

INCREMENT 3

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Design choices

We are using a relation database (SQLITE) as the information for the campaigns can be effectively and easily shown in columns and rows in a table. All the members of our group have experience with it, therefore this permits everyone to form a commitment to the usage of different features. Interface is appropriate, usable and clear for intended users, shows clear error messages given.

Our main goals for the current increment were the tasks which were mentioned in the previous one for Increment 3. Basically, to add some more functionality- adding interface features to be able to compare numerous campaigns, extra functionality to customize the appearance of the application, to create an instructions page to help users also to make the processes running behind these interfaces correct and efficient.

Due to the last feedback that we received, now we provide more artifacts than just a class diagram. Therefore, we added scenarios, user guide and made better tests. Moreover, we have optimized the time loading files but we chose not to change manager to h2, we will explain within the responses to the feedback section.

We have chosen to use again more technologies like:

Maven – dependency manager; project object model

- The project can be effectively ported on each machine
- Loads all required conditions for compiling and working on the application

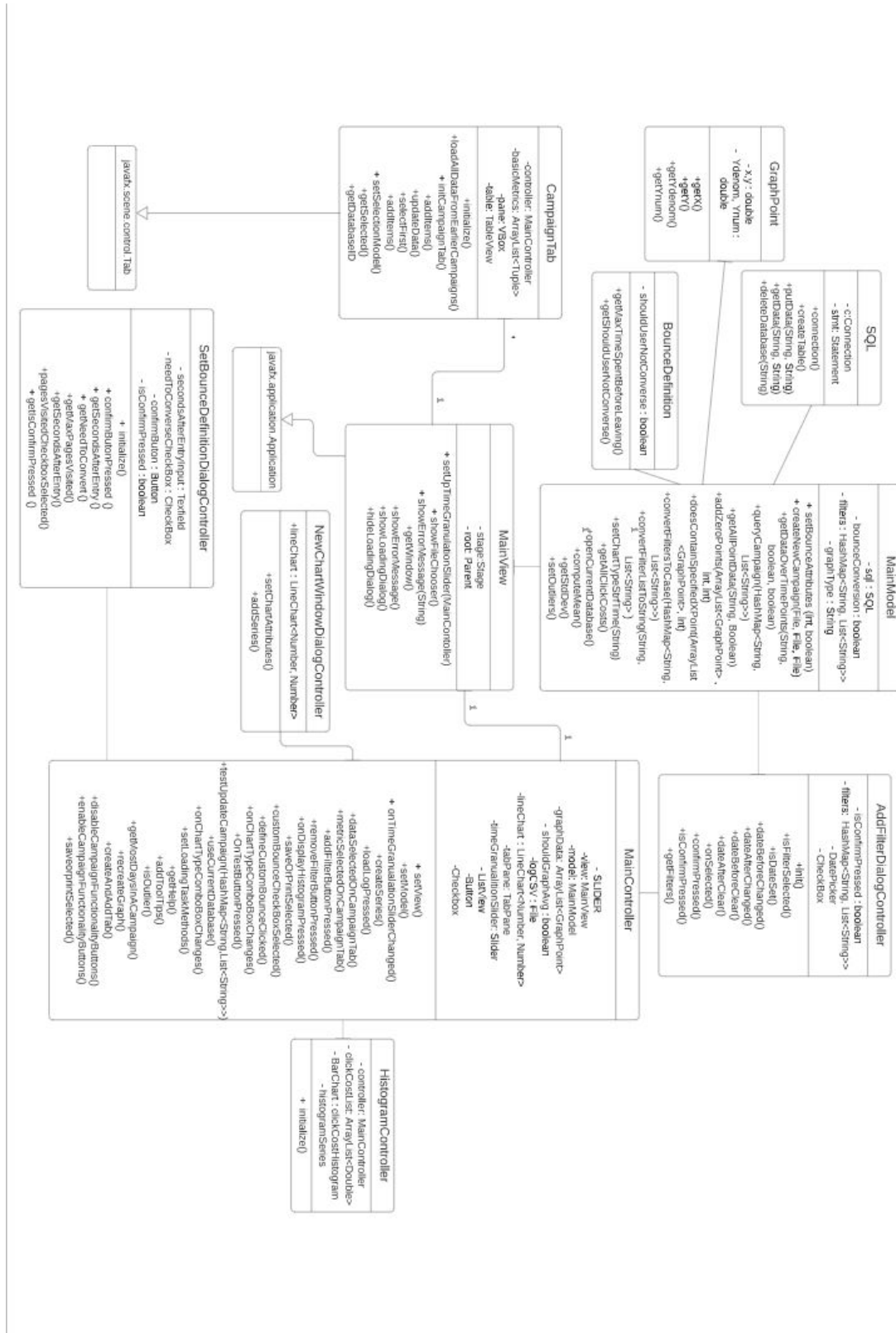
JavaFX – oversees the Client Interface

- Front-end .
- Allows applying way better styles utilizing Cascading Fashion Sheets (CSS)
- Encourages the utilization of Model-View-Controller (MVC) Plan Pattern
- Import control buttons and checkboxes

Back-end: SQL queries

- Helps to prevent any bugs and the ensures the appropriate working of new added features

UML CLASS DIAGRAM



The UML Class Diagram has been further developed in this increment, with multiple methods added to the MainController, CampaignTab, MainModel and SQL classes.

