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SER316

Task 1

Size

- 1) 22539 lines of code
- 2) EventsManager.java has 329 lines
- 3) It uses method 1 where every statement counts for 1. It won't count any white space.

Cohesion

- 1) The definition of LCOM2 gives a number that defines which class has increased encapsulation and decreased complexity which means it would have the likelihood of less errors. The formula it uses is $1 - \frac{\sum(mA)}{m \cdot a}$ which takes the sum of the number of methods that access a variable divided by the multiplication of number of methods and the number of variables in the class. It subtracts it from one to give a percentage.
- 2) The ones that have the highest cohesion is the interface classes like TaskList.java and NoteList.java. But the one with the lowest percentage given was the HistoryItem.java with 0.333. The reason I believe they are because they don't have many variables being used in the methods (or in the case of the interface classes none).

Complexity

- 1) The mean is 1.746
- 2) The EventsManager.java is the most complex class and it is 2.5
- 3) I changed the ProjectImpl.java file. I commented out some of the if statements which reduced the mean for it from 2.133 to 1.933. I commented out line 130. I understand that it reduced the number because it has less branches in the code so it is less complex.

Package-level Coupling

- 1) Afferent coupling is the number of classes in other packages that depend upon classes within the package. Efferent coupling is the number of classes in other packages that the classes in a package depend upon.
- 2) The main.java.memoranda.util is the worst with a value at 57.
- 3) The main.java.memoranda.ui is the worst with a value of 49.

Worst quality

- 1) I would say the worst class is the EventsManager because I feel complexity is one of the hardest to figure out all outcomes due to its overuse of branches. I don't know how it compares to a traditional java program but it was the highest using this metric.

| Metric | Total | Mean | Std. Dev. | Maxim... | Resource causing Maximum | Method |
|--|-------|--------|-----------|----------|---|--------------------|
| > McCabe Cyclomatic Complexity (avg/max per | | 2.239 | 2.852 | 42 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | setTableProperties |
| > Number of Parameters (avg/max per method) | | 0.928 | 1.097 | 9 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | setImageProperties |
| > Nested Block Depth (avg/max per method) | | 1.39 | 0.955 | 8 | /SER316-Spring-2018/src/main/java/memoranda/Not... | getNotesForPeriod |
| > Afferent Coupling (avg/max per packageFragm | | 19.333 | 19.653 | 57 | /SER316-Spring-2018/src/main/java/memoranda/util | |
| > Efferent Coupling (avg/max per packageFragm | | 11.444 | 15.276 | 49 | /SER316-Spring-2018/src/main/java/memoranda/ui | |
| > Instability (avg/max per packageFragment) | | 0.36 | 0.247 | 0.778 | /SER316-Spring-2018/src/main/java/memoranda/ui | |
| > Abstractness (avg/max per packageFragment) | | 0.111 | 0.137 | 0.333 | /SER316-Spring-2018/src/main/java/memoranda/date | |
| > Normalized Distance (avg/max per packageFra | | 0.529 | 0.237 | 1 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Depth of Inheritance Tree (avg/max per type) | | 2.652 | 1.934 | 6 | /SER316-Spring-2018/src/main/java/memoranda/ui/J... | |
| > Weighted methods per Class (avg/max per ty | 3251 | 14.135 | 25.532 | 242 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Children (avg/max per type) | 60 | 0.261 | 1.405 | 16 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Overridden Methods (avg/max per | 59 | 0.257 | 0.691 | 4 | /SER316-Spring-2018/src/main/java/memoranda/ui/T... | |
| > Lack of Cohesion of Methods (avg/max per ty | | 0.262 | 0.398 | 1.2 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Attributes (avg/max per type) | 1326 | 5.765 | 14.118 | 101 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Static Attributes (avg/max per ty | 136 | 0.591 | 1.793 | 12 | /SER316-Spring-2018/src/main/java/memoranda/Tas... | |
| > Number of Methods (avg/max per type) | 1269 | 5.517 | 6.833 | 42 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Static Methods (avg/max per type) | 183 | 0.796 | 2.51 | 17 | /SER316-Spring-2018/src/main/java/memoranda/Eve... | |
| > Specialization Index (avg/max per type) | | 0.15 | 0.487 | 5 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Classes (avg/max per packageFrag | 230 | 25.556 | 29.833 | 92 | /SER316-Spring-2018/src/main/java/memoranda/ui | |
| > Number of Interfaces (avg/max per packageFra | 16 | 1.778 | 3.292 | 11 | /SER316-Spring-2018/src/main/java/memoranda | |
| > Number of Packages | 9 | | | | | |
| > Total Lines of Code | 22534 | | | | | |
| > Method Lines of Code (avg/max per method) | 15632 | 10.766 | 28.22 | 346 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | jblnit |

