Recent UK Earthquakes Android App

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Course – **Mobile Platform Development**

# Project links

Demo video – <https://github.com/seanmul10/MPD-Coursework/blob/main/Muldoon_Sean_S1714073_Video.mp4>

Android Studio project – <https://github.com/seanmul10/MPD-Coursework/tree/main/Recent%20UK%20Earthquakes>

Application .apk file – <https://github.com/seanmul10/MPD-Coursework/blob/main/Recent%20UK%20Earthquakes/app/release/app-release.apk>



# Test strategy

The application has been designed and tested iteratively throughout the production of the project. The final testing documentation below has been done using the latest release build of the application.



**Earthquake list (Main Activity)**

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| **Function** | **Expected Behaviour** | **Final Behaviour** |
| Navigation to earthquake list view. | The application should launch with this activity and can also be reached by tapping the ‘List View’ button on the navigation menu. | Works as intended. |
| List of earthquakes is displayed. This data is retrieved using the GeoRSS feed available from the British Geological Survey. | The corresponding location and date of each earthquake is displayed in a RecyclerView. The magnitude is displayed to the right of each earthquake. | Works as intended. |
| Magnitudes are colour coded. | Magnitudes are colour coded programmatically using a gradient of colours. | Works as intended. |
| Can sort the list based on the date, location name, magnitude, or depth. | A Spinner component can be tapped to allow the user to sort the earthquake list by any type of data and in ascending or descending order. | Works as intended. |
| Manual refresh button. | The user can tap the Refresh button to manually force the app to retrieve and parse the earthquake data and update the RecyclerView adapter. | Works as intended. |
| Build date is displayed | The most recent build date and time provided by the data feed is displayed to the user to show them the accuracy of the earthquake data. | Works as intended. Time is always in GMT, which could cause some confusion. |
| Distinct portrait and landscape layouts | In landscape mode, the height of the earthquake data items is smaller, and the additional horizontal space is used to show the depth of each earthquake too. | Works as intended. |

**Map view**

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| **Function** | **Expected Behaviour** | **Final Behaviour** |
| Navigation to the earthquake location map view. | Can be started by tapping the ‘Map View’ button in the navigation menu. | Works as intended. |
| Earthquake locations are displayed using pins. | Marker pins mark the exact location of every earthquake in the data feed. | Works as intended. |
| Pins are colour coded by magnitude. | Marker pins are colour coded using the same colour coding as the earthquake data in the list view. | Works to a degree. Pins are colour coded but due to Google Maps API restrictions, the default marker pins can only be dynamically coloured using a hue instead of an rgb value. An rgbToHsv() method was created to mitigate this issue. |
| Pins can be tapped. | Tapping an earthquake starts the detailed activity view and displays data on the tapped earthquake. | Works as intended. |
| Application does not crash or hang when getting the data and displaying the map. | All information gathering is done on a background thread and if the data feed cannot be reached, the map will display properly without earthquake locations. | Works as intended. |

**Search by date**

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| **Function** | **Expected Behaviour** | **Final Behaviour** |
| Navigation to the search by date facility. | The search by date activity can be reached by tapping the ‘Search by Date’ button on the navigation menu. | Works as intended. |
| Can enter start date and end date of the search range. | Tapping on the TextView for the start date or end date brings up a DatePickerDialog where the user can enter a date in the calendar. | Works as intended. |
| Cannot enter dates in the future or more than 50 days ago. | App prevents the user from selecting an impossible date for the earthquake data by setting a minDate and maxDate for the DatePickers. | Works as intended. |
| User cannot enter an end date that precedes the start date. | Entering a start or end date that leaves the end date preceding the start date is not possible. | Works as intended. A pop-up dialog is used to alert this to the user. |
| User can choose between entering a range between two dates or entering a single date to search for. | Two radio buttons are used to allow the user to choose between a ‘Date Range’ or ‘Single Date’. Clicking Single Date disables the end date functionality and uses the start date instead. | Works as intended. |
| User can search for earthquakes in the entered date range. | Tapping the search button searches for all earthquakes on and between the date range. A message is displayed telling the user how many earthquakes in total were found. The SearchResultsFragment replaces the EmptyFragment. | Works as intended. If no earthquakes can be found a pop-up dialog alerts this to the user. |
| Earthquake data for the largest, most northerly, most easterly, most southerly, most westerly, shallowest, and deepest earthquakes are shown. | All of the locations and dates for the required information are shown. Beside each location is the corresponding data (magnitude for largest earthquake, lat/long for most southerly etc.). | Works as intended. |
| Distinct portrait and landscape layouts | In landscape mode, the earthquake data items are slightly smaller. The |  |

