@+id/editTextStartUnit"
    app:layout_constraintTop_toTopOf="@+id/editTextStartUnit" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

### 6.2.11 conversion\_fragment.xml (xlarge)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <TextView
        android:id="@+id/categoryLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="20dp"
        android:text="@string/categoryLabel"
        android:textSize="35sp"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/textViewStartUnitLabel"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toTopOf="parent" />

    <TableLayout
        android:id="@+id/tableLayout"
        android:layout_width="393dp"
        android:layout_height="445dp"
        android:layout_marginBottom="20dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/editTextConvertedUnit">

        <TableRow
            android:layout_width="match_parent"
            android:layout_height="match_parent">

            <Button

```

```

        android:id="@+id/button7"
        android:layout_width="130dp"
        android:layout_height="110dp"
        android:textSize="30sp"
        android:text="@string/button7" />

<Button
    android:id="@+id/button8"
    android:textSize="30sp"
    android:layout_width="130dp"
    android:layout_height="110dp"
    android:text="@string/button8" />

<Button
    android:id="@+id/button9"
    android:textSize="30sp"
    android:layout_width="130dp"
    android:layout_height="110dp"
    android:text="@string/button9" />
</TableRow>

<TableRow
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <Button
        android:id="@+id/button4"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="110dp"
        android:text="@string/button4" />

    <Button
        android:id="@+id/button5"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="110dp"
        android:text="@string/button5" />

    <Button
        android:id="@+id/button6"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="110dp"
        android:text="@string/button6" />
</TableRow>

<TableRow
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <Button
        android:id="@+id/button1"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="110dp"
        android:text="@string/button1" />

    <Button
        android:id="@+id/button2"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="110dp"
        android:text="@string/button2" />

    <Button
        android:id="@+id/button3"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="110dp"
        android:text="@string/button3" />
</TableRow>

<TableRow

```



```

        android:layout_width="match_parent"
        android:layout_height="match_parent">

        <Button
            android:id="@+id/buttonDel"
            android:textSize="30sp"
            android:layout_width="130dp"
            android:layout_height="110dp"
            android:text="@string/buttonDel" />

        <Button
            android:id="@+id/button0"
            android:textSize="30sp"
            android:layout_width="130dp"
            android:layout_height="110dp"
            android:text="@string/button0" />

        <Button
            android:id="@+id/buttonDot"
            android:textSize="30sp"
            android:layout_width="130dp"
            android:layout_height="110dp"
            android:text="@string/buttonDot" />
    </TableRow>

</TableLayout>

<TextView
    android:id="@+id/textViewConvertedUnitLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="converted unit placeholder"
    android:textColor="@color/labelColour"
    android:textSize="30sp"
    app:layout_constraintBottom_toTopOf="@+id/editTextConvertedUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextConvertedUnit"
    app:layout_constraintTop_toBottomOf="@+id/editTextStartUnit" />

<TextView
    android:id="@+id/textViewStartUnitLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="start unit placeholder"
    android:textColor="@color/labelColour"
    android:textSize="30sp"
    app:layout_constraintBottom_toTopOf="@+id/editTextStartUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextStartUnit"
    app:layout_constraintTop_toBottomOf="@+id/categoryLabel" />

<Button
    android:id="@+id/clearButton"
    android:layout_width="124dp"
    android:layout_height="77dp"
    android:layout_marginEnd="70dp"
    android:layout_marginRight="70dp"
    android:text="@string/ClearButton"
    android:textSize="20sp"
    app:layout_constraintBottom_toBottomOf="@+id/editTextStartUnit"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toEndOf="@+id/editTextStartUnit"
    app:layout_constraintTop_toTopOf="@+id/editTextStartUnit" />

<EditText
    android:id="@+id/editTextStartUnit"
    android:layout_width="300dp"
    android:layout_height="60dp"
    android:ems="10"
    android:inputType="numberDecimal"
    android:focusable="false"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/textViewConvertedUnitLabel"
    app:layout_constraintEnd_toStartOf="@+id/clearButton"

```

```

        app:layout_constraintHorizontal_chainStyle="spread_inside"
        app:layout_constraintStart_toStartOf="@+id/textViewConvertedUnitLabel"
        app:layout_constraintTop_toBottomOf="@+id/textViewStartUnitLabel" />

