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SOFTWARE RESOURCES FOR INSTALLATION AND TESTING FISHERIES EARLY WARNING AND EMERGENCY RESPONSE (FEWER) ON CIRP'S INFRASTRUCTURE

CRFM Secretariat
2018



SOFTWARE RESOURCES FOR INSTALLATION AND TESTING FISHERIES EARLY WARNING AND EMERGENCY RESPONSE (FEWER) ON CIRP'S INFRASTRUCTURE

Prepared by:
ICT4Fisheries Consortium

under contract through the Marine sub-component of the Investment Plan for the Caribbean Regional Track of the Pilot Program for Climate Resilience, co-implemented by the Caribbean Regional Fisheries Mechanism (CRFM).

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CRFM Secretariat
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1. Introduction

This document provides an account of the software resources in support of Fisheries Early Warning and Emergency Response (FEWER) D-7 contract deliverable: *Final Early Warning and Emergency Response System, including e-services, installed and tested*, to be deployed on infrastructure managed by the global administrator.

FEWER comprises of several software components. The repositories for the software components are hosted via the public code management (software version management and hosting) service, bitbucket.com. To abstract away from any particular development or management institution, the ICT4Fisheries Consortium recommends that FEWER components are deployed under the identity ewer.fish, and hosted independently of the Consortium. However, as at the end of the contract period, arrangements have not been made for external hosting, FEWER is temporarily deployed on CIRP (Caribbean ICT Research Programme) infrastructure.

Deployment of FEWER web components entails the copying of the respective code repository onto a publicly accessible server, installing dependencies and configuring the FEWER web services. Deployment of the FEWER mobile application entails copying of the respective code repository onto a development machine to build the application using the Android development toolkit. The built application must then be uploaded to the Google Play Store under the developer account. The Consortium has purchased the ewer.fish Google developer account for this purpose, in anticipation of the agreement to deploy under the ewer.fish identity. The hosting of FEWER web services and corresponding application components on infrastructure external to CIRP requires various subscriptions as outlined in the Specifications for Software and Equipment for FEWER deployment, included as an Appendix to the FEWER global administrator manual.

In accordance with Fisheries Early Warning and Emergency Response (FEWER) D-7 contract deliverables *Final Early Warning and Emergency Response System, including e-services, installed and tested*, this document provides:

1. access credentials for all the FEWER administrators
2. links to all repositories of the FEWER software components
3. procedures to access the deployed the FEWER mobile application
4. proposed links to access the FEWER web services and application once deployed on a public server
5. a summary of FEWER testing procedures

1.1 Intended audience

The primary intended audiences for this document are FEWER project implementing agencies and global administrators as well as technical administrators in the project's countries: Grenada, Dominica, Saint Lucia and St. Vincent and the Grenadines. The document may also be of interest to designated FEWER country and agency administrators.

2. FEWER Software Components

FEWER is built on the [mFisheries](#) framework and comprises three components:

1. the **mobile application** developed in Android provides services to the public, primarily fishers;
2. the **web application** developed in AngularJS provides public as well as administrator dashboard services; and
3. the **web and API services** that provide the services that underpin both the mobile and web applications.

Weather extractors were also developed specifically for FEWER. The weather extractors retrieve data from an initial set of public weather data sources used within FEWER. They also serve as a reference implementation for creating new source providers within the FEWER weather module.

2.1 Access FEWER

Anyone can access the mobile and web applications. However, only users with the appropriate credentials can access the specific features for the administrators. Table 2.1 provides the links used to access FEWER’s mobile and web applications.

Table 2.1 URLs for Accessing the FEWER Software Components

| Component | URL |
|--------------------|---|
| Mobile Application | https://play.google.com/store/apps/details?id=com.cirp.mfisheries.fewer |
| Web Application | https://fewer.cirp.org.tt/ |

2.2 Access FEWER Software Source Code

Access to the source code will be granted to technical and global administrators of FEWER countries. Technical administrators will only have read privileges and will not be able to add any new features to the web system. Global administrators will have full (read, write, execute) access to the web source code via the “ewer.fish@gmail.com” email address. Table 2.2 provides the URLs to access the repositories of code used to develop and maintain FEWER.

Table 2.2 URLs for Accessing the FEWER Source Code

| Component | URL | Technology |
|--------------------|---|-------------------------------------|
| Mobile Application | https://bitbucket.org/ewer_fish/fewer_mobile | Android SDK (Java) |
| Web Application | https://bitbucket.org/ewer_fish/fewer_webapp | Angular JS (v1) (JavaScript–ES2016) |

| Component | URL | Technology |
|----------------------|---|-------------------|
| Web and API Services | https://bitbucket.org/ewer_fish/fewer_webservices | Pyramid (Python) |
| Weather Extractors | https://bitbucket.org/ewer_fish/fewerweatherextractors | Requests (Python) |

2.3 Description of Software Components

2.3.1 Mobile Application

The mobile application is the primary means of using the application for fishers. It can be accessed on the Google Play store for fishers to download the application on their mobile phones. It is only available to Android devices (not iPhones). More details on the specifications are specified in the User Manual. The repository for the source code of the mobile application can be accessed via the URL, https://bitbucket.org/ewer_fish/fewer_mobileas as shown in Figure 2.1.

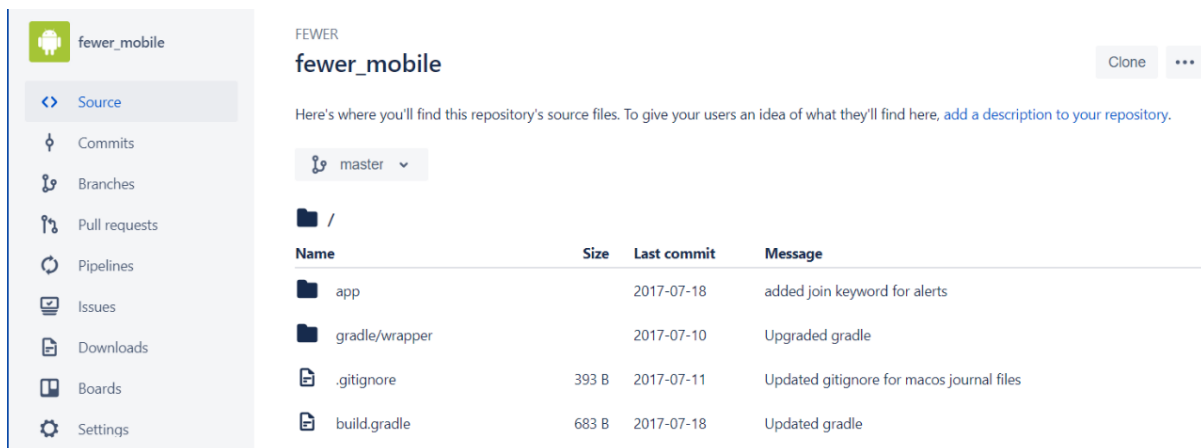


Figure 2.1 FEWER Mobile App Source Code Landing Page

2.3.2 Web application

The web application will be the primary interface for administrators to interface with the system and is accessible by using an internet browser such as Internet Explorer or Google Chrome and can also be accessed on mobile phone internet browsers as well. The web portal is also usable by public users (Fishers) to view publicly available information such as the weather report. The interface for each country is the same through the available content is different. The repository for the source code of the web application is open source and can be accessed via the URL, https://bitbucket.org/ewer_fish/fewer_webapp, as shown in Figure 2.2.

