Weather Station Test Plan

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Revision History

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Introduction

1.1 Purpose

The purpose of this document is to detail the means with which the weather station application will be tested. These tests have a specific goal of ensuring that all the requirements of the product are being met and that any changes made to the application will not produce a different outcome than the one specified.

Functional Testing

2.1 Approach

Knex seed files will be used to preload data into the database for testing purposes. A tester will then follow a specific set of instructions that will allow each test to be executed. These tests will have a clearly defined end state that will allow the tester to know if the test passed or failed.

There will be at minimum a total of 15 automated tests as well. These tests will be run using Mocha test suite and Selenium to simulate a user on the site. These automated tests will be able to be run through a simple command on the terminal.

2.2 Pass/Fail Criteria

For each test case to pass, all aspects of the expected results must meet the specified requirements. If the results of the test case do not meet the expected results, the test case will fail.

2.3 Entry/Exit Criteria

The Entry Criteria of functional testing is:

1. A basic implementation of each functional requirement has been completed.

The Exit Criteria of functional testing is:

1. All functional test cases have been executed.

2. The pass rate of the executed test cases is 100%.

2.4 Suspension/Resumption Criteria

Testing will be suspended if a test case fails and causes the site to become inoperable. This failed test case will then be logged and assigned to a team member to be fixed. Once the team member has fixed the issue for the failed test case, testing will resume.

2.5 Risks/Issues

One potential risk to the validity of the test cases would be the execution of SQL scripts to populate the database in certain ways for each tests. Should there be a bug in one of these scripts, it would cause issues for the validity of the test cases. Another potential issue could arise when testing the Raspberry Pi and sensor hardware. If the hardware is working improperly, it would cause test cases to fail even though they may not normally.

2.6 Items To Be Tested

User Login		
Test Case ID	Title	Description
TC-1	Invalid Username/Password	Display error to user when invalid data is entered
TC-2	Register Button	Redirects user to Register page
TC-3	Forgot Password	Redirects user to password recovery page
TC-4	Login	User credentials are verified and they are redirected to stations page

New Account Requirements		
Test Case ID	Title	Description
TC-5	Blank Username	User did not enter a string in the username field
TC- 6	Invalid Username	User used symbols in their

		username
TC-7	Duplicate Username	User has entered a username that already exists
TC-8	Blank Email	User did not enter a string in the email field
TC-9	Invalid Email	User did not enter an email address
TC-10	Duplicate Email	User entered an email address that already exists
TC-11	Short Password	User's password is under 8 characters
TC-12	Password doesn't meet string requirements	User did not user at least 1 letter and 1 number in their password
TC-13	Passwords do not match	User's passwords did not match each other

Create Account		
Test Case ID	Title	Description
TC-14	Create Account Submit	User submits accounts and is redirected to login on success
TC-15	Return Button	Redirects User to login page when clicked

Password Reset		
Test Case ID	Title	Description
TC-16	Invalid Email	User did not enter an email
TC-17	Recover Password Button	Sends user an email
TC-18	Return Button	Redirects user to login page

TC-19	Email Link	Takes user to reset password page
TC-20	Short Password	User's password is under 8 characters
TC-21	Passwords do not match	User's passwords did not match each other
TC-22	Expired Token	User's URL token has expired
TC-23	Invalid Token	User's URL token is invalid
TC-24	Success Redirect	Redirects user to login page

User Logout		
Test Case ID	Title	Description
TC-25	Logout Button	Redirects user to login page

View Station		
Test Case ID	Title	Description
TC-26	No Stations	There are no stations that have sent weather data to the server.
TC-27	Connected station	Display a connected station.
TC-28	Disconnected station	Display a disconnected station.
TC-29	List Mode	There is at least one station that has sent weather data and the page is in the list view mode.
TC-30	Grid Mode	There is at least one station that has sent weather data and the page is in the grid view mode.

TC-31	View Mode is Saved	If the user sets the view mode, navigates away from the site, and comes back to the stations page the view mode is what it last was.

View Station Details		
Test Case ID	Title	Description
TC-32	Regular User	The user does not have admin privileges and clicks on a station card to bring up the additional detail view.
TC-33	Admin User	The user does have admin privileges and clicks on a station card to bring up the additional detail view.
TC-34	Change Station Name	The user does have admin privileges and changes the name of the station in the station details.

View Individual Station Location		
Test Case ID	Title	Description
TC-35	Valid latitude and longitude coordinates.	View an individual station's location by viewing the station detail modal.
TC-36	No latitude and longitude coordinates	There are no latitude and longitude coordinates when opening the station detail modal.