<EditText
    android:id="@+id/editTextConvertedUnit"
    android:layout_width="300dp"
    android:layout_height="60dp"
    android:ems="10"
    android:inputType="numberDecimal"
    android:focusable="false"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/tableLayout"
    app:layout_constraintStart_toStartOf="@+id/tableLayout"
    app:layout_constraintTop_toBottomOf="@+id/textViewConvertedUnitLabel" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

## 6.2.12 conversion\_fragment.xml (xlarge-land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <TextView
        android:id="@+id/categoryLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/categoryLabel"
        android:textColor="@color/labelColour"
        android:textSize="35sp"
        app:layout_constraintBottom_toTopOf="@+id/textViewStartUnitLabel"
        app:layout_constraintStart_toStartOf="@+id/textViewStartUnitLabel"
        app:layout_constraintTop_toTopOf="parent" />

    <TableLayout
        android:id="@+id/tableLayout"
        android:layout_width="396dp"
        android:layout_height="528dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toEndOf="@+id/editTextStartUnit"
        app:layout_constraintTop_toTopOf="parent">

        <TableRow
            android:layout_width="match_parent"
            android:layout_height="match_parent">

            <Button
                android:id="@+id/button7"
                android:textSize="30sp"
                android:layout_width="130dp"
                android:layout_height="130dp"
                android:text="@string/button7" />

            <Button
                android:id="@+id/button8"
                android:textSize="30sp"
                android:layout_width="130dp"
                android:layout_height="130dp"
                android:text="@string/button8" />

            <Button
                android:id="@+id/button9"
                android:textSize="30sp"
                android:layout_width="130dp"
                android:layout_height="130dp"
                android:text="@string/button9" />
        </TableRow>
    </TableLayout>

```

```

</TableRow>

<TableRow
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <Button
        android:id="@+id/button4"
        android:textSize="30sp"
        android:layout_width="80dp"
        android:layout_height="130dp"
        android:text="@string/button4" />

    <Button
        android:id="@+id/button5"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="130dp"
        android:text="@string/button5" />

    <Button
        android:id="@+id/button6"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="130dp"
        android:text="@string/button6" />
</TableRow>

<TableRow
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <Button
        android:id="@+id/button1"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="130dp"
        android:text="@string/button1" />

    <Button
        android:id="@+id/button2"
        android:textSize="30sp"
        android:layout_width="80dp"
        android:layout_height="130dp"
        android:text="@string/button2" />

    <Button
        android:id="@+id/button3"
        android:textSize="30sp"
        android:layout_width="80dp"
        android:layout_height="130dp"
        android:text="@string/button3" />
</TableRow>

<TableRow
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <Button
        android:id="@+id/buttonDel"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="130dp"
        android:text="@string/buttonDel" />

    <Button
        android:id="@+id/button0"
        android:textSize="30sp"
        android:layout_width="130dp"
        android:layout_height="130dp"
        android:text="@string/button0" />

    <Button
        android:id="@+id/buttonDot"

```

```

        android:textSize="30sp"
        android:layout_width="80dp"
        android:layout_height="130dp"
        android:text="@string/buttonDot" />
    </TableRow>

</TableLayout>

<Button
    android:id="@+id/clearButton"
    android:layout_width="124dp"
    android:layout_height="77dp"
    android:text="@string/ClearButton"
    android:textSize="20sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="@+id/editTextConvertedUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextConvertedUnit"
    app:layout_constraintTop_toBottomOf="@+id/editTextConvertedUnit" />

<TextView
    android:id="@+id/textViewConvertedUnitLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="converted unit placeholder"
    android:textColor="@color/labelColour"
    android:textSize="30sp"
    app:layout_constraintBottom_toTopOf="@+id/editTextConvertedUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextStartUnit"
    app:layout_constraintTop_toBottomOf="@+id/editTextStartUnit" />

<EditText
    android:id="@+id/editTextConvertedUnit"
    android:layout_width="300dp"
    android:layout_height="60dp"
    android:ems="10"
    android:inputType="numberDecimal"
    android:focusable="false"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/clearButton"
    app:layout_constraintStart_toStartOf="@+id/textViewConvertedUnitLabel"
    app:layout_constraintTop_toBottomOf="@+id/textViewConvertedUnitLabel" />