Methods in the MainController class include:

- loadAllDataFromEarlierCampaigns() which allows the user to load the data from any campaigns automatically detected in the same directory.
- createAndAddTab() which allows the user to create and add a new campaign
- enable/disable CampaignFunctionalityButtons() meaning that the interface now has the ability to enable and disable all the buttons that should only work when a campaign is active
- getCampaignTabs() returns all the tabs so that all the tabs can be displayed in the interface
- recreateGraph() which allows for the graph to be recreated with the current value if no time granularity value is selected
- getMostDaysInACampaign() which retrieves the length of the biggest campaign.
- setBasicLoadingTaskMethods() which sets basic events for some loading tasks which shares common features
- getHelp() which displays the user guide as an HTML page once the button is clicked.
- saveorprintSelected() which allows the user to save or print a particular graph
- updateCampaign() method updates the currently selected campaign given new filters.
- onChartTypeComboBoxChanges() which gets the selected chart type and sets the model to that selected type.

In the MainModel class, changes have been made to recognise outlier values:

- computeMean() and getStdDev() are there to calculate the average datapoint and compute how far each data point is from the average, respectively.
- setOutliers recognises the data points that exceed the average by a distance greater than a multiple of stdDev.

In the CampaignTab class,

- getSelected() returns the selected campaign in the table
- getDatabaseID() method gets the campaignID. The getShouldShowCampaign method returns a boolean value as to whether a campaign is shown or not.

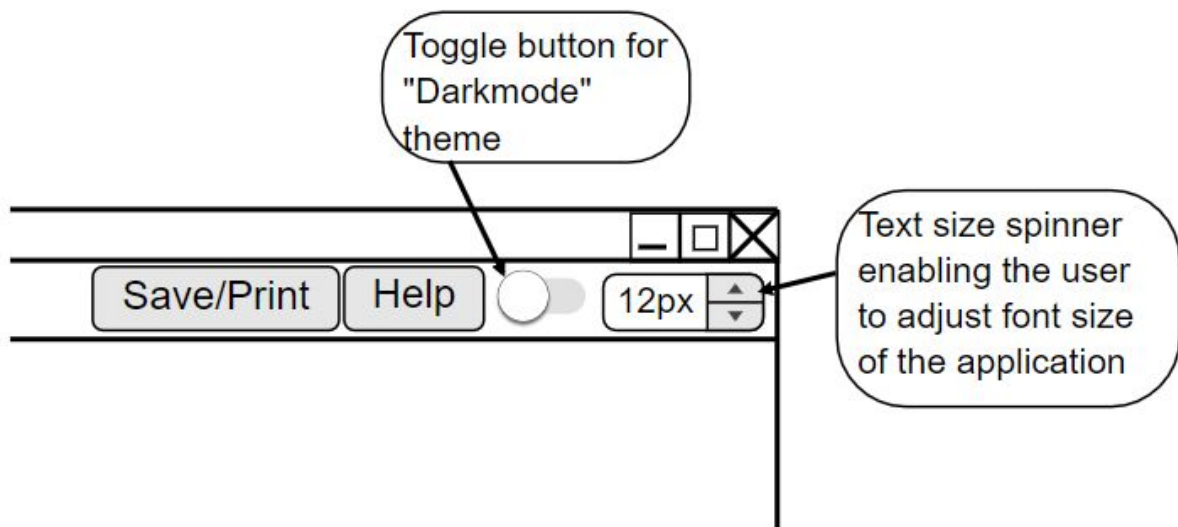
A new class has been added to the Controller part of the program-

NewChartWindowDialogController which has methods setChartAttributes() and addSeries(). This class is responsible for displaying the chart upon the selection of the 'Open New Window For Chart' button.

- The setChartAttributes() method determines the chart's x-axis scale, whereas the addSeries() method displays the data in the chart.

The SQL class too, has also been modified with the `deleteDatabase()` method so that a database can be deleted.

Because the settings options we originally planned on implementing had been narrowed down to just dark-mode theme functionality and changing font size on the application, we thought it no longer made sense to have an entire window open for just these two options. So instead we decided it was more intuitive to add them to the toolbar at the top of the application.