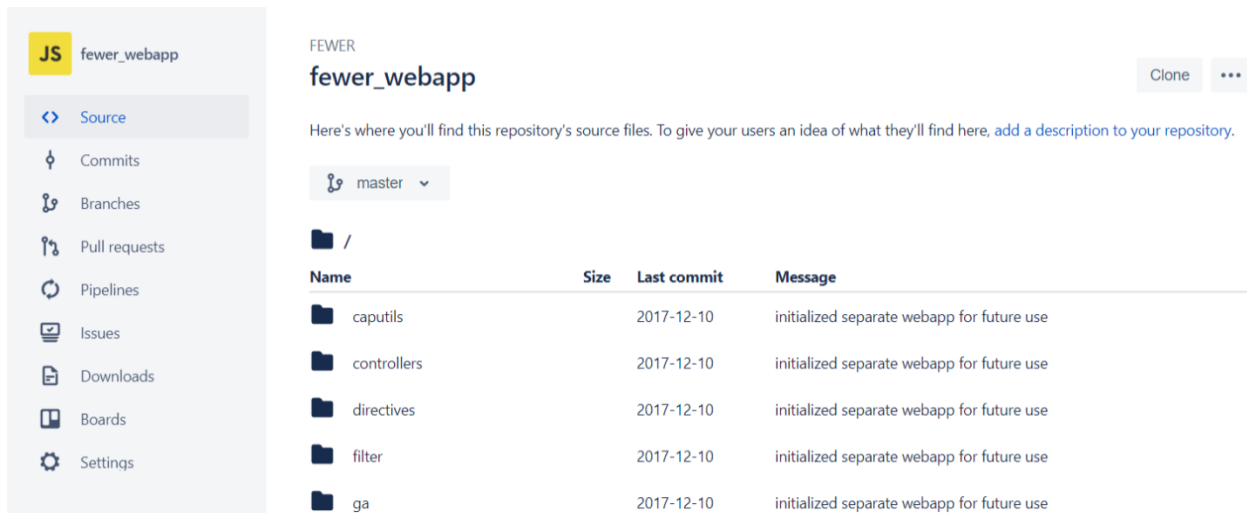


Figure 2.2 FEWER Web App Source Code Landing Page

2.3.3 Web and API Services

The FEWER Web Services is a web service Application Programming Interface (API) developed using HTTP requests to perform data actions such as retrieval, update and deletion of data records in the web system. It is important to test these API calls to ensure that FEWER can provide services for the web and mobile applications. The repository for the source code of the FEWER Web Services is open source and can be accessed via the URL, https://bitbucket.org/ewer_fish/fewer_webservices as shown in Figure 2.3.

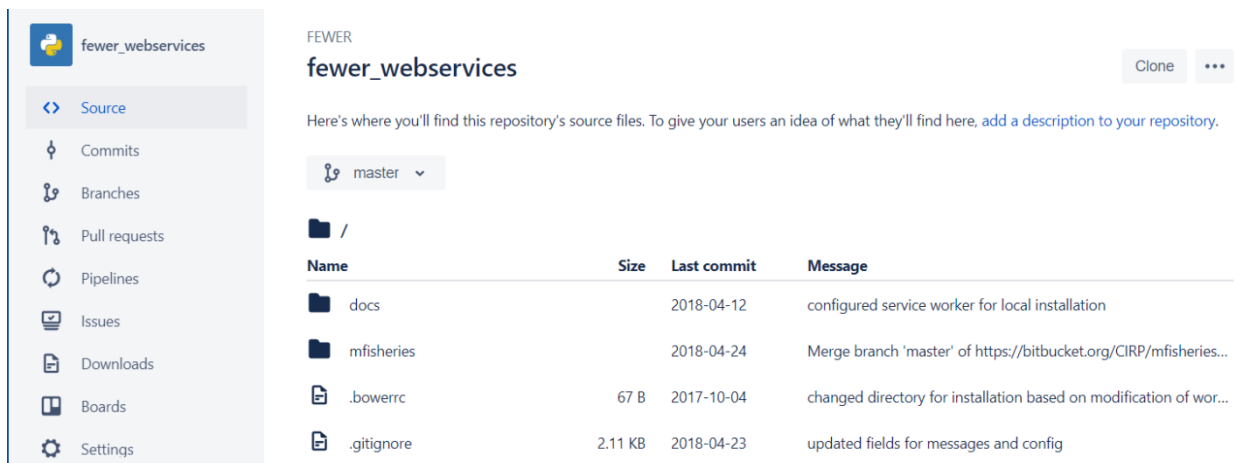


Figure 2.3 FEWER Web and API Services Platform Source Code Landing Page

2.3.4 Weather Extractors

Within the system, extractors are files that are run within the FEWER system to retrieve hydro-met data from a specific weather source. These files can be set to run on a schedule or manually at any time by an administrator. The repository for the source code of the weather extractors are open source and can be accessed via the URL, https://bitbucket.org/ewer_fish/fewerweatherextractors as shown in Figure 2.4.

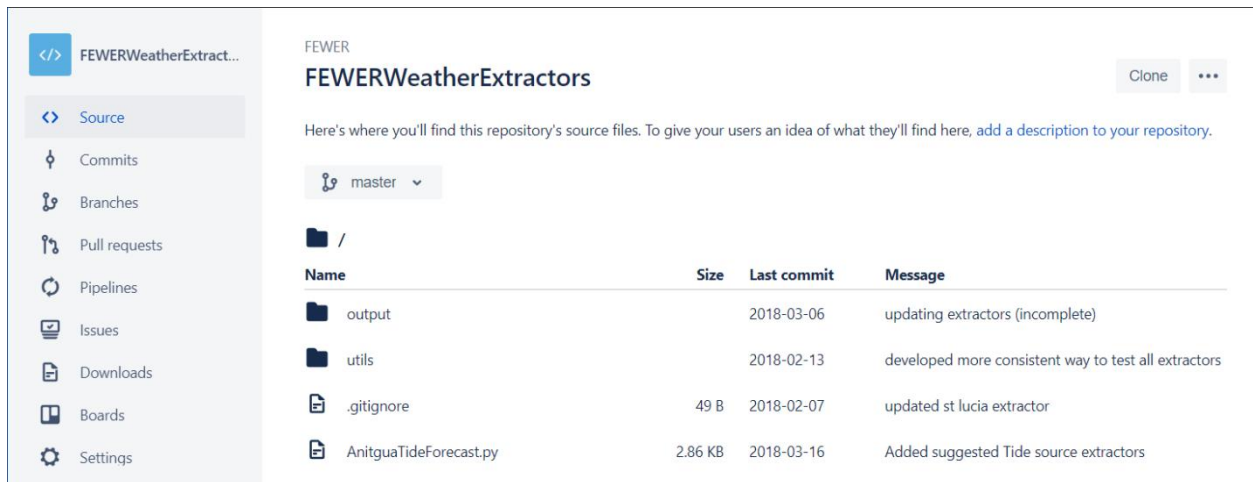


Figure 2.4 FEWER Weather Extractors Source Code Landing Page

3. Administrator Credentials

This section provides the credentials that are configured for each administrator's role in the FEWER participating countries. The credentials listed are currently configured. However, the country and technical administrator can update the credentials of each group.

3.1 Dominica

The credentials for each administrator group within Dominica to access the web interface is provided in Table 3.1.

Table 3.1 Dominica Country Credentials

| Group | Credentials |
|----------------------------------|---|
| Country Administrator | Username: domadminuser Password: TheNatureIsland |
| Technical Administrator | Username: domtechadmin Password: TheNatureIsland |
| Local Fisheries Organization | Username: domnfoadmin Password: TheNatureIsland |
| Coast guard | Username: domcoastguard Password: TheNatureIsland |
| DRM Administrator | Username: domdrmadmin Password: TheNatureIsland |
| MET Office Administrator | Username: dommetadmin Password: TheNatureIsland |
| Fisheries Division Administrator | Username: domfdadminuser Password: TheNatureIsland |
| Red Cross Administrator | Username: domrcadmin Password: TheNatureIsland |

3.2 Grenada

The credentials for each administrator group within Grenada to access the web interface is provided in Table 3.2.