<TextView
    android:id="@+id/textViewStartUnitLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="start unit placeholder"
    android:textColor="@color/labelColour"
    android:textSize="30sp"
    app:layout_constraintBottom_toTopOf="@+id/editTextStartUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextStartUnit"
    app:layout_constraintTop_toBottomOf="@+id/categoryLabel" />

<EditText
    android:id="@+id/editTextStartUnit"
    android:layout_width="300dp"
    android:layout_height="60dp"
    android:ems="10"
    android:inputType="numberDecimal"
    android:focusable="false"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/textViewConvertedUnitLabel"
    app:layout_constraintEnd_toStartOf="@+id/tableLayout"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/textViewStartUnitLabel" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

### 6.2.13 add\_conversion.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <EditText
        android:id="@+id/editTextAddConversionName"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:ems="10"
        android:maxLength="30"
        android:hint="e.g. inch to foot"
        android:textColorHint="@color/hintColour"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/addConversionStartUnitNameLabel"
        app:layout_constraintStart_toStartOf="@+id/addConversionStartUnitNameLabel"
        app:layout_constraintTop_toBottomOf="@+id/addConversionNameLabel" />

    <EditText
        android:id="@+id/editTextAddConversionStartUnit"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:ems="10"
        android:maxLength="30"
        android:hint="e.g. inch"
        android:textColorHint="@color/hintColour"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/addConversionConvertedUnitNameLabel"
        app:layout_constraintStart_toStartOf="@+id/addConversionConvertedUnitNameLabel"
        app:layout_constraintTop_toBottomOf="@+id/addConversionStartUnitNameLabel" />

    <EditText
        android:id="@+id/editTextAddConversionConvertedUnit"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:ems="10"
        android:maxLength="30"
        android:hint="e.g. foot"
        android:textColorHint="@color/hintColour"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/addConversionMultiplier"
        app:layout_constraintStart_toStartOf="@+id/addConversionMultiplier"
        app:layout_constraintTop_toBottomOf="@+id/addConversionConvertedUnitNameLabel" />

    <EditText
        android:id="@+id/editTextAddConversionMultiplier"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:ems="10"
        android:inputType="numberDecimal"
        android:maxLength="10"
        android:hint="e.g. 0.0833333"
        android:textColorHint="@color/hintColour"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/clearAllButton"
        app:layout_constraintStart_toStartOf="@+id/clearAllButton"
        app:layout_constraintTop_toBottomOf="@+id/addConversionMultiplier" />

    <TextView
        android:id="@+id/addConversionNameLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/addConvNameLabel"
        android:textSize="18sp"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/editTextAddConversionName"
        app:layout_constraintStart_toStartOf="@+id/editTextAddConversionName"
        app:layout_constraintTop_toTopOf="parent" />
```

```

<TextView
    android:id="@+id/addConversionStartUnitNameLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addStartUnitLabel"
    android:textSize="18sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/editTextAddConversionStartUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextAddConversionStartUnit"
    app:layout_constraintTop_toBottomOf="@+id/editTextAddConversionName" />

<TextView
    android:id="@+id/addConversionConvertedUnitNameLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addConvToLabel"
    android:textSize="18sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/editTextAddConversionConvertedUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextAddConversionConvertedUnit"
    app:layout_constraintTop_toBottomOf="@+id/editTextAddConversionStartUnit" />

<TextView
    android:id="@+id/addConversionMultiplier"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addConvMultiLabel"
    android:textSize="18sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/editTextAddConversionMultiplier"
    app:layout_constraintStart_toStartOf="@+id/editTextAddConversionMultiplier"
    app:layout_constraintTop_toBottomOf="@+id/editTextAddConversionConvertedUnit" />

<Button
    android:id="@+id/clearAllButton"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/clearAllButton"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toStartOf="@+id/addButton"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/editTextAddConversionMultiplier" />

<Button
    android:id="@+id/addButton"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addConversion"
    app:layout_constraintBottom_toBottomOf="@+id/clearAllButton"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toEndOf="@+id/clearAllButton"
    app:layout_constraintTop_toTopOf="@+id/clearAllButton" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

#### 6.2.14 add\_conversion.xml (land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <TextView
        android:id="@+id/addConversionNameLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/addConvNameLabel"
        android:textSize="18sp"
        android:textColor="@color/labelColour"

```

```
app:layout_constraintBottom_toTopOf="@+id/addConversionStartUnitNameLabel"
app:layout_constraintStart_toStartOf="@+id/addConversionStartUnitNameLabel"
app:layout_constraintTop_toTopOf="parent" />
```

#### <Button