During the development of this increment, we decided that as we were only going to allow the user to select a set of different text sizes, it didn't make sense to have a spinner for this functionality. Instead we decided it was more intuitive to have a combo box showing the users which text sizes are available.

How we responded to feedback

GREEN = We have responded and made the changes suggested

RED = We didn't make the changes

The key is included to make it easier to see which responses we acted on and which ones we didn't have time to and the reasons behind this.

Feedback	How we responded
Remove the 0 data value from the line graphs.	We have removed the useless 0 data value from the graphs effected as recommended from our last increment feedback.
Use tooltips to show values of the histogram and charts	We added tooltips to our histogram and line graphs. This allows you to see the exact value of the metric selected at that specific point without having to work it out.
Change numbers to days of week / hours of day	We managed to react to the comment and have changed this so the client can now observe the data in a way that makes sense relatively.
Grey out time granularity when not needed	To guide users away from errors we have greyed out the time granularity when it is not used, for example when the graph is switched to hours per day it is not applicable.
Take graph out of window and compare the filters	Speaking to our supervisor Tom in our weekly sprint he suggested that when we pop out a graph, in order to compare it, that the current state is the one that is popped instead of a dynamic one that changes. We have acted on this and have implemented it this way so it is clear for the user.
Change custom bounce definition to include an option for number of pages visited	We responded to this bit of feedback by making sure that our custom bounce feature matched the specification accurately and offered the user the option of the number of pages visited and time spent on the ad.
Make writing bigger	We have tried to make this deliverable report much more concise and easier to read for our clients. We did this by keeping our graphical images and making our writing bigger and not in huge paragraphs.
Change SQL manager to h2	We chose not to change manager to h2. There are a few reasons for this: <ul style="list-style-type: none">• Our 2 week campaign only takes 15-19 seconds on our most high end device• Switching to h2 also caused a lot of complicated queries to have to be re-written as some of the functions we used were no longer supported.• The reason behind this was mainly due to the change in date type.

	<p>Overall we had to sit down and work out our time management and priorities and due to the short amount of time we had to come to the conclusion that saving a short amount of time was not worth the time that we could have put elsewhere into the program.</p> <p>This is something that if we were to do a similar project would look at doing from the start.</p>
Add a user option to set the strictness of the outlier definitions.	After speaking to our Supervisor/Client in our weekly sprint meeting he decided that it would be a good idea to allow the user to set the number of standard deviations away from the mean counts for an outlier instead of having it set to a default 2. Therefore we added this to our program.
Save state when program is closed	Our program now works by keeping the database file that was previously created so that when you close and reopen the software the client has access straight away to the campaign they were working on.
Custom bounce text size	We changed the size of the font of this feature so that it matched the aesthetic of the rest of our program.
Testing	See below to see what we did differently from the previous increment.

Testing

The biggest complaint we received from our supervisors/clients in the last increment was how we went around testing. While our user acceptance tests were good, our unit tests were severely lacking. We also were told to incorporate more testing methods and tools, such as code coverage and scenario testing.

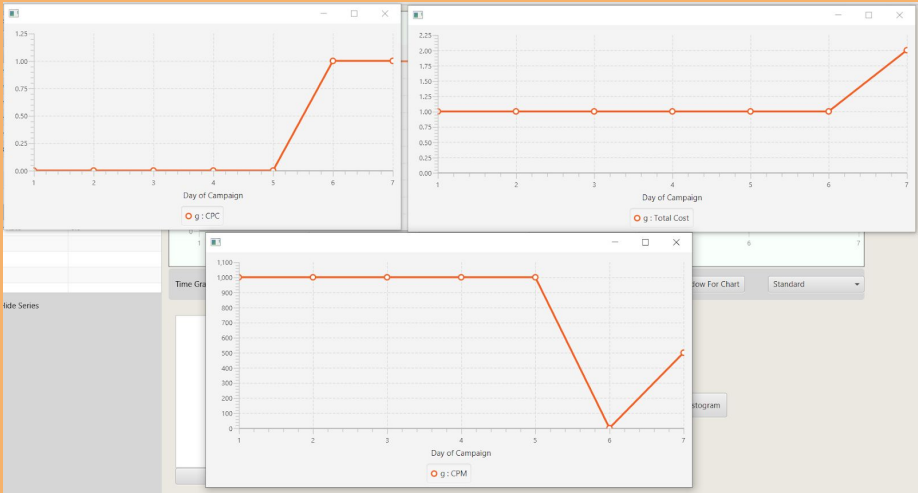
Our unit tests this time round were split into different units that ran individually. This allowed us to see exactly what went wrong upon running the tests instead of having to go through the testing code to figure out the error. We did unit tests for all MainModel functionality involving querying, filters, bounce rates and calculating outlier values.