Table 3.2 Grenada Country Credentials

| Group | Credentials |
|-----------------------|--|
| Country Administrator | Username: greadminuser Password: GrenadalsKnownAsTheSpiceIsle |

| Group | Credentials |
|----------------------------------|---|
| Technical Administrator | Username: gretechadmin Password: GrenadalsKnownAsTheSpiceIsle |
| Local Fisheries Organization | Username: grenfoadmin Password: GrenadalsKnownAsTheSpiceIsle |
| Coast guard | Username: grecoastguard Password: GrenadalsKnownAsTheSpiceIsle |
| DRM Administrator | Username: gredrmadminuser Password: GrenadalsKnownAsTheSpiceIsle |
| MET Office Administrator | Username: gremetadmin Password: GrenadalsKnownAsTheSpiceIsle |
| Fisheries Division Administrator | Username: grefdadminuser Password: GrenadalsKnownAsTheSpiceIsle |
| Red Cross Administrator | Username: greccadmin Password: GrenadalsKnownAsTheSpiceIsle |

3.3 Saint Lucia

The credentials for each administrator group within Saint Lucia to access the web interface is provided in Table 3.3.

Table 3.3 Saint Lucia Country Credentials

| Group | Credentials |
|----------------------------------|---|
| Country Administrator | Username: sludminuser Password: GrosPitonIsTheLargerMountain |
| Technical Administrator | Username: slutechadmin Password: GrosPitonIsTheLargerMountain |
| Local Fisheries Organization | Username: slunfoadmin Password: GrosPitonIsTheLargerMountain |
| Coast guard | Username: slucoastguard Password: GrosPitonIsTheLargerMountain |
| DRM Administrator | Username: sludrmadminuser Password: GrosPitonIsTheLargerMountain |
| MET Office Administrator | Username: slumetadmin Password: GrosPitonIsTheLargerMountain |
| Fisheries Division Administrator | Username: slufdadminuser Password: GrosPitonIsTheLargerMountain |

| | |
|-------------------------|--|
| Red Cross Administrator | Username: slurcadmin Password: GrosPitonIsTheLargerMountain |
|-------------------------|--|

3.4 St Vincent and the Grenadines

The credentials for each administrator group within St. Vincent and the Grenadines to access the web interface is provided in Table 3.4.

Table 3.4 St. Vincent and the Grenadines Country Credentials

| Group | Credentials |
|----------------------------------|--|
| Country Administrator | Username: svgadminuser Password: FortDuvernette |
| Technical Administrator | Username: svgtechadmin Password: FortDuvernette |
| Local Fisheries Organization | Username: svgnfoadmin Password: FortDuvernette |
| Coast guard | Username: svgcoastguard Password: FortDuvernette |
| DRM Administrator | Username: svgdrmadmin Password: FortDuvernette |
| MET Office Administrator | Username: svgmetadmin Password: FortDuvernette |
| Fisheries Division Administrator | Username: svgfdadminuser Password: FortDuvernette |
| Red Cross Administrator | Username: svgrcadmin Password: FortDuvernette |

4. CAP Templates

The CAP templates repository contains the XML code that is used to define the nominal set of FEWER supported alerts as well as customised alerts. The FEWER CAP templates have

been created to serve the special needs of seafaring fisherfolk. These extend the national portfolio of CAP alerts.

4.1 Source Code Access

Access to the CAP Template source code will be granted to Technical and Global administrators of the FEWER countries. Technical administrators will only have read privileges and will not be able to add any new features to the mobile application. Global administrators will have full (read, write, execute) access to the CAP template source code. The CAP templates source code can be found at the following URL: https://bitbucket.org/ewer_fish/fewercaptemplates

5. Installation

5.1 Mobile Application

FEWER is developed as a fork of mFisheries mobile application to facilitate the specific requirements, customisations and functionality required. The Android Studio IDE provides tools to manage the development of native Android applications.

5.1.1 Requirements

The minimum requirements to install the mobile application of FEWER and related functionality are as follows:

1. Windows 10 (build 1511 or later) or MacOS (10.13.2 or later) or Ubuntu Linux (17.10 or later)
2. 6GB or greater of RAM
3. 64GB or greater of free secondary storage
4. Android SDK 26.1.1 or later
5. Android SDK build tools 27.0.2 or later
6. Java Development Toolkit (JDK) v8 or later
7. Android Studio 3.0.1 or later

5.1.2 Installation

To install the mobile app, you can retrieve the source code using the Android Studio IDE.

Upon launch, the IDE presents a set of options for managing projects, as shown in Figure 5.1.

To retrieve the source code, use the “Check out project from Version Control” option in the menu.

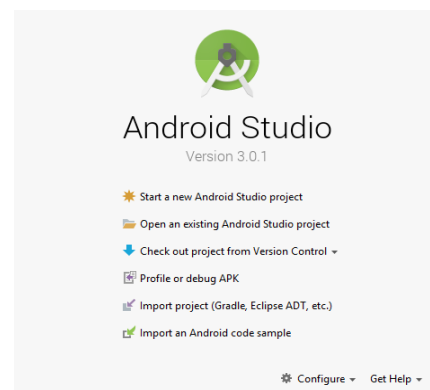


Figure 5.1 Android Studio IDE Start Menu Options

The menu opens a window that enables the specification of the source URL of the code to be retrieved; and the specific path where the code will be stored on the local machine, as shown in Figure 5.2.

The repository URL using the link for the mobile application source code is provided in Table 2.2.

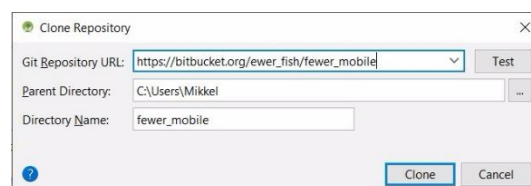


Figure 5.2 Check Out Configuration Window for Android Studio

After downloading the source code through the “check out” process, Android Studio will install the required packages and configure IDE for the project. After completing the installation, the project is available in the side menu, shown in Figure 5.3. Resources are grouped based on purpose within the Android development environment.

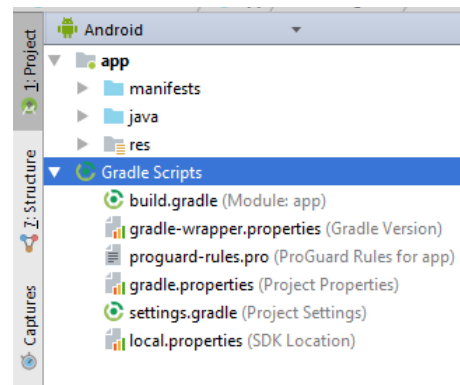


Figure 5.3 Installed Android Project

5.2 Web Application

The web application is an Angular JS (v1) application written in ES2016 code. The code is compiled to ES5 using the Babel.js command-line toolkit to ensure wider browser compatibility.

FEWER-related functionality is provided as a module within mFisheries. Therefore, all the code for FEWER-specific functionality can be found in the FEWER folder shown in Figure 5.4

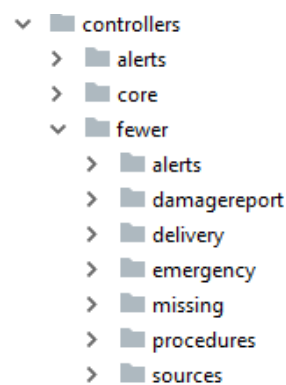


Figure 5.4 FEWER Folder Structure

5.2.1 Requirements

The minimum requirements to install the web application of FEWER and related functionality are as follows:

1. Windows 10 (build 1511 or later) or MacOS (10.13.2 or later) or Ubuntu Linux (17.10 or later)
2. 6GB or greater of RAM
3. 64GB or greater of free secondary storage
4. Ubuntu Bash (if using Windows 10)
5. IntelliJ 2017.2.5 or later
6. Nodejs (9.2.0 or later) and NPM (5.5.1 or later)
7. Bower (1.8.2 or later) and Gulp-CLI (3.9.1 or later)

5.2.2 Installation

To install the FEWER web app, you can retrieve the source code using the IntelliJ IDEA shown in Figure 5.5.