View Stations Map		
Test Case ID	Title	Description
TC-37	No stations with	Display no available station

	latitude/longitude coordinates.	locations alert.
TC-38	At least one station with latitude/longitude coordinates.	Display a map marker and corresponding station name in the sidebar.
TC-39	Hover mouse on station marker.	Hovering over a station marker brings up weather data for that station.
TC-40	Hide station.	Uncheck the box next to a station's name.
TC-41	Show station.	Check the box next to a station's name.
TC-42	Hide all stations.	Uncheck the box next to "All Stations"
TC-43	Show all stations.	Check the box next to "All Stations"
TC-44	Hide station labels.	Uncheck the box next to "Show station labels"
TC-45	Show station labels.	Check the box next to "Show station labels"

Administration Permissions		
Test Case ID	Title	Description
TC-46	Promote user.	Change user rights from operator to admin rights.
TC-47	Demote user.	Demote admin to operator rights.
TC-48	Demote admin.	Demote admin to operator rights (superuser only).

New User Account Approval

Test Case ID	Title	Description
TC-49	Request Email	Email gets sent out to the admin/superuser.
TC-50	Email Link	Link in the user request email loads correct webpage.
TC-51	Approve User	Admin approves the account
TC-52	Deny User	Admin denies the user of creating an account
TC-53	Confirmation Email	Operator gets notified if their account has been approved or denied.

Edit Station Name		
Test Case ID	Title	Description
TC-54	Admin clicks on weather station card	Brings up station detail view with an input box for station name value.
TC-55	Admin saves changes	Changes get updated in the database, and gets updated display the new station name.
TC-56	Operator clicks on weather station card	Brings up station detail view with only viewing rights and no input box.

View Historical Data		
Test Case ID	Title	Description
TC-57	View Page With Data	View the historical page with stored weather data.
TC-58	View Page With No Data	View the historical page

		with no weather data sto red.

Filter Historical Data		
Test Case ID	Title	Description
TC-59	Click Filter	Click on the filter button to get filter options
TC-60	Click Submit	The selected filter options should be applied to the graph
TC-61	Click Cancel	The selected filter options are discarded and are not applied to the graph.
TC-62	Filter By Pressure	Filter the graph data by pressure.
TC-63	Filter By Temperature	Filter the graph data by temperature.
TC-64	Filter By Humidity	Filter the graph data by humidity.
TC-65	Filter By Time	Set the graph to be filtered between two dates.
TC-66	Filter By Invalid Time	Set the filter dates for impossible times.
TC-67	Filter By Station Name	Select the stations to be displayed on the graph.
TC-68	Filter By No Station	Select no stations to be filtered.

User Profile		
Test Case ID	Title	Description

TC-69	Render User Data	Operator can navigate to the user profile
TC-70	Duplicate Email	User entered an email address that already exists
TC-71	Update Email	User successfully updates email.
TC-72	Invalid Phone Number	User enters invalid phone number
TC-73	Duplicate Phone Number	User enters a phone number that's already in use
TC-74	Update Phone Number	User successfully changes phone number
TC-75	Short Password	User's password is under 8 characters
TC-76	Passwords do not match	User's passwords did not match each other
TC-77	Password Update	User's password is updated successfully

Weather Alerts		
Test Case ID	Title	Description
TC-78	Add Alert Button	Clicking add alert button opens a new window for the user
TC-79	Disable Add Alert Button	Button is disabled when no stations are added
TC-80	Station Dropdown	Stations dropdown is populated with options for all stations
TC-81	Multiple Value Toggle	When between is selected user can enter multiple values, otherwise only one

		entry box is displayed
TC-82	Invalid Value Input	User can only enter numbers in value box
TC-83	Multiple values in wrong order	User has entered values with the larger one being in the first box.
TC-84	Edit Alert	User will edit an alert that is already created.
TC-85	Cancel Button	Cancel button close alert window
TC-86	Delete Button	Deletes an alert when clicked

Email Alerts		
Test Case ID	Title	Description
TC-87	Add Email Alert Method	Select email to be one of the alert methods.
TC-88	Receive Email Alert	Receive a weather alert from an email
TC-89	Remove Email Alert Method	Unselect email from the alert methods.

SMS Alerts		
Test Case ID	Title	Description
TC-90	Add SMS Alert Method	Select sms to be one of the alert methods.
TC-91	Receive SMS Alert	Receive a weather alert from an sms.
TC-92	Remove SMS Alert Method	Unselect sms from the alert methods.