As well as improving our unit tests dramatically, we improved our user acceptance testing by incorporating scenario testing by using hypothetical scenarios involving our personas from envisioning.

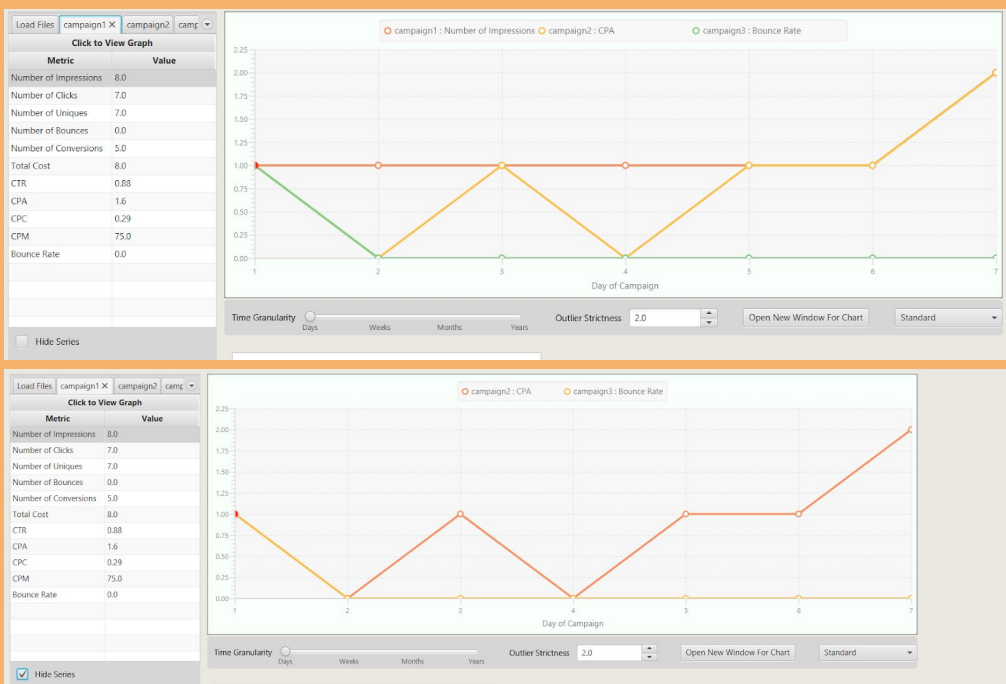
Test Number	Related User Stories	Test Criteria and scenarios	Test type	Result
1.1	21	TEST CRITERIA - Campaign Manager can create a new campaign tab. - Campaign Manager can select “open new window for chart” to create a new window that displays the data that was currently seen on the chart. - Campaign Manager can do this many times to produce as many new windows as they like. SCENARIOS One of our personas Lucy may wish to view different filters applied to the same campaign to view trends in the campaign such as what gender was most drawn in by this campaign or what age groups were more inclined to click the advertisements. This information will help her in managing the process of future campaigns. Another one of our personas Kiara may wish to use this feature to learn of the successes and failures of the campaign, hence helping her learn how to improve her campaign designs in the future.	Validation	Pass
2.1	24	TEST CRITERIA - Head of Communication can create multiple new campaign tabs. -The series for all graphs created will appear on the chart. SCENARIOS Derek may wish to use this feature to compare the success of one agency's campaigns with the success of another agency. This will allow him to communicate ideas and information about improving campaigns back to his clients so they can have more success in the future.	Validation	Pass

		<p>Kiara may also wish to use this feature to compare the success of one campaign with the success of another. This can allow her to better understand what makes a campaign work and what can cause it to be less successful.</p>		
2.2	24	<p>TEST CRITERIA</p> <p>-Head of Communication can create multiple new campaign tabs. -Head of Communication can try to create a campaign with an ID that is already in use, and should then receive an error message alerting him of this fact.</p> <p>SCENARIOS</p> <p>Derek may try to load in 2 campaigns which have the same identifier. He would then receive an error message telling him this is not allowed. He could then change the identifier so that it is unique.</p>	Erroneous	Pass
2.3	24	<p>TEST CRITERIA</p> <p>-Head of Communication can create multiple new campaign tabs. -Head of Communication can choose to hide a certain campaign so that it does not appear on the chart.</p> <p>SCENARIOS</p> <p>Kiara may wish to see certain trends between a number of specific campaigns while ignoring other campaigns. With the ability to simply hide campaigns, she can easily do just that.</p>	Validation	Pass
2.4	24	<p>TEST CRITERIA</p> <p>-Head of Communication can create multiple new campaign tabs. -Head of Communication can choose to delete a tab, therefore deleting the campaign and its database from the device</p> <p>SCENARIOS</p> <p>Kiara may be done inspecting a certain campaign and may wish to delete it to clear space and clean up her interface.</p>	Validation	Pass
3.1	28	<p>TEST CRITERIA</p> <p>-Head of Communication can click on settings and can alter the font and colours of the application.</p> <p>SCENARIOS</p> <p>Given Derek's beliefs about the importance of a good GUI, he would like to be able to tailor his viewing experience to match his desires.</p> <p>Due to Harold's colour blindness, he also would like the ability to alter the font sizes and GUI colours so that he doesn't have to strain himself when potentially using the application.</p>	Validation	Pass
4.1	29	<p>TEST CRITERIA</p> <p>-Campaign Manager can create a new campaign tab</p>	Validation	Pass