Upon launch, IntelliJ presents a set of options for managing projects.

To retrieve the source code, use the “Check out project from Version Control” option in the menu.

The menu opens a window that enables the specification of the source of the code to be retrieved; and the specific path where the code will be stored on the local machine, shown in Figure 5.6.

The repository URL using the link for the mobile application source code is provided in Table 2.2.

After downloading the source code through the “clone” process, the IntelliJ IDE will be automatically configured for the project. This will generate the side menu as highlighted in Figure 5.7.

After completing the installation, the project is available in the side menu. The system displays the folder structure of the project and provides additional tools based on the files edited.

After the IntelliJ IDE successfully configures the project, configure the development packages used by the web application. The command to run the installation for packages “npm install” is illustrated in Figure 5.8. The Terminal window can be found by clicking the terminal tab in the lower left corner of the editor.

This command will download all the libraries and software packages for running and compiling software code for wide browser compatibility.

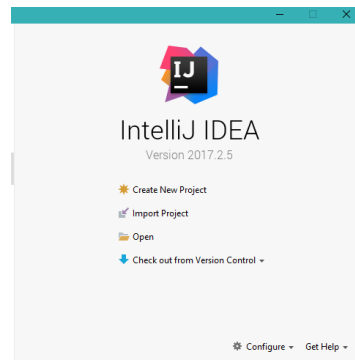


Figure 5.5 IntelliJ IDE Start Menu Options

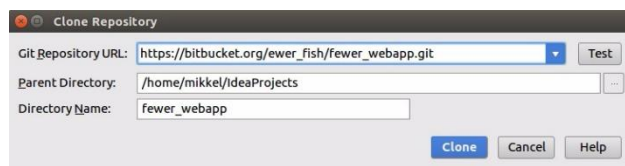


Figure 5.6 Check Out Configuration Window for IntelliJ

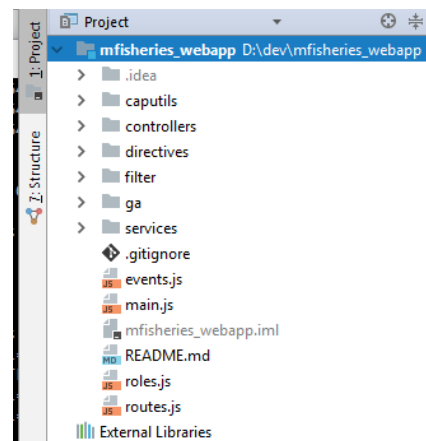


Figure 5.7 Installed IntelliJ Web Project

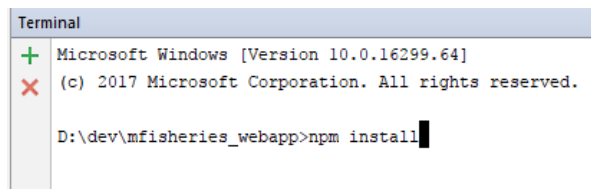
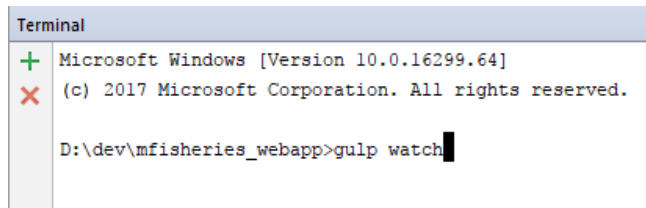


Figure 5.8 NPM Command for Software Package Installation

The development process uses the gulp (<https://gulpjs.com/>) system to automate several common tasks. Gulp is used to monitor the code edited to compile all JavaScript files to the ES5 standard for wide browser compatibility.

The monitoring functionality of gulp is invoked using the watch option. The invocation using the “gulp watch” command shown in Figure 5.9.



```
Terminal
+ Microsoft Windows [Version 10.0.16299.64]
X (c) 2017 Microsoft Corporation. All rights reserved.

D:\dev\mfisheries_webapp>gulp watch
```

Figure 5.9 Gulp Command for ES2016 Compilation

5.3 Web and API Services

The web and API services platform are built using the Pyramid, a python web application framework. The code is organized using python modules that relates to modules provided by the mFisheries platform.

FEWER-related functionality is provided as a module within mFisheries. Therefore, all the code for FEWER-specific functionality can be found in the FEWER module.

5.3.1 Requirements

To install the web and API services platform of the mFisheries suite to extend the FEWER related functionality, the following is required:

1. Ubuntu Linux (17.10 or later) or Centos 7 recommended. (However, Windows 10 (build 1511 or later) or MacOS (10.13.2 or later) can be used with additional configuration)
2. 6GB or greater of RAM
3. 64GB or greater of free secondary storage
4. IntelliJ 2017.2.5 or later
5. Nodejs (9.2.0 or later) and NPM (5.5.1 or later)
6. Bower (1.8.2 or later) and Gulp-CLI (3.9.1 or later)
7. Python development libraries and Python-MySQL client libraries
8. Pyramid (1.9)

5.3.2 Installation

To install the mFisheries web app, we can retrieve the source code using the IntelliJ IDEA.

Upon launch, IntelliJ presents a set of options for managing projects.

To retrieve the source code, we use the “Check out project from Version Control” option in the menu shown in Figure 5.10.

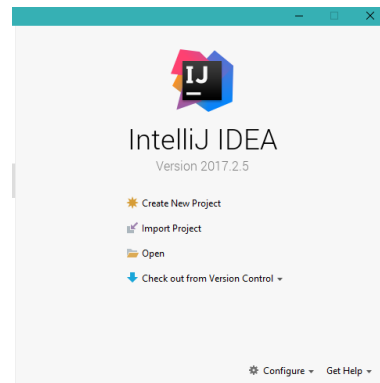


Figure 5.10 IntelliJ IDE Start Menu Options

The menu opens a window that enables the specification of the source of the code to be retrieved; and the specific path where the code will be stored on the local machine. See Figure 5.11.

The repository URL using the link for the mobile application source code is provided in Table 2.2.

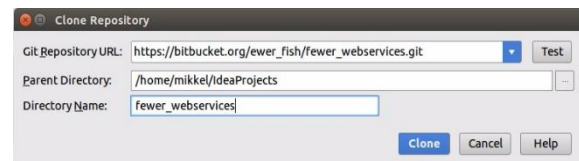


Figure 5.11 Check Out Configuration Window for IntelliJ

After downloading the source code through the “check out” process, IntelliJ with configure IDE for the project. This will generate the side menu as highlighted in Figure 5.12. The system displays the folder structure of the project and provides additional tools based on the files edited.

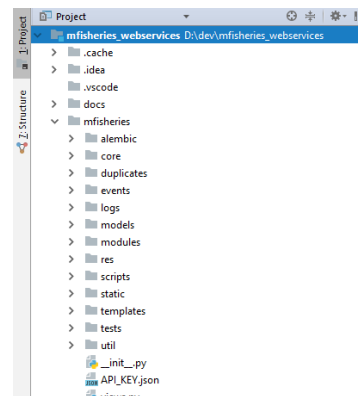


Figure 5.12 Installed IntelliJ Web API Services Project

To install development packages needed for the web app, run the command “./mfisheries/scripts/run.sh” as illustrated in Figure 5.13.