```
    android:id="@+id/clearAllButton"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginEnd="15dp"
    android:layout_marginRight="15dp"
    android:text="@string/clearAllButton"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toStartOf="@+id/addButton"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/addConversionMultiplier" />
```

#### <EditText

```
    android:id="@+id/editTextAddConversionStartUnit"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:maxLength="30"
    android:hint="e.g. inch"
    android:textColorHint="@color/hintColour"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toBottomOf="@+id/addConversionStartUnitNameLabel"
    app:layout_constraintStart_toStartOf="@+id/editTextAddConversionConvertedUnit"
    app:layout_constraintTop_toTopOf="@+id/addConversionStartUnitNameLabel" />
```

#### <TextView

```
    android:id="@+id/addConversionStartUnitNameLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addStartUnitLabel"
    android:textSize="18sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/addConversionConvertedUnitNameLabel"
    app:layout_constraintStart_toStartOf="@+id/addConversionConvertedUnitNameLabel"
    app:layout_constraintTop_toBottomOf="@+id/addConversionNameLabel" />
```

#### <EditText

```
    android:id="@+id/editTextAddConversionName"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:maxLength="30"
    android:hint="e.g. inch to foot"
    android:textColorHint="@color/hintColour"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toBottomOf="@+id/addConversionNameLabel"
    app:layout_constraintStart_toStartOf="@+id/editTextAddConversionStartUnit"
    app:layout_constraintTop_toTopOf="@+id/addConversionNameLabel" />
```

#### <TextView

```
    android:id="@+id/addConversionConvertedUnitNameLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addConvToLabel"
    android:textSize="18sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/addConversionMultiplier"
    app:layout_constraintStart_toStartOf="@+id/addConversionMultiplier"
    app:layout_constraintTop_toBottomOf="@+id/addConversionStartUnitNameLabel" />
```

#### <EditText

```
    android:id="@+id/editTextAddConversionConvertedUnit"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:maxLength="15"
    android:hint="e.g. foot"
    android:textColorHint="@color/hintColour"
    android:textColor="@color/labelColour"
```



```

        app:layout_constraintBottom_toBottomOf="@+id/addConversionConvertedUnitNameLabel"
        app:layout_constraintStart_toStartOf="@+id/editTextAddConversionMultiplier"
        app:layout_constraintTop_toTopOf="@+id/addConversionConvertedUnitNameLabel" />

<EditText
    android:id="@+id/editTextAddConversionMultiplier"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:inputType="numberDecimal"
    android:maxLength="10"
    android:hint="e.g. 0.0833333"
    android:textColorHint="@color/hintColour"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toBottomOf="@+id/addConversionMultiplier"
    app:layout_constraintEnd_toEndOf="@+id/addButton"
    app:layout_constraintStart_toStartOf="@+id/addButton"
    app:layout_constraintTop_toTopOf="@+id/addConversionMultiplier" />

<TextView
    android:id="@+id/addConversionMultiplier"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addConvMultiLabel"
    android:textSize="18sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/clearAllButton"
    app:layout_constraintEnd_toEndOf="@+id/clearAllButton"
    app:layout_constraintStart_toStartOf="@+id/clearAllButton"
    app:layout_constraintTop_toBottomOf="@+id/addConversionConvertedUnitNameLabel" />

<Button
    android:id="@+id/addButton"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginStart="15dp"
    android:layout_marginLeft="15dp"
    android:text="@string/addConversion"
    app:layout_constraintBottom_toBottomOf="@+id/clearAllButton"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toEndOf="@+id/clearAllButton"
    app:layout_constraintTop_toTopOf="@+id/clearAllButton" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

## 6.2.15 add\_conversion.xml (xlarge)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <EditText
        android:id="@+id/editTextAddConversionName"
        android:layout_width="300dp"
        android:layout_height="55dp"
        android:ems="10"
        android:maxLength="30"
        android:textSize="30sp"
        android:hint="e.g. inch to foot"
        android:textColorHint="@color/hintColour"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/addConversionStartUnitNameLabel"
        app:layout_constraintStart_toStartOf="@+id/addConversionStartUnitNameLabel"
        app:layout_constraintTop_toBottomOf="@+id/addConversionNameLabel" />