		<p>-The data points shown on screen will be indicated as red if a point is deemed to be an outlier</p> <p>SCENARIOS</p> <p>Lucy may want to be able to quickly identify what days of the campaign had outlier values and what days of the week may have more significant differences to others.</p>		
4.2	29	<p>TEST CRITERIA</p> <p>-Campaign Manager can change the “strictness” of what is deemed an outlier, where a lower strictness indicates a value is more likely to be deemed an outlier.</p> <p>SCENARIOS</p> <p>Lucy may want to be able to change what is deemed an outlier to be able to see smaller deviations from the normal trends.</p>	Validation	Pass
5.1	30	<p>TEST CRITERIA</p> <p>-Campaign Manager can click the help button to bring up a text based description of how to use the application..</p> <p>SCENARIOS</p> <p>Lucy would want here colleagues to easily be able to use the application with minimal training and difficulty.</p> <p>Since Joanne has trouble using technology at times, she would likely run into scenarios where she is stuck as to what to do to perform a certain task. She would appreciate the ability to get help at the push of a button without needing to bother her colleagues.</p>	Validation	Pass
6.1	None as this feature was requested by our client during increment 3	<p>TEST CRITERIA</p> <p>-Campaign Manager can create multiple new campaign tabs.</p> <p>-They can then shut the application down without deleting some of them</p> <p>-Campaign Manager can restart the application</p> <p>-Any campaigns that were not deleted last time the application was shut down and are still in the application directory will be automatically loaded back up</p> <p>SCENARIOS</p> <p>Lucy may want to shut down the application and return to it later, without needing to select all the files and create the databases again.</p> <p>Joanne may accidentally shut down the application without meaning to. She would then like to reopen the application and have all here data still be there.</p>	Validation	Pass

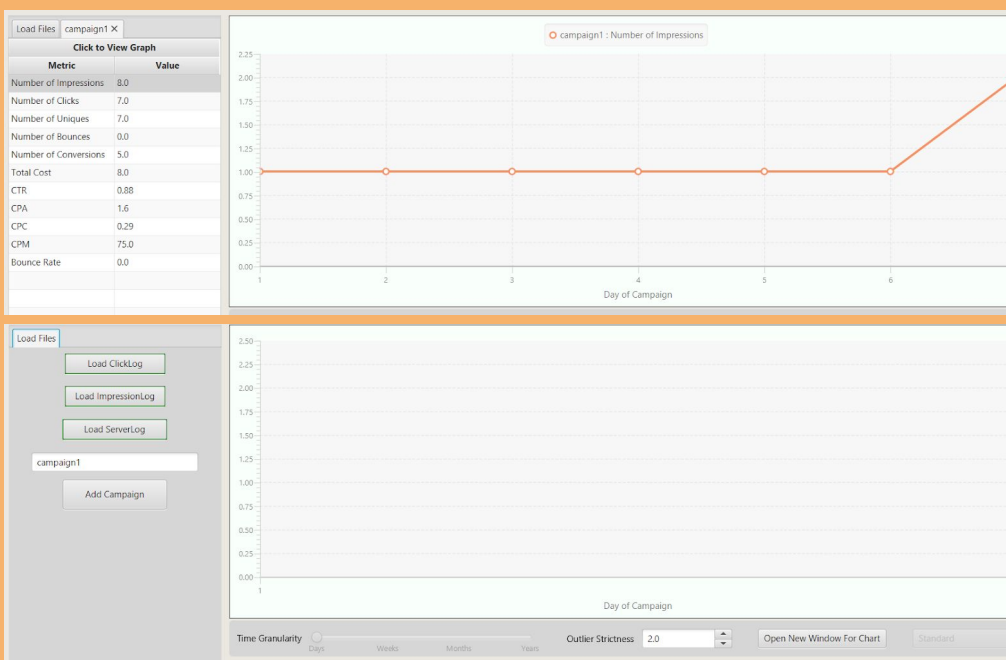
Test Number	Screenshots/Results	Description
1.1		<p>Pressing the button very simply copies the current grid and all its points. Any further changes made to the grid after it has been copied do not affect the new window. It is entirely isolated from the main scene.</p> <p>As shown by the screenshot, you can keep making new windows with different displays for comparing different trends.</p>
2.1		<p>Inputting valid data for creating a new campaign will successfully create a new tab which can be manipulated as an individual campaign with its own filters and metrics.</p> <p>As shown in the image, all 3 campaigns currently selected metric are shown on the same main chart.</p>
2.2		<p>As shown in the image, when attempting to add a campaign with an ID that is already in use, an error message is returned to the user.</p>

2.3



As shown by the left images, the green series on the chart represents campaign 1. When the “hide series” button is selected at the bottom of the tab for campaign 1, the green series vanishes from the chart and is removed from the legend at the top.