This command will download all the libraries and software packages for running python project.

The development process uses the gulp (<https://gulpjs.com/>) system to automate several common tasks. Gulp is used to monitor the code edited to compile all JavaScript files to the ES5 standard for wide browser compatibility.

The monitoring functionality of gulp is invoked using the watch option. The invocation using the “gulp watch” command shown in Figure 5.14.

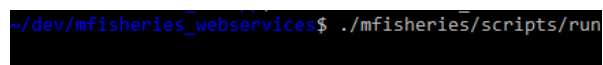


Figure 5.13 Terminal Command for Software Package Installation

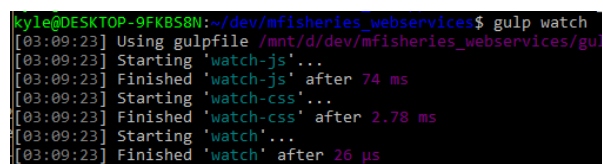


Figure 5.14 Gulp Command for ES2016 Compilation

5.4 Weather Extractors

The weather extractors retrieve data from an initial set of public weather data sources used within FEWER

5.4.1 Requirements

The minimum requirements to install the weather extractors of FEWER for development and customisation are as follows:

1. Ubuntu Linux (17.10 or later) or Centos 7 recommended. (However, Windows 10 (build 1511 or later) or MacOS (10.13.2 or later) can be used with additional configuration)
2. 2 GB or greater of RAM
3. 16 GB or greater secondary storage
4. Python Request Library
5. IntelliJ 2017.2.5 or later

5.4.2 Installation

To install the mFisheries web app, we can retrieve the source code using the IntelliJ IDEA.

Upon launch, IntelliJ presents a set of options for managing projects.

To retrieve the source code, we use the “Check out project from Version Control” option in the menu shown in Figure 5.15.

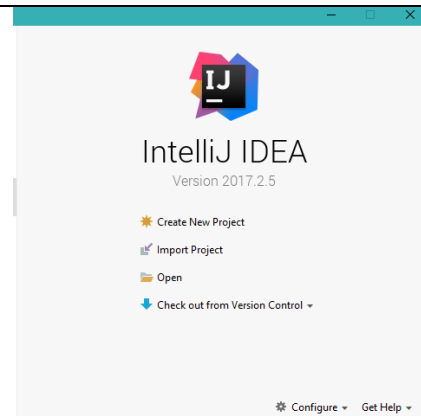


Figure 5.15 IntelliJ IDE Start Menu Options

The menu opens a window that enables the specification of the source of the code to be retrieved; and the specific path where the code will be stored on the local machine. See Figure 5.16.

The repository URL for the source code is provided in Table 2.2

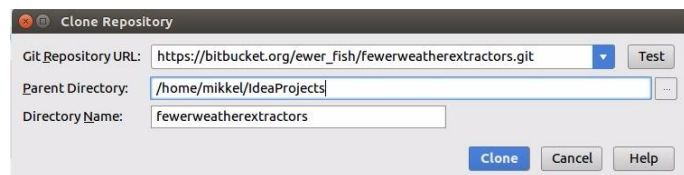
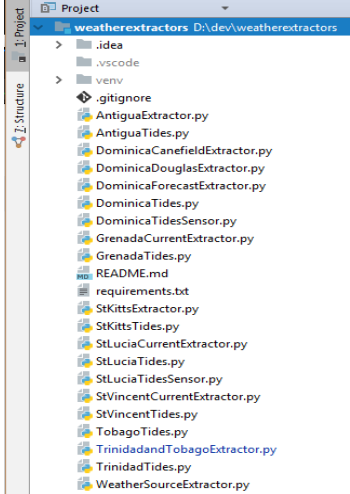
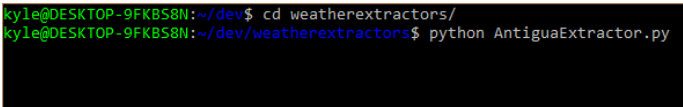


Figure 5.16 Check Out Configuration Window for IntelliJ

| | |
|---|--|
| <p>After downloading the source code through the “clone” process, the IntelliJ IDE will be automatically configured for the project. This will generate the side menu as highlighted in Figure 5.17.</p> <p>The IntelliJ IDE will display the folder structure of the project and provides additional tools based on the python files edited.</p> |  <p style="text-align: center;"><i>Figure 5.17 Installed IntelliJ Web API Services Project</i></p> |
| <p>The extractors can be executed via the command line of the OS used to determine if the extractor retrieves information from its source correctly. Figure 5.18 illustrates how to run an extractor from the Ubuntu terminal.</p> |  <p style="text-align: center;"><i>Figure 5.18 Terminal Command for running Extractor</i></p> |

The extractors are primarily used for loading into the weather sources of the system. The weather extractors within the repository are pre-configured upon commissioning of FEWER. Therefore, the code can be used to update extractors or as a template for creating new extractors

6. Testing

The mobile and web applications have been repeatedly tested to ensure a quality experience when users interact with the application. Parts of the system that have undergone this testing include the REST API on the web interface and the communication between these API endpoints and the mobile application. The functionality of the modules on both the web and mobile application has been tested throughout the development of the mobile and web applications.

6.1 Web Application Testing

The web application was tested by using both human-based and automated methods. Automated testing was done using scripts to determine the stability of the code of the back-end services of the application. Human-based testing was used to evaluate the interface and operations provided by the application.

6.1.1 Testing the User Interface

The manual testing of the interface of the web application was conducted by completing specific tasks under different conditions and the results of the tests recorded. Table 6.1 provides the results of the testing of the deployed FEWER web application.

Table 6.1 Web Application Manual Test Results

| Section | Function | Test | Outcome /Comments | Status | Dates |
|---------|-------------|--|-------------------|-------------------|------------|
| Users | Add User | Attempt to add user without any data input | Success | Fully Operational | 04-05-2018 |
| | Add User | Attempt to add a user | Success | Fully Operational | 04-05-2018 |
| | Add User | Duplicate email | Success | Fully Operational | 04-05-2018 |
| | Add User | Attempt to add duplicate user | Success | Fully Operational | 04-05-2018 |
| | Delete User | Attempt to delete a user | Success | Fully Operational | 04-05-2018 |
| | Edit User | Attempt to edit a user | Success | Fully Operational | 04-05-2018 |
| | Edit User | Change a user's Password | Success | Fully Operational | 04-05-2018 |
| | Search User | Search for a user | Success | Fully Operational | 04-05-2018 |