**Detailed earthquake view**

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| **Function** | **Expected Behaviour** | **Final Behaviour** |
| Navigation to earthquake view. | Can be started by tapping on any earthquake data in the list view activity, search by date activity or by tapping a marker pin on the Google maps fragment in the map view. | Works as intended. |
| Displays a specific earthquake. | When tapping to view data on an earthquake, the correct earthquake data is displayed. | Works as intended. |
| Detailed data is displayed. | All available data on the earthquake is displayed; its location, date, time, latitude & longitude, and its depth. | Works as intended. Time is always in GMT, which could cause some confusion. |
| Map view. | In both layouts, a Google maps fragment zoomed in on the earthquake’s location can be viewed. The location is marked with a pin. | Works as intended. |
| Distinct portrait and landscape layouts. | Portrait mode displays the location, map, and data vertically. Landscape mode splits the location and map on the left and the rest of the data on the right. | Works on most devices. In landscape mode, some narrower devices might make the data views on the right clip each other slightly. |

**Threading and parsing**

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| **Function** | **Expected Behaviour** | **Final Behaviour** |
| Application connects to the internet and retrieves the data feed. | Using the BufferedReader and InputStreamReader classes, the device attempts to connect to the internet and return the .xml data feed as a string to be parsed. | Works as intended. |
| Application does not crash or hang when trying to get the feed. | The application uses a background thread to retrieve the data from the feed. This is done using an ASyncTask and a Handler. This means the main thread is free to display UI and allow the user to use the app. | Works as intended. |
| Data is parsed and stored in an appropriate class. | The data is parsed using the XmlPullParserFactory class. The parsing methods looks for the start tag: “Item” to signify a new Earthquake instance should be created. Then the “description” tag is used to get the earthquake data and a combination of the split() and trim() methods allow this data to be passed to the setter methods in the Earthquake instance. An ArrayList of these objects is stored in the static EarthquakeData class. The last build date is also retrieved here and stored in EarthquakeData. | Works as intended. |
| Threading approach is different to that in the provided starter code. | The approach used in this project involved a combination of an ASyncTask to execute the task in a background thread and a Handler to start the ASyncTask periodically. | Works as intended. |
| Earthquake data is updated regularly. | Every 5 minutes the data is updated by the Handler posting a new Runnable. This Runnable calls the startTask() method which executes the ASyncTask. | Works as intended. It is unknown exactly how accurate the 5-minute delay time is when the app is not in use. This is not an important issue. |

**Other testing**

Each activity and fragment layout in the application has a different theme for if the device is in night mode or not. The colour coding is also dependant on the device’s night mode setting and it will use a more subdued colour gradient for light mode and darker colours for dark mode.

The application uses Resources as much as possible for things such as strings and colours. This allows for easy modification in the future.

# Conclusion

In conclusion, the application meets the required specifications comprehensively. Almost all of the features and their functionality work precisely as intended, any other features work to an acceptable degree.

This does not mean the application is perfect by any means and there is a number of improvements that could be made. These include but are not limited to: a better use of themes and the consideration of daylight saving time when displaying the build date and earthquake times.