    <EditText
        android:id="@+id/editTextAddConversionStartUnit"
        android:layout_width="300dp"
        android:layout_height="55dp"

```



```

        android:ems="10"
        android:maxLength="15"
        android:textSize="30sp"
        android:hint="e.g. inch"
        android:textColorHint="@color/hintColour"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/addConversionConvertedUnitNameLabel"
        app:layout_constraintStart_toStartOf="@+id/addConversionConvertedUnitNameLabel"
        app:layout_constraintTop_toBottomOf="@+id/addConversionStartUnitNameLabel" />

<EditText
    android:id="@+id/editTextAddConversionConvertedUnit"
    android:layout_width="300dp"
    android:layout_height="55dp"
    android:ems="10"
    android:maxLength="15"
    android:textSize="30sp"
    android:hint="e.g. foot"
    android:textColorHint="@color/hintColour"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/addConversionMultiplier"
    app:layout_constraintStart_toStartOf="@+id/addConversionMultiplier"
    app:layout_constraintTop_toBottomOf="@+id/addConversionConvertedUnitNameLabel" />

<EditText
    android:id="@+id/editTextAddConversionMultiplier"
    android:layout_width="300dp"
    android:layout_height="55dp"
    android:ems="10"
    android:inputType="numberDecimal"
    android:maxLength="10"
    android:textSize="30sp"
    android:hint="e.g. 0.0833333"
    android:textColorHint="@color/hintColour"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/clearAllButton"
    app:layout_constraintStart_toStartOf="@+id/clearAllButton"
    app:layout_constraintTop_toBottomOf="@+id/addConversionMultiplier" />

<TextView
    android:id="@+id/addConversionNameLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addConvNameLabel"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/editTextAddConversionName"
    app:layout_constraintStart_toStartOf="@+id/editTextAddConversionName"
    app:layout_constraintTop_toTopOf="parent" />

<TextView
    android:id="@+id/addConversionStartUnitNameLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addStartUnitLabel"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/editTextAddConversionStartUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextAddConversionStartUnit"
    app:layout_constraintTop_toBottomOf="@+id/editTextAddConversionName" />

<TextView
    android:id="@+id/addConversionConvertedUnitNameLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addConvToLabel"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/editTextAddConversionConvertedUnit"
    app:layout_constraintStart_toStartOf="@+id/editTextAddConversionConvertedUnit"
    app:layout_constraintTop_toBottomOf="@+id/editTextAddConversionStartUnit" />

<TextView
    android:id="@+id/addConversionMultiplier"

```

```

        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/addConvMultiLabel"
        android:textSize="30sp"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/editTextAddConversionMultiplier"
        app:layout_constraintStart_toStartOf="@+id/editTextAddConversionMultiplier"
        app:layout_constraintTop_toBottomOf="@+id/editTextAddConversionConvertedUnit" />

<Button
    android:id="@+id/clearAllButton"
    android:layout_width="110dp"
    android:layout_height="70dp"
    android:text="@string/clearAllButton"
    android:textSize="20sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toStartOf="@+id/addButton"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/editTextAddConversionMultiplier" />

<Button
    android:id="@+id/addButton"
    android:layout_width="110dp"
    android:layout_height="70dp"
    android:text="@string/addConversion"
    android:textSize="20sp"
    app:layout_constraintBottom_toBottomOf="@+id/clearAllButton"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toEndOf="@+id/clearAllButton"
    app:layout_constraintTop_toTopOf="@+id/clearAllButton" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

## 6.2.16 add\_conversion.xml (xlarge-land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <TextView
        android:id="@+id/addConversionNameLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/addConvNameLabel"
        android:textSize="30sp"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/addConversionStartUnitNameLabel"
        app:layout_constraintStart_toStartOf="@+id/addConversionStartUnitNameLabel"
        app:layout_constraintTop_toTopOf="parent" />

    <EditText
        android:id="@+id/editTextAddConversionName"
        android:layout_width="300dp"
        android:layout_height="70dp"
        android:ems="10"
        android:hint="e.g. inch to foot"
        android:maxLength="30"
        android:textColor="@color/labelColour"
        android:textColorHint="@color/hintColour"
        android:textSize="30sp"
        app:layout_constraintBottom_toBottomOf="@+id/addConversionNameLabel"
        app:layout_constraintStart_toStartOf="@+id/editTextAddConversionStartUnit"
        app:layout_constraintTop_toTopOf="@+id/addConversionNameLabel" />