| Section | Function | Test | Outcome /Comments | Status | Dates |
|-------------|-----------------------|--|-------------------|-------------------|------------|
| | View User | View a user's profile | Success | Fully Operational | 04-05-2018 |
| | Track User | View a user's location | Success | Fully Operational | 04-05-2018 |
| Country | Add Country | Attempt to add country without any data input | Success | Fully Operational | 04-05-2018 |
| | Delete Country | Attempt to delete country | Success | Fully Operational | 04-05-2018 |
| | Add Module | Attempt to add blank module | Success | Fully Operational | 04-05-2018 |
| | Edit Module | Attempt to edit Module | Success | Fully Operational | 04-05-2018 |
| | Delete Module | Attempt to delete Modules | Success | Fully Operational | 04-05-2018 |
| | Add Country Module | Attempt to add blank country Module | Success | Fully Operational | 04-05-2018 |
| | Add Country Module | Add a Country Module | Success | Fully Operational | 04-05-2018 |
| | Delete Country Module | Attempt to delete a country module | Success | Fully Operational | 04-05-2018 |
| Groups | Add Group | Attempt to add a blank group | Success | Fully Operational | 04-05-2018 |
| | Add Group | Attempt to add a group without a country | Success | Fully Operational | 04-05-2018 |
| | Edit Group | Attempt to edit a group | Success | Fully Operational | 04-05-2018 |
| | Delete Group | Attempt to delete a group | Success | Fully Operational | 04-05-2018 |
| | View Group | Attempt to view members of a group | Success | Fully Operational | 04-05-2018 |
| Villages | Add Village | Attempt to add a village with all fields blank | Success | Fully Operational | 04-05-2018 |
| | Add Village | Attempt to add a duplicate village | Success | Fully Operational | 04-05-2018 |
| | Edit Village | Attempt to edit village information | Success | Fully Operational | 04-05-2018 |
| | Delete Village | Attempt to delete a village | Success | Fully Operational | 04-05-2018 |
| Occupations | Edit Occupation | Attempt to edit an occupation | Success | Fully Operational | 04-05-2018 |
| | Create Occupation | Attempt to add a blank occupation | Success | Fully Operational | 04-05-2018 |

| Section | Function | Test | Outcome /Comments | Status | Dates |
|--------------------|-------------------------|---|-------------------|-------------------|------------|
| | Create Occupation | Attempt to add a duplicate occupation | Success | Fully Operational | 04-05-2018 |
| | Create Occupation | Attempt to create an occupation | Success | Fully Operational | 04-05-2018 |
| | Delete Occupation | Attempt to delete an occupation | Success | Fully Operational | 04-05-2018 |
| Alerts | Create alert | Attempt to create a community alert | Success | Fully Operational | 04-05-2018 |
| | Receive community alert | Attempt to receive a community alert | Success | Fully Operational | 04-05-2018 |
| | Manage community alert | Broadcast a community alert | Success | Fully Operational | 04-05-2018 |
| Weather | View Weather | Attempt to view current weather | Success | Fully Operational | 04-05-2018 |
| Tracking | View User Tracks | View user tracks on a map | Success | Fully Operational | 04-05-2018 |
| | View Track details | View more information on a tracking pin | Success | Fully Operational | 04-05-2018 |
| | View SOS details | View more information on a SOS pin | Success | Fully Operational | 04-05-2018 |
| | Resolve SOS | Resolve an SOS alert | Success | Fully Operational | 04-05-2018 |
| Damage Reporting | Create category | Attempt to create a category | Success | Fully Operational | 04-05-2018 |
| | Create category | Attempt to create a blank category | Success | Fully Operational | 04-05-2018 |
| | Edit category | Attempt to edit a category | Success | Fully Operational | 04-05-2018 |
| | Delete category | Attempt to delete a category | Success | Fully Operational | 04-05-2018 |
| | Create report | Attempt to create a report | Success | Fully Operational | 04-05-2018 |
| | Create report | Attempt to create a blank report | Success | Fully Operational | 04-05-2018 |
| | Edit report | Attempt to edit a report | Success | Fully Operational | 04-05-2018 |
| | Delete report | Attempt to delete a report | Success | Fully Operational | 04-05-2018 |
| Emergency Contacts | Add contact | Attempt to create a new emergency contact | Success | Fully Operational | 04-05-2018 |

| Section | Function | Test | Outcome /Comments | Status | Dates |
|-----------------|---------------------|---|-------------------|-------------------|------------|
| | Add contact | Attempt to add a blank emergency contact | Success | Fully Operational | 04-05-2018 |
| | Edit contact | Attempt to edit an emergency contact | Success | Fully Operational | 04-05-2018 |
| | Delete contacts | Attempt to delete an emergency contact | Success | Fully Operational | 04-05-2018 |
| | View contacts | Attempt to view the administrator listing of contacts | Success | Fully Operational | 04-05-2018 |
| | View contacts | Attempt to view public listing of contacts | Success | Fully Operational | 04-05-2018 |
| Missing Persons | Create report | Attempt to create a report | Success | Fully Operational | 04-05-2018 |
| | Create report | Attempt to create a blank report | Success | Fully Operational | 04-05-2018 |
| | View report details | Attempt to view report details | Success | Fully Operational | 04-05-2018 |
| | Edit report | Attempt to edit a report | Success | Fully Operational | 04-05-2018 |
| | Delete report | Attempt to delete a report | Success | Fully Operational | 04-05-2018 |
| LEK | Create category | Attempt to create a category | Success | Fully Operational | 04-05-2018 |
| | Create category | Attempt to create a blank category | Success | Fully Operational | 04-05-2018 |
| | Edit category | Attempt to edit a category | Success | Fully Operational | 04-05-2018 |
| | Delete category | Attempt to delete a category | Success | Fully Operational | 04-05-2018 |
| | Create report | Attempt to create a report | Success | Fully Operational | 04-05-2018 |
| | Create report | Attempt to create a blank report | Success | Fully Operational | 04-05-2018 |
| | Edit report | Attempt to edit a report | Success | Fully Operational | 04-05-2018 |
| | Delete report | Attempt to delete a report | Success | Fully Operational | 04-05-2018 |
| Weather | View Weather | Attempt to view current weather | Success | Fully Operational | 04-05-2018 |
| | View Extractors | Attempt to view list of extractors | Success | Fully Operational | 04-05-2018 |

| Section | Function | Test | Outcome /Comments | Status | Dates |
|---------|---------------------|--|-------------------|-------------------|------------|
| | Run Extractor | Attempt to run an extractor manually | Success | Fully Operational | 04-05-2018 |
| | Open source | Attempt to view extractor source | Success | Fully Operational | 04-05-2018 |
| | View extractor data | Attempt to view information retrieved by extractor | Success | Fully Operational | 04-05-2018 |

6.1.2 Back-End Services Testing

The back-end services were tested through a combination of unit tests and system integration tests executed by the programmer. The results of these tests were recorded.

Table 6.2 shows the results of the back-end service testing of the deployed FEWER web application.

Table 6.2 Back-End Service Testing Results

| Test | Outcome /Comments | Dates |
|----------------|-------------------------|----------|
| General Test | All tests Passed | 07-05-18 |
| API Calls Test | 6 of 6 Passed | 07-05-18 |
| Modules Test | 11 of 11 Passed | 07-05-18 |

6.2 Mobile Application Testing

The mobile application was tested by using both human-based and automated methods. Automated testing was done using the Android Unit Test Framework and Instrumentation Testing Framework to determine the stability of the mobile application's communication with the back-end services of FEWER. Human-based testing was used to evaluate the interface and operations provided by the application.

6.2.1 Testing the User Interface

The user interface testing for the mobile application was conducted by completing specific tasks under different conditions and the results of the tests recorded. Table 6.3 provides the results of the testing of the deployed FEWER mobile application.