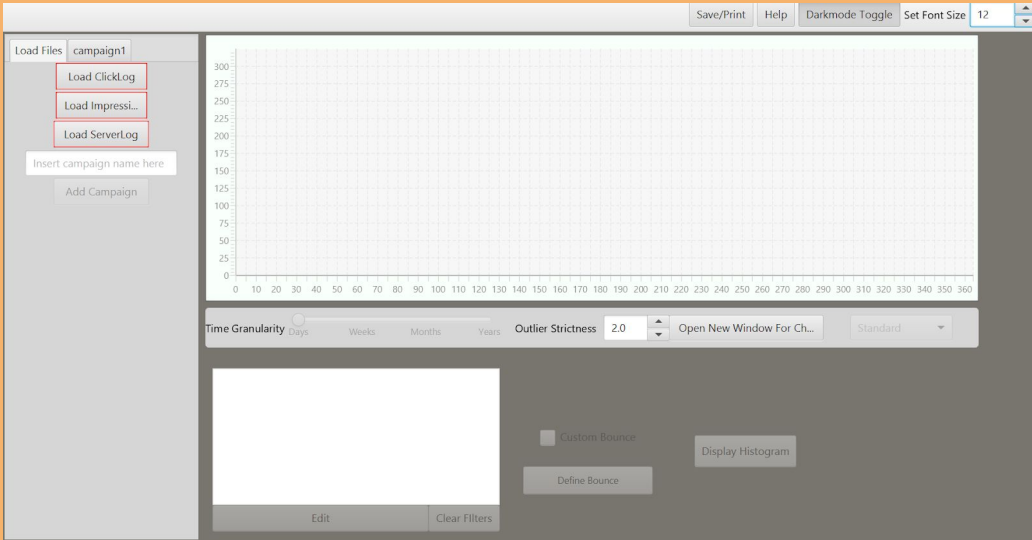
2.4



The first image on the left shows campaign 1 as the only campaign. When the “x” button next to it on the tab pane is clicked, it removes campaign 1 from the chart and deletes its tab.

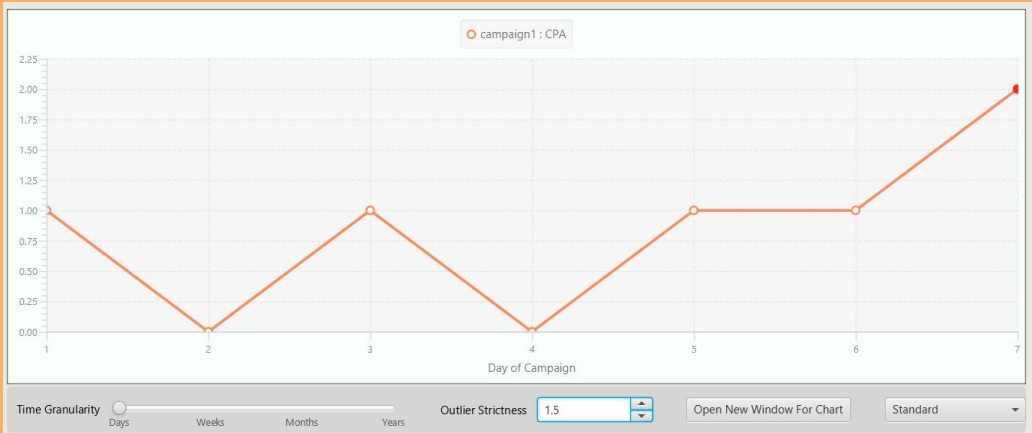
The database for campaign 1 is also removed from the directory.