    <EditText
        android:id="@+id/editTextAddConversionStartUnit"
        android:layout_width="300dp"
        android:layout_height="70dp"

```

```

        android:ems="10"
        android:maxLength="15"
        android:textSize="30sp"
        android:hint="e.g. inch"
        android:textColorHint="@color/hintColour"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toBottomOf="@+id/addConversionStartUnitNameLabel"
        app:layout_constraintStart_toStartOf="@+id/editTextAddConversionConvertedUnit"
        app:layout_constraintTop_toTopOf="@+id/addConversionStartUnitNameLabel" />

<TextView
    android:id="@+id/addConversionStartUnitNameLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addStartUnitLabel"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/addConversionConvertedUnitNameLabel"
    app:layout_constraintStart_toStartOf="@+id/addConversionConvertedUnitNameLabel"
    app:layout_constraintTop_toBottomOf="@+id/addConversionNameLabel" />

<TextView
    android:id="@+id/addConversionConvertedUnitNameLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addConvToLabel"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/addConversionMultiplier"
    app:layout_constraintStart_toStartOf="@+id/addConversionMultiplier"
    app:layout_constraintTop_toBottomOf="@+id/addConversionStartUnitNameLabel" />

<EditText
    android:id="@+id/editTextAddConversionConvertedUnit"
    android:layout_width="300dp"
    android:layout_height="70dp"
    android:ems="10"
    android:maxLength="15"
    android:textSize="30sp"
    android:hint="e.g. foot"
    android:textColorHint="@color/hintColour"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toBottomOf="@+id/addConversionConvertedUnitNameLabel"
    app:layout_constraintStart_toStartOf="@+id/editTextAddConversionMultiplier"
    app:layout_constraintTop_toTopOf="@+id/addConversionConvertedUnitNameLabel" />

<EditText
    android:id="@+id/editTextAddConversionMultiplier"
    android:layout_width="300dp"
    android:layout_height="70dp"
    android:ems="10"
    android:inputType="numberDecimal"
    android:maxLength="10"
    android:textSize="30sp"
    android:hint="e.g. 0.0833333"
    android:textColorHint="@color/hintColour"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toBottomOf="@+id/addConversionMultiplier"
    app:layout_constraintEnd_toEndOf="@+id/addButton"
    app:layout_constraintStart_toStartOf="@+id/addButton"
    app:layout_constraintTop_toTopOf="@+id/addConversionMultiplier"
    app:layout_constraintVertical_bias="0.625" />

<TextView
    android:id="@+id/addConversionMultiplier"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/addConvMultiLabel"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintBottom_toTopOf="@+id/clearAllButton"
    app:layout_constraintEnd_toEndOf="@+id/clearAllButton"
    app:layout_constraintStart_toStartOf="@+id/clearAllButton"
    app:layout_constraintTop_toBottomOf="@+id/addConversionConvertedUnitNameLabel" />

```

```

<Button
    android:id="@+id/clearAllButton"
    android:layout_width="130dp"
    android:layout_height="60dp"
    android:layout_marginEnd="150dp"
    android:layout_marginRight="150dp"
    android:layout_marginBottom="40dp"
    android:text="@string/clearAllButton"
    android:textSize="20sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toStartOf="@+id/addButton"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/addConversionMultiplier" />

<Button
    android:id="@+id/addButton"
    android:layout_width="130dp"
    android:layout_height="60dp"
    android:text="@string/addConversion"
    android:textSize="20sp"
    app:layout_constraintBottom_toBottomOf="@+id/clearAllButton"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toEndOf="@+id/clearAllButton"
    app:layout_constraintTop_toTopOf="@+id/clearAllButton" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

### 6.2.17 remove\_conversion.xml

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <EditText
        android:id="@+id/editTextRemoveConversion"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:ems="10"
        android:hint="e.g. inch to foot"
        android:textColor="@color/labelColour"
        android:textColorHint="@color/hintColour"
        app:layout_constraintBottom_toTopOf="@+id/removeButton"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/removeLabel" />

    <TextView
        android:id="@+id/removeLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="120dp"
        android:text="@string/removeLabel"
        android:textSize="20sp"
        android:textColor="@color/labelColour"
        app:layout_constraintEnd_toEndOf="@+id/editTextRemoveConversion"
        app:layout_constraintStart_toStartOf="@+id/editTextRemoveConversion"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/removeButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginBottom="300dp"
        android:text="@string/removeButton"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="@+id/editTextRemoveConversion"

```