Table 6.3 Mobile Application Interface Testing results

| Section | Function | Test | Outcome /Comments | Online | Offline | Status | Dates |
|--------------|----------------|--------------------------------------|---|---------|---------|-----------------|----------|
| Installation | Select Country | Choose user country on the first run | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |

| Section | Function | Test | Outcome /Comments | Online | Offline | Status | Dates |
|---------|-------------------------|--|---|---------|--|-----------------|----------|
| | Choose Permissions | Open dialog to choose permission | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Add Modules | Open add modules dialog and select modules | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Register for account | Open dialog to select Gmail account | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Register for account | After Gmail selection register user | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| Alerts | Join alert group | Attempt to join the alert group | Success Functions as expected | Success | Success Appropriate message displayed | Fully Operation | 25-04-18 |
| | Create alert | Attempt to create and send an alert to other users | Success Functions as expected | Success | N/A | Fully Operation | 25-04-18 |
| | Receive alert | Receive and attempt to view an alert | Success Functions as expected | Success | N/A | Fully Operation | 25-04-18 |
| | Rate alert | Attempt to rate a received alert | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | View alert details | Attempt to view full alert details | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Share alert | Attempt to share an alert | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Delete alert | Attempt to delete an alert | Success Appropriate message displayed | Success | Success Appropriate message displayed | Fully Operation | 11-05-18 |
| Weather | View weather | Attempt to open and view weather | Success Functions as expected | Success | Success Appropriate message displayed | Fully Operation | 25-04-18 |
| | View additional details | Attempt to view additional details on weather | Success Functions as expected | Success | Success Appropriate message displayed | Fully Operation | 25-04-18 |
| | View a | Attempt to view | Success | Success | Success | Fully | 25-04-18 |

| Section | Function | Test | Outcome /Comments | Online | Offline | Status | Dates |
|----------------------|---------------------------------|---|---|---------|--|-----------------|----------|
| | different source | details from a different weather source | Functions as expected | | Appropriate message displayed | Operation | |
| | Share weather | Attempt to share weather details | Success Functions as expected | Success | Success Appropriate message displayed | Fully Operation | 25-04-18 |
| | View tides | Attempts to view tide info | Success Functions as expected | Success | Success Appropriate message displayed | Fully Operation | 25-04-18 |
| | View suggested apps | Attempt to view the suggested apps | Success Functions as expected | Success | Success Appropriate message displayed | Fully Operation | 25-04-18 |
| Messaging | Send a message | Attempt to send a message to another user | Success Functions as expected | Success | Success Appropriate message displayed | Fully Operation | 25-04-18 |
| | Receive a message | Attempt to receive and view a message | Success Functions as expected | Success | N/A | Fully Operation | 25-04-18 |
| | Create a group | Attempt to create a group with multiple users | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| Emergency Procedures | View list of procedures | Attempt to view a listing of available procedures | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | View Procedure | Attempt to play a procedure | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| Emergency Contacts | View list of emergency contacts | Attempt to view a list of contacts | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Call an emergency contact | Attempt to call a contact | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Email an emergency contact | Attempt to email contact | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | View contact details | Attempt to view contact details | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Share contact | Attempt to share | Success | Success | Success | Fully | 25-04-18 |

| Section | Function | Test | Outcome /Comments | Online | Offline | Status | Dates |
|------------------|----------------------------------|--|---|---------|---------|-----------------|----------|
| | details | a contact | Functions as expected | | | Operation | |
| | Add private emergency contact | Attempt to add a private contact | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Remove private emergency contact | Attempt to remove a contact | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| Damage Reporting | View list of reports | Attempt to view a list of reports | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Create report | Attempt to create a report | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Delete report | Attempt to delete a report | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | View report details | Attempt to view report details | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Share report details | Attempt to share report details | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| Missing Persons | View list of reports | Attempt to view a list of reports | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Create report | Attempt to create a report | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | View report details | Attempt to view report details | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Share report details | Attempt to share report details | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Mark a report | Attempt to mark a person as found | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| | Contact creator | Attempt to contact the creator of a report | Success Functions as expected | Success | Success | Fully Operation | 25-04-18 |
| LEK | View Map | Attempt to view the LEK map | Success Functions as | Success | Success | Fully Operation | 25-04-18 |

| Section | Function | Test | Outcome /Comments | Online | Offline | Status | Dates |
|---------|--------------|-------------------------|---|---------|--|-----------------|----------|
| | | | expected | | | | |
| | View a post | Attempt to view a post | Success Functions as expected | Success | N/A | Fully Operation | 25-04-18 |
| | Filter posts | Attempt to filter posts | Success Functions as expected | Success | N/A | Fully Operation | 25-04-18 |
| | Create post | Create and LEK post | Success Functions as expected | Success | Success Appropriate message displayed | Fully Operation | 25-04-18 |
| | Delete post | Delete an LEK post | Success Functions as expected | Success | N/A | Fully Operation | 25-04-18 |

6.2.2 Mobile automated testing

The automated testing conducted on the mobile application was performed by writing unit and instrumentation tests in Android code to be conducted by the Android Studio IDE and the results of these tests are returned and displayed to the programmer, which are recorded in Table 6.4.

Table 6.4 Mobile application automated testing results

| Section | Test | Total sub tests | Outcome /Comments | Status | Dates |
|----------------------|---|-----------------|------------------------------------|-------------|----------|
| Core | API Test | 4 | 4 Passed 0 Failed | Test Passed | 08-05-18 |
| Core | Modules Test | 1 | 1 Passed 0 Failed | Test Passed | 08-05-18 |
| Core | Download Instrumentation Test | 1 | 1 Passed 0 Failed | Test Passed | 08-05-18 |
| Alerts | Utilities Test | 1 | 1 Passed 0 Failed | Test Passed | 08-05-18 |
| Damage Reporting | Damage Reporting Instrumentation Test | 1 | 1 Passed 0 Failed | Test Passed | 09-05-18 |
| Emergency Procedures | Emergency Procedures Instrumentation Test | 1 | 1 Passed 0 Failed | Test Passed | 09-05-18 |
| Emergency Contacts | Emergency Contacts Instrumentation Test | 1 | 1 Passed 0 Failed | Test Passed | 09-05-18 |
| Missing Persons | Missing Persons Instrumentation Test | 1 | 1 Passed 0 Failed | Test Passed | 09-05-18 |
| LEK | LEK Instrumentation Test | 2 | 2 Passed | Test Passed | 09-05-18 |

| Section | Test | Total sub tests | Outcome /Comments | Status | Dates |
|---------|------------------------|-----------------|----------------------|-------------|----------|
| | | | 0 Failed | | |
| LEK | LEK Utilities Test | 1 | 1 Passed 0 Passed | Test Passed | 09-05-18 |
| Weather | Weather Utilities Test | 4 | 4 Passed 0 Failed | Test Passed | 07-05-18 |

6.3 Extractor Testing

The extractors used by the web system to retrieve weather data were tested to determine the accuracy of the information being retrieved as compared to what is shown at the source. All extractors are tested twice with one command. The first test checks if all the extractors can be retrieved in the second tests if they can retrieve information. If no errors are detected, then a total of two tests are displayed as passed. An example of the results is shown below in Figure 6.1.

```
(testvenv) mikkell@mikkell-VirtualBox:~/mfisheries_webserv
Running the __init__ of the mFisheries project
No handlers could be found for logger "fastkml.config"
.Running the __init__ of the mFisheries project
/home/mikkell/testvenv/local/lib/python2.7/site-packages/s
ent. configure() can not affect sessions that have alrea
warn('At least one scoped session is already present.
.
2 passed in 2.03 seconds
```

Figure 6.1 Extractor Testing Results

6.4 Load Testing

Testing of the capability of the web system to handle an expected number of concurrent users was conducted. To do this a simulation of many users was done and the system was swarmed with these virtual users. This was done using <http://locust.io>. An example of the results from this can be seen in Figure 6.2.