3.1



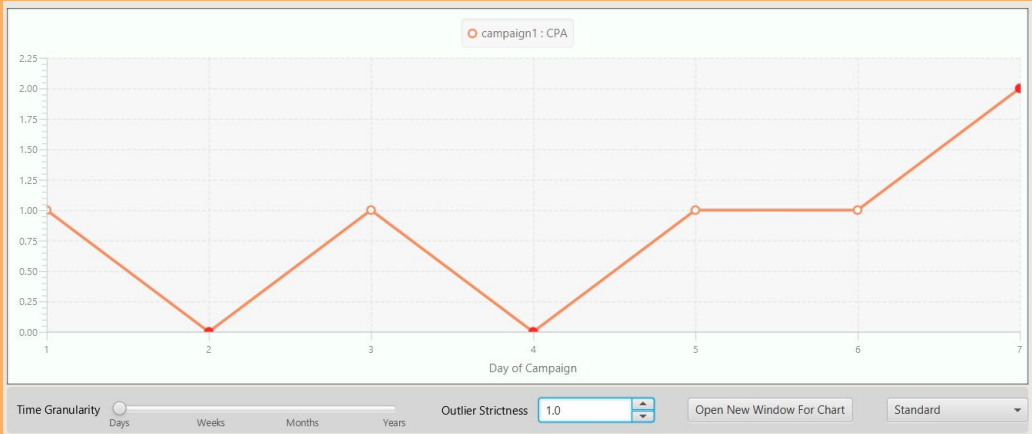
Clicking the Darkmode button does cause the background to darken. Changing the font size changes the size of every word on the application.

4.1



In the image you can see that the final point for day 7 is highlighted in red. This indicates that it is deemed an outlier by the current level of "strictness".

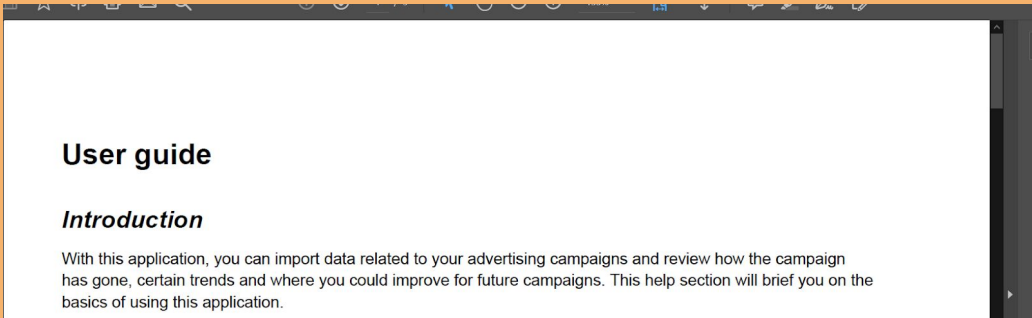
4.2



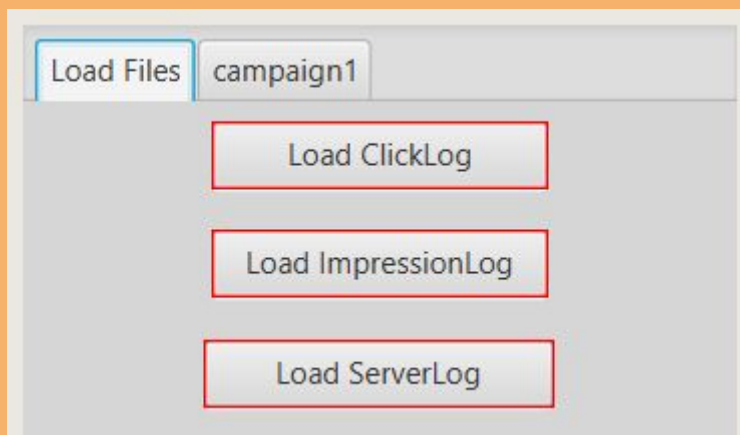
This image is similar to the image for test 4.1, except the strictness has been now set from 1.5 to 1.

This has resulted in the points for day 2 and 4 also being deemed outliers as they are now outside the range that determines whether or not a value is an outlier.

5.1



Clicking the "help" button will automatically bring up a PDF document explaining how to use the application.



After shutting down the campaign with only campaign 1 still up and then loading the application again, campaign 1 was automatically loaded back up into the application.

While hard to display this functionality in an image, it will be shown in better detail in the video.

Unit Testing

As mentioned above the main change we made to our unit tests is grouping them into sections as can be seen here:

▼ ✓ MainModelTest (Model)	110 ms
✓ testBaseMetricValues	37 ms
✓ testBaseMetricValuesWithDateFilters	5 ms
✓ testBaseMetricValuesWithOtherFilters	6 ms
✓ testChangesInBounceRate	12 ms
✓ testGraphPointValues	7 ms
✓ testGraphPointValuesOnPerDayOfWeekGraph	3 ms
✓ testGraphPointValuesOnPerDayOfWeekGraphWithFilters	6 ms
✓ testGraphPointValuesOnPerHourOfDayGraphWithFilters	15 ms
✓ testGraphPointValuesOnPerHoursOfDayGraph	2 ms
✓ testGraphPointValuesWithDateFilters	9 ms
✓ testGraphPointValuesWithOtherFilters	4 ms
✓ testOutliers	4 ms