```

        app:layout_constraintStart_toStartOf="@+id/editTextRemoveConversion"
        app:layout_constraintTop_toBottomOf="@+id/editTextRemoveConversion" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

### 6.2.18 remove\_conversion.xml (land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
xmlns:app="http://schemas.android.com/apk/res-auto"
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"
android:layout_height="match_parent"
android:background="@color/fragBackground">

    <EditText
        android:id="@+id/editTextRemoveConversion"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:ems="10"
        android:hint="e.g. inch to foot"
        android:textColor="@color/labelColour"
        android:textColorHint="@color/hintColour"
        app:layout_constraintBottom_toTopOf="@+id/removeButton"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/removeLabel" />

    <TextView
        android:id="@+id/removeLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="50dp"
        android:text="@string/removeLabel"
        android:textSize="18sp"
        android:textColor="@color/labelColour"
        app:layout_constraintBottom_toTopOf="@+id/editTextRemoveConversion"
        app:layout_constraintEnd_toEndOf="@+id/editTextRemoveConversion"
        app:layout_constraintStart_toStartOf="@+id/editTextRemoveConversion"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/removeButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginBottom="100dp"
        android:text="@string/removeButton"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="@+id/editTextRemoveConversion"
        app:layout_constraintStart_toStartOf="@+id/editTextRemoveConversion"
        app:layout_constraintTop_toBottomOf="@+id/editTextRemoveConversion" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

### 6.2.19 remove\_conversion.xml (xlarge)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
xmlns:app="http://schemas.android.com/apk/res-auto"
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"
android:layout_height="match_parent"
android:background="@color/fragBackground">

    <EditText
        android:id="@+id/editTextRemoveConversion"
        android:layout_width="300dp"
        android:layout_height="60dp"
        android:ems="10"
        android:textSize="30sp"
        android:hint="e.g. inch to foot"

```

```

        android:textColor="@color/labelColour"
        android:textColorHint="@color/hintColour"
        app:layout_constraintBottom_toTopOf="@+id/removeButton"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/removeLabel" />

<TextView
    android:id="@+id/removeLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="250dp"
    android:text="@string/removeLabel"
    android:textSize="30sp"
    android:textColor="@color/labelColour"
    app:layout_constraintEnd_toEndOf="@+id/editTextRemoveConversion"
    app:layout_constraintStart_toStartOf="@+id/editTextRemoveConversion"
    app:layout_constraintTop_toTopOf="parent" />

<Button
    android:id="@+id/removeButton"
    android:layout_width="130dp"
    android:layout_height="60dp"
    android:layout_marginBottom="350dp"
    android:text="@string/removeButton"
    android:textSize="20sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="@+id/editTextRemoveConversion"
    app:layout_constraintStart_toStartOf="@+id/editTextRemoveConversion"
    app:layout_constraintTop_toBottomOf="@+id/editTextRemoveConversion" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

### 6.2.20 remove\_conversion.xml (xlarge-land)

```

<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/fragBackground">

    <EditText
        android:id="@+id/editTextRemoveConversion"
        android:layout_width="300dp"
        android:layout_height="61dp"
        android:ems="10"
        android:textSize="30sp"
        android:hint="e.g. inch to foot"
        android:textColor="@color/labelColour"
        android:textColorHint="@color/hintColour"
        app:layout_constraintBottom_toTopOf="@+id/removeButton"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/removeLabel" />

    <TextView
        android:id="@+id/removeLabel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="120dp"
        android:text="@string/removeLabel"
        android:textSize="30sp"
        android:textColor="@color/labelColour"
        app:layout_constraintEnd_toEndOf="@+id/editTextRemoveConversion"
        app:layout_constraintStart_toStartOf="@+id/editTextRemoveConversion"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/removeButton"

```

```

        android:layout_width="130dp"
        android:layout_height="60dp"
        android:layout_marginBottom="300dp"
        android:text="@string/removeButton"
        android:textSize="20sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="@+id/editTextRemoveConversion"
        app:layout_constraintStart_toStartOf="@+id/editTextRemoveConversion"
        app:layout_constraintTop_toBottomOf="@+id/editTextRemoveConversion" />
    </androidx.constraintlayout.widget.ConstraintLayout>