| Statistics | | | | | | | | | | |
|--|----------------------------|------------|------------|-------------|--------------|------------|-------------|--------------|------------|--|
| Charts Failures Exceptions Download Data | | | | | | | | | | |
| Type | Name | # requests | # fails | Median (ms) | Average (ms) | Min (ms) | Max (ms) | Content Size | # reqs/sec | |
| GET | / | 26 | 44 | 6900 | 6806 | 3962 | 7525 | 27134 | 0.1 | |
| GET | /api/alerts | 11 | 5 | 1900 | 2795 | 581 | 7218 | 40347 | 0.4 | |
| GET | /api/capsources | 3 | 1 | 380 | 2272 | 297 | 6140 | 3075 | 0.1 | |
| GET | /api/config | 11 | 11 | 950 | 1893 | 285 | 6365 | 4203 | 0.6 | |
| GET | /api/countries | 4 | 6 | 290 | 1212 | 206 | 4013 | 987 | 0.1 | |
| GET | /api/country/modules | 22 | 25 | 390 | 1469 | 310 | 7279 | 7011 | 0.5 | |
| GET | /api/countrylocs | 26 | 9 | 900 | 1997 | 126 | 7410 | 1598 | 0.6 | |
| GET | /api/damagereport | 12 | 1 | 510 | 1928 | 311 | 6869 | 16574 | 0.4 | |
| GET | /api/damagereport/category | 9 | 8 | 420 | 1443 | 199 | 6318 | 6846 | 0.2 | |
| GET | /api/emergencycontact | 20 | 16 | 1400 | 2434 | 271 | 7527 | 15644 | 0.5 | |
| GET | /api/groups | 7 | 4 | 1100 | 3136 | 410 | 7310 | 18890 | 0.1 | |
| GET | /api/lek | 14 | 13 | 620 | 1400 | 395 | 7207 | 34960 | 0.6 | |
| GET | /api/missingpersons | 38 | 9 | 820 | 1729 | 514 | 7613 | 26662 | 1.1 | |
| GET | /api/modules | 16 | 17 | 350 | 1811 | 129 | 7023 | 704 | 0.3 | |
| GET | /api/occupations | 13 | 12 | 1600 | 2539 | 151 | 6971 | 13745 | 0.6 | |
| Total | | 232 | 181 | 820 | 2494 | 126 | 7613 | 16390 | 6.2 | |

Figure 6.2 Load Testing Results

7. Additional Resources

Companion documents to this submission are:

- FEWER Administrator Manual
- FEWER Fisher Manual
- FEWER Extractor Manual.









8. Appendix: Overview of FEWER

Fisheries Early Warning and Emergency Response (FEWER) is a set of tools that link small-scale fishers with each other and with agencies that play critical roles in the overall DRM framework. These links are effected through a system of information and communications facilities. The tools comprise a mobile application and web-based administrators' dashboard. FEWER is one of several tools that reduce fishers' risks.

FEWER was developed through the Marine sub-component of Component 4, Applied Adaptation Initiatives, of the Caribbean Regional Track of the Pilot Programme for Climate Resilience (PPCR). A consultant was contracted to develop the early warning and emergency response system (EWERS) for fishers in Grenada, Dominica, Saint Lucia and St. Vincent and the Grenadines; and to provide associated training. One of the contracted deliverables was D-7 Final EWERS, including e-services, installed and tested.

FEWER provides support for all four phases of the disaster management cycle through eight modules: Local Ecological Knowledge (LEK), Messaging, Weather, Alerts, Emergency Contacts, Emergency Procedures, Damage Reporting and Missing Persons as shown in Table 8.1.

Table 8.1 FEWER Modules and Key Time to Use

| DM Phase | FEWER Module | Fishers ... |
|--------------|--|---|
| Mitigation |  LEK | <ul style="list-style-type: none"> Record anything in the marine environment that should be noted to reduce fishers' risks |
| |  Messaging | <ul style="list-style-type: none"> Keep in touch with other fishers to be aware if, where and when anyone goes missing |
| Preparedness |  Weather | <ul style="list-style-type: none"> Receive and share information from local and international sources with indicators when things look risky |
| |  Alerts | <ul style="list-style-type: none"> Receive from and send alerts to Fisheries, Met and Disaster Offices, and other fishers |
| Response |  Emergency Contacts | <ul style="list-style-type: none"> Access up to date Emergency Contacts directly Receive trusted guidance on procedures to follow in emergency situations |
| |  Emergency Procedures | |
| Recovery |  Damage Reporting | <ul style="list-style-type: none"> Share reports based on property damage with the Authorities |
| |  Missing Persons | <ul style="list-style-type: none"> Broadcast information to help in the recovery of missing fishers. |

The administration of fisher early warning and emergency response communication falls to the fisheries authorities as the FEWER **country administrators (CA)**; and the disaster management agencies, Met services and fisherfolk organisations as FEWER **agency**

administrators (AA). The overarching coordination of FEWER is the responsibility of the CRFM as the regional authority for fisheries. The CRFM is joined by regional authorities for hydrometeorology and disaster management, and the Caribbean Network of Fisherfolk Organisations, as FEWER **regional reviewers (RR).** These administrators view all information accessible to country and agency administrators, and can draw on this information to create reports, but do not otherwise play a role in the day to day support of FEWER operations at the national level. As a software application, the technical aspects of FEWER are managed at the national level by **technical administrators (TA)** and supported regionally by the **global administrators (GA).** Further details of the capabilities of the administrators can be accessed in the administrator manual.

FEWER is configured for the following countries:

1. Grenada
2. Dominica
3. Saint Lucia
4. St. Vincent and the Grenadines.

Country configuration is conducted by FEWER country administrators. This includes activities such as defining values, such as categories for Damage Reporting and LEK, community alert groups, Emergency Procedures, Weather Extractors and Emergency Contacts, that are used in both the web and mobile application. Various categories of country configuration information are shown in the Appendix.

The country locations are used to give a rough estimate of location to determine weather conditions when a GPS signal is not available to the application.

Table 8.1 Country locations

| Country | GPS Coordinates |
|--------------------------------|---|
| Dominica | (15.414999, -61.370976) |
| Grenada | (12.262776, -61.604171) |
| Saint Lucia | (13.909444, -60.978893) |
| St. Vincent and the Grenadines | (12.984305, -61.287228) |

8.1 Module-specific Configurations

FEWER modules have been designed to be highly reconfigurable. Key baseline module configurations include categories for damage reporting and local ecological knowledge, community alerts groups, weather extractors, emergency procedures and emergency contacts. Country administrators can configure additional information for the existing modules provided in FEWER. The following sections provide details for the baseline module configurations provided on deployment.

8.1.1 Damage Reporting Categories

FEWER organises user created damage reports according to categories. These categories can be added or removed by Country and Technical administrators of the system. The current damage reporting categories are as follows:

- Boats
- Buildings
- Environment
- Man-made
- Other

8.1.2 Local Ecological Knowledge Categories

Like Damage Reporting, FEWER also organises user created LEK posts according to categories. These can be added or removed by Country and Technical administrators of the system. The current LEK categories are as follows:

- Beach
- Coast Line
- Environmental
- Open Sea

8.1.3 Community Alert Groups

Community alert groups are generated from a listing of villages for a country. These groups are used to send out alerts to members of the same community of fishers. The listing of villages used for generating the community alert groups was compiled by the development team and confirmed by the respective countries.

8.1.4 Weather Extractors

Extractors are files that are run within the FEWER system to retrieve hydro-met data from a specific weather source. These files can be set to run on a schedule or manually at any time by an administrator.

8.1.5 Emergency Procedures

Emergency Procedures consists of a listing of instructional videos and guidance to follow in the event of an emergency. The current listing of Emergency Procedures available to each of the FEWER countries is as follows:

- Emergency at sea and sailing
- Navigation lights
- Pre-sea check
- Search and rescue
- Stability and trim
- Vhf radio

8.1.6 Emergency Contacts

In the event of an emergency there is a listing of possible emergency contacts that a user may wish to contact. These numbers are compiled into the FEWER system for each of the available countries.

The CRFM is an inter-governmental organization whose mission is to “Promote and facilitate the responsible utilization of the region’s fisheries and other aquatic resources for the economic and social benefits of the current and future population of the region”. The CRFM consists of three bodies – the Ministerial Council, the Caribbean Fisheries Forum and the CRFM Secretariat. CRFM members are Anguilla, Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago and the Turks and Caicos Islands.

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