Webpage Alerts		
Test Case ID	Title	Description
TC-93	Add Webpage Alert Method	Select webpage to be one of the alert methods.
TC-94	Receive Webpage Alert	Receive a weather alert from on a webpage.
TC-95	Remove Webpage Alert Method	Unselect webpage from the alert methods.

Station Connection Quality Indicator		
Test Case ID	Title	Description
TC-96	Good connection quality.	Connection indicator is green.
TC-97	Okay connection quality.	Connection indicator is yellow.
TC-98	Poor connection quality.	Connection indicator is red.

Save Station Data Locally		
Test Case ID	Title	Description
TC-99	Station Saves Locally	With loss of connection the station begins storing data locally.
TC-100	Station Reconnects	Once connected to the internet again the station sends the saved data.

Filter By Station Name		
Test Case ID	Title	Description

TC-101	Matching Name	A station name matches what is typed in the filter bar.
TC-102	No Matching Name	No Station has a matching name to what's typed in the filter.

Connect Stations Automatically		
Test Case ID	Title	Description
TC-103	On Startup	The program on the station should run on startup.
TC-104	Connect with API Key	Once program has started it should connect automatically with a valid api key.
TC-105	Connect with Invalid API Key	With Invalid api key it should display invalid key.

Add a station		
Test Case ID	Title	Description
TC-106	Duplicate station name.	There is an existing station with the same name.
TC-107	Successfully add new station.	New station successfully added to database.

Install New Station		
Test Case ID	Title	Description
TC-108	Sense Hat Station	Set up a station with the Sense Hat weather sensor.
TC-109	Individual Sensors Station	Set up a station with individual weather sensors.

Webpage Alerts Display		
Test Case ID	Title	Description
TC-110	Render Notification Number	When user has unread notification, number of unread notifications would be displayed
TC- 111	Toggle dropdown	When bell icon is clicked, drop down with all alerts opens
TC-112	Mark Read	Alerts are marked read when drop down is opened
TC-113	Render Alerts	When drop down is opened, all web pages alerts are rendered for user
TC-114	View Alert Details	Clicking on an alert renders details for when alert was triggered
TC-115	Dismiss Alerts	Clicking dismiss button will clear all alerts from dropdown

Average Weather Data		
Test Case ID	Title	Description
TC-116	Single Station	Display the data from that single station when averaging the weather
TC-117	Multiple Stations	Average together the temperature, humidity, and pressure of all stations within the circle radius
TC-118	No Stations	Display zeros when averaging data from no station within the circle

		radius

Historic Alerts		
Test Case ID	Title	Description
TC-119	Render Historic Alerts	All triggered alerts are displayed to user
TC-120	Filter Historic Alerts By Date	User can filter alerts by date
TC-121	Filter Historic Alerts By Station	
TC-122	View Historic Alert Details	User can click on an alert to view more details about it

Integration Testing

3.1 Approach

Integration tests will be using scripts to preload data into the database. The goal of these tests is to test the various communication routes this application will be using. Communication between the weather station and the weather station site, and the communication between the weather station site and the open weather maps API.

3.2 Pass/Fail Criteria

For each test case to pass, all aspects of the expected results must meet the specified requirements. If the results of the test case do not meet the expected results, the test case will fail.

3.3 Entry/Exit Criteria

The Entry Criteria of integration testing is:

1. All functional test cases have completed and have passed.

The Exit Criteria of functional testing is:

1. All integration test cases have been completed
2. The pass rate of the executed test cases is 100%.

3.4 Suspension/Resumption Criteria

Testing will be suspended if a test case fails and causes the site to become inoperable. This failed test case will then be logged and assigned to a team member to be fixed. Once the team member has fixed the issue for the failed test case, testing will resume.

3.5 Risks/Issues

One potential risk to the validity of the test cases would be the execution of SQL scripts to populate the database in certain ways for each tests. Should there be a bug in one of these scripts, it would cause issues for the validity of the test cases. Another potential issue could arise when testing the Raspberry Pi and sensor hardware. If the hardware is working improperly, it would cause test cases to fail even though they may not normally. Because this is integration testing, more issues could arise due to the consistent internet connection required to be able to access Open Weather Map API data.