Test	Short Description
testBaseMetricValues	Test basic static totals/averages of each metric that are displayed on the side when you load a campaign
testBaseMetricValuesWithDateFilters	This tests the basic metrics with a date filter. It uses a dateBefore and a dateAfter example to make sure both work.
testBaseMetricValuesWithOtherFilters	This tests the basic metrics with the other filters. It uses an example of every filter to test all cases.
testChangesInBounceRate	This test changes numerous bounce attributes and then checks whether the changes observed are expected.
testGraphPointValues	This tests the individual graph points that are found on the graph to make sure that all points are exactly correct.
testGraphPointValuesWithDateFilters	This tests the same as above with a date filter. It uses

	a dateBefore and a dateAfter example to make sure both work.
testGraphPointValuesWithOtherFilters	This tests the same as above with the other filters. It uses an example of every filter to test all cases.
testGraphPointValuesOnPerHoursOfDayGraph	This changes the chart type to “Per Hour of Day” and performs similar tests to the testGraphPointValues.
testGraphPointValuesOnPerDayOfWeekGraph	This changes the chart type to “Per Day of Week” and performs similar tests to the testGraphPointValues.
testGraphPointValuesOnPerDayOfWeekGraphWithFilters	This tests the same “Per Day of Week” chart but with random filters now applied.
testGraphPointValuesOnPerHourOfDayGraphWithFilters	This tests the same “Per Hour of Day” chart but with random filters now applied.
testOutliers	This final test tests for whether the outliers have been correctly identified within the graph. It does this by testing different strictness values on manually created graph points.

Code Coverage

18% classes, 25% lines covered in 'all classes in scope'			
Element	Class, %	Method, % ▼	Line, %
META-INF	100% (0/0)	100% (0/0)	100% (0/0)
Model	100% (3/3)	82% (34/41)	85% (252/296)
View	14% (1/7)	5% (2/36)	3% (5/154)
Controller	0% (0/11)	0% (0/111)	0% (0/560)
Launcher	0% (0/1)	0% (0/1)	0% (0/2)

100% classes, 85% lines covered in package 'Model'			
Element	Class, %	Method, % ▼	Line, %
SQL	100% (1/1)	85% (6/7)	79% (79/99)
MainModel	100% (1/1)	84% (22/26)	87% (155/177)
GraphPoint	100% (1/1)	75% (6/8)	90% (18/20)

Above shows the code coverage for our unit tests that are displayed above. As you can see the unit tests were used to test mainly the model as this is where the numbers are calculated and where this type of testing is most effective.

We managed to cover 85% of the lines within the section and 100% of all the classes.

Scenarios

Scenario 1

1. Derek is working in a company and he is responsible for its marketing. The company currently is working with a new tool for analyzing the performance of companies. Derek opens it to get familiar with it.
2. On the screen pops up a window where Derek has to browse through file directories and find the latest campaign and then press the **Add Campaign** button.
3. The tool shows an error message because he did not put a name of the campaign, he fixes this problem and imports it.
4. After all the data is imported he starts with analysing the campaign.

Scenario 2

1. Lucy is a campaign manager and now is working on a tool for analysing the performance of online marketing campaigns. She and his team have done all the requirements about functionality so they are improving now the user experience. To achieve this they are testing and getting familiar with the tool.
2. She adds the campaign and filters the results by different metrics- number of bounces, number of uniques etc.
3. Lucy is mostly happy with the application`s design, but for her it is an extremely important user experience and she decides to think how to improve it.
4. She is firmly resolved to customise the appearance of the application and to be able directly to compare metrics or charts with different filters applied to them.

Planning

USER STORIES RELATED TO THIS INCREMENT (For reference purposes only)

21 - Directly compare metrics or charts with different filters applied to them	As a Campaign Manager I want to be able to compare numerous metrics and charts side by side with different filters applied so that I can compare different data to discover trends and contrasts.
24 - Load and compare data from multiple campaigns	As a Head of Communication of the Marketing Agency I want to be able to load data from multiple campaigns so that I can compare the effectiveness and success of different advertising campaigns that my agency has made.
28 - Customise the appearance of the application	As a Head of Communication of the Marketing Agency I want to be able to customise the appearance of the application so that I can use the application despite mine or my client(s) visual impairments.
29 - Ability of the system to identify outlier values	As a Campaign Manager of the Client I want to be able to see outlier values on charts so that I can easily identify data points that may skew the plots.
30 - A main GUI Interface with clear instructions on how to use it	As a Campaign Manager of the Client I want to use a GUI interface that is easy to use, and has clear instructions that explain how to utilise all of its features so that it takes me and my peers minimal time to learn how to use them.

Increment 3 Complete Burndown chart