```

### 6.2.21 colors.xml

```

<?xml version="1.0" encoding="utf-8"?>
<resources>
    <color name="colorPrimary">#6200EE</color>
    <color name="colorPrimaryDark">#3700B3</color>
    <color name="colorAccent">#03DAC5</color>
    <color name="headerColour">#48BEFF</color>
    <color name="selectedTabColour">#1b7a9f</color>
    <color name="tabTextColour">#f9f9f9</color>
    <color name="fragBackground">#ffffff</color>
    <color name="labelColour">#222222</color>
    <color name="hintColour">#999999</color>
</resources>

```

### 6.2.22 colors.xml (night)

```

<?xml version="1.0" encoding="utf-8"?>
<resources>
    <color name="colorPrimary">#bb86fc</color>
    <color name="colorPrimaryDark">#ffffff</color>
    <color name="colorAccent">#03DAC5</color>
    <color name="headerColour">#212121</color>
    <color name="tabTextColour">#dfdfdf</color>
    <color name="selectedTabColour">#bb867c</color>
    <color name="fragBackground">#303030</color>
    <color name="labelColour">#dfdfdf</color>
    <color name="hintColour">#777777</color>
</resources>

```

### 6.2.23 strings.xml

```

<resources>
    <string name="app_name">Unit Conversion App</string>
    <string name="tab_page1">Unit Selection</string>
    <string name="tab_page2">Unit Conversion</string>
    <string name="tab_page3">Add Conversion</string>
    <string name="DistanceLabel">Distance</string>
    <string name="UnitCategoryLabel">Unit Type:</string>
    <string name="StartUnitLabel">Step 2. Select Unit to Convert From:</string>
    <string name="UnitCategoryLab">Step 1. Select Unit Category:</string>
    <string name="ConvertedUnitLabel">Step 3: Select Unit to Convert To:</string>
    <string name="clearButton" />
    <string name="ClearButton">Clear</string>
    <string name="rotateButton">Rotate</string>
    <string name="tab_page4">Remove Conversion</string>
    <string name="categoryLabel">Category place holder</string>
    <string name="button7">7</string>
    <string name="button8">8</string>
    <string name="button9">9</string>
    <string name="button4">4</string>
    <string name="button5">5</string>
    <string name="button6">6</string>
    <string name="button3">3</string>
    <string name="button2">2</string>
    <string name="button1">1</string>
    <string name="button0">0</string>
    <string name="buttonDot">.</string>
    <string name="buttonDel">DEL</string>
    <string name="addConvNameLabel">Step 1. Enter Conversion Name:</string>

```



```

<string name="addStartUnitLabel">Step 2: Enter Unit From:</string>
<string name="addConvToLabel">Step 3: Enter Unit To:</string>
<string name="addConvMultiLabel">Step 4: Enter Multiplier:</string>
<string name="clearAllButton">Clear</string>
<string name="addConversion">Add</string>
<string name="removeLabel">Enter Conversion To Remove:</string>
<string name="removeButton">Remove</string>
<string name="nightMode">Night</string>
</resources>

```

## 6.2.24 styles.xml

```

<resources>
    <!-- Base application theme. -->
    <style name="AppTheme" parent="Theme.AppCompat.Light.DarkActionBar">
        <!-- Customize your theme here. -->
        <item name="colorPrimary">@color/colorPrimary</item>
        <item name="colorPrimaryDark">@color/colorPrimaryDark</item>
        <item name="colorAccent">@color/colorAccent</item>
        <item name="windowNoTitle">true</item>
    </style>

    <!--<style name="AppTheme" parent="Theme.AppCompat.Light.NoActionBar"> -->
    <style name="Toolbar.TitleText" parent="TextAppearance.Widget.AppCompat.Toolbar.Title">
        <item name="android:textSize">30sp</item>
    </style>

    <style name="NightMode" parent="Theme.AppCompat.DayNight">
    </style>
</resources>

```

## 6.2.25 AndroidManifest.xml

```

<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="uk.ac.stir.cs.andriodproject">

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/AppTheme">
        <activity android:name=".MainActivity"
            android:windowSoftInputMode="stateHidden">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
        <provider
            android:name="Provider"
            android:authorities="uk.ac.stir.cs.andriodproject.Conversion"
            android:exported="true">
        </provider>

    </application>
</manifest>

```