3.6 Items To Be Tested

Open Weather Map API		
Test Case ID	Title	Description
TC-123	Valid latitude and longitude coordinates.	Retrieve weather data with valid latitude and longitude coordinates.
TC-124	Invalid latitude and longitude coordinates	Attempt to retrieve weather data with latitude and longitude coordinates that do not have data within Open Weather Map

Station Communication		
Test Case ID	Title	Description
TC-125	Send weather data	Send weather data after retrieving it from the

		attached sensors on the device.
TC-126	Send stored weather data	Send weather data stored in text files on the device.
TC-127	Valid API key	Verify API key when setting up the device. The API key cannot be in use and must exist in the database.
TC-128	API key in use	When installing a station, the user inputs an API key already in use.
TC-129	API key does not exist	When installing a station, the user inputs an API key that does not exist in the database.

System Testing

4.1 Approach

System tests will be performed in a specific order with the goal of touching on almost every aspect of the weather station and weather station site. These tests will use scripts to preload specific data into the database.

Certain tests will require a specific amount of time to pass before they can be finished. While waiting for the time to pass, the tester can simply move onto the next test and come back to the original test at a later time to verify the results.

4.2 Pass/Fail Criteria

For each test case to pass, all aspects of the expected results must meet the specified requirements. If the results of the test case do not meet the expected results, the test case will fail.

4.3 Entry/Exit Criteria

The Entry Criteria of system testing is:

1. All integration test cases have completed and have passed.

The Exit Criteria of functional testing is:

1. All system test cases have been completed
2. The pass rate of the executed test cases is 100%.

4.4 Suspension/Resumption Criteria

Testing will be suspended if a test case fails. This failed test case will then be logged and assigned to a team member to be fixed. Once the team member has fixed the issue for the failed test case, testing will resume.

4.5 Risks/Issues

One potential risk to the validity of the test cases would be the complete reliance on the user while completing these system tests. If there is some user error or an action is done out of order there could be unexpected results. Another potential issue could arise when testing the Raspberry Pi and sensor hardware. If the hardware is working improperly, it would cause test cases to fail even though they may not normally.

4.6 Execution Path

The following tests must be executed in the order that they appear in this testing plan. Parameters for each test, if necessary, will appear in the Test Case Specification Document with the corresponding test case.

To begin, execute script DBS-01 to remove all existing data from the database and add a single superuser.

Test Case ID	Title	Description
TC-130	Superuser Login	Log into the website.
TC-131	Add a Station	Generate an API key and give a name to a station.
TC-132	Install a Station	Install the weatherstation

		binary file onto a Raspberry Pi Weather Station
TC-133	View Stations	View the live data coming in from the Weather Station
TC-134	Change Station Name	Change the name of the station after clicking station details
TC-135	View Station Map	View the map page to see the station's location
TC-136	Hover Station Marker	Hover mouse over the station marker to view weather data for that station.
TC-137	Hide / Show Station	Hide and then show the station's location
TC-138	Hide / Show Station Labels	Hide and then show the station's label
TC-139	Average Weather	Average the weather from the single station displayed on the map
TC-140	Add Alert	Add an alert to be triggered within one minute (email and webpage).

Wait at most one minute for the alert that was added to be triggered. If the alert is not triggered within one minute, the test case fails.

Test Case ID	Title	Description
TC-141	View Webpage Alert	View the webpage alerts dropdown in the navigation bar.
TC-142	View Weather Data at Time of Alert	Click on the alert within the alerts dropdown in the navigation bar.

TC-143	View Alert History	View all alerts that have been triggered.
TC-144	Filter Alert History By Day	Filter the alert history to show another day's alerts.
TC-145	Edit Alert	Change the values on an existing alert.
TC-146	Delete Alert	Remove an alert from the system.

Wait thirty minutes for the connected station to send enough weather data to begin filling the historical graph. Test cases not having to do with the historical graph can continue to be completed, but thirty minutes must pass for two points to display on the graph.

Test Case ID	Title	Description
TC-147	View Historical Data	View all temperature data from the last 24 hours.
TC-148	Filter Historical Data By Day	Filter the historical graph to display data from a different day.
TC-149	Filter Historical Data by Data Type	Filter the historical graph to display humidity or pressure data.
TC-150	View Profile Information	View user profile information.
TC-151	Update Phone Number	Change the value of the phone number in the profile page.
TC-152	Change Password	Change the user password.
TC-153	Logout	Logout of the webpage.
TC-154	Login With New Password	Login with the changed password.
TC-155	Disconnect Station	Turn off the weather

		station so it is no longer sending data
TC-156	Delete Station	Delete the station.