After

| Metric | Total | Mean | Std. Dev. | Maxim... | Resource causing Maximum | Method |
|--|-------|--------|-----------|----------|---|--------------------|
| ▼ McCabe Cyclomatic Complexity (avg/max per | | 2.241 | 2.851 | 42 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | setTableProperties |
| > src | | 2.241 | 2.851 | 42 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | setTableProperties |
| > Number of Parameters (avg/max per method) | | 0.928 | 1.097 | 9 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | setImageProperties |
| > Nested Block Depth (avg/max per method) | | 1.39 | 0.955 | 8 | /SER316-Spring-2018/src/main/java/memoranda/Not... | getNotesForPeriod |
| > Afferent Coupling (avg/max per packageFragm | | 21.6 | 20.011 | 57 | /SER316-Spring-2018/src/main/java/memoranda/util | |
| > Efferent Coupling (avg/max per packageFragm | | 10.6 | 14.263 | 49 | /SER316-Spring-2018/src/main/java/memoranda/ui | |
| > Instability (avg/max per packageFragment) | | 0.335 | 0.243 | 0.778 | /SER316-Spring-2018/src/main/java/memoranda/ui | |
| > Abstractness (avg/max per packageFragment) | | 0.172 | 0.301 | 1 | /SER316-Spring-2018/src/main/java/memoranda/inte... | |
| > Normalized Distance (avg/max per packageFra | | 0.522 | 0.251 | 1 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Depth of Inheritance Tree (avg/max per type) | | 2.652 | 1.934 | 6 | /SER316-Spring-2018/src/main/java/memoranda/ui/J... | |
| > Weighted methods per Class (avg/max per typ | 3254 | 14.148 | 25.54 | 242 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Children (avg/max per type) | 60 | 0.261 | 1.405 | 16 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Overridden Methods (avg/max per | 59 | 0.257 | 0.691 | 4 | /SER316-Spring-2018/src/main/java/memoranda/ui/t... | |
| ▼ Lack of Cohesion of Methods (avg/max per typ | | 0.262 | 0.398 | 1.2 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| ▼ src | | 0.262 | 0.398 | 1.2 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > main.java.memoranda.ui.htmleditor | | 0.255 | 0.419 | 1.2 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > main.java.memoranda.ui | | 0.408 | 0.449 | 1.1 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > main.java.memoranda.ui.table | | 0.383 | 0.383 | 0.767 | /SER316-Spring-2018/src/main/java/memoranda/ui/t... | |
| > main.java.memoranda | | 0.127 | 0.237 | 0.679 | /SER316-Spring-2018/src/main/java/memoranda/Tas... | |
| > main.java.memoranda.util | | 0.065 | 0.183 | 0.643 | /SER316-Spring-2018/src/main/java/memoranda/util... | |
| > main.java.memoranda.ui.treetable | | 0.157 | 0.241 | 0.571 | /SER316-Spring-2018/src/main/java/memoranda/ui/t... | |
| > main.java.memoranda.ui.htmleditor.file | | 0.167 | 0.236 | 0.5 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > main.java.memoranda.date | | 0.133 | 0.189 | 0.4 | /SER316-Spring-2018/src/main/java/memoranda/dat... | |
| > main.java.memoranda.interfaces | | 0 | 0 | 0 | /SER316-Spring-2018/src/main/java/memoranda/inte... | |
| > main.java.memoranda.ui.htmleditor.ut | | 0 | 0 | 0 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Attributes (avg/max per type) | 1326 | 5.765 | 14.118 | 101 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Static Attributes (avg/max per type) | 136 | 0.591 | 1.793 | 12 | /SER316-Spring-2018/src/main/java/memoranda/inte... | |
| > Number of Methods (avg/max per type) | 1269 | 5.517 | 6.833 | 42 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Static Methods (avg/max per type) | 183 | 0.796 | 2.51 | 17 | /SER316-Spring-2018/src/main/java/memoranda/Eve... | |
| > Specialization Index (avg/max per type) | | 0.15 | 0.487 | 5 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Classes (avg/max per packageFragm | 230 | 23 | 28.174 | 92 | /SER316-Spring-2018/src/main/java/memoranda/ui | |
| > Number of Interfaces (avg/max per packageFri | 16 | 1.6 | 3.169 | 11 | /SER316-Spring-2018/src/main/java/memoranda/inte... | |
| > Number of Packages | 10 | | | | | |
| > Total Lines of Code | 22586 | | | | | |
| > Method Lines of Code (avg/max per method) | 15637 | 10.769 | 28.219 | 346 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | jblnit |

8) The Afferent Coupling and the Efferent coupling changed. One decreased and the other one increased. So, there are more classes that depend on more of a certain package and less of a package that depend on other classes. So, while one changed for the better, the other changed for the worse.

Task 3

- 1) I saw in the TaskImpl class there was a method getStatus that was kind of long and saw there was two If statements that return to ITasks.ACTIVE. So, I cut out three lines of the one if statement and added another condition to the first if statement that will keep the program working the same. The change is at line 149 with lines 159-161 being commented out. I also feel that this could be categorized as Duplicate code since two if statements had the same potential outcome.
- 2) In the EventsManager class file, I noticed one of the methods had 8 parameters with some being similar that I created a new class to handle some of the data. The

parameters were so long of course it could not be shown on one line so it almost looked like variables for the methods and not parameters being sent. I created a new class called Time handles variables with hour, minute, and period. Now I had to look outside the main.java.memoranda package to find where the method would be called. It was called in the main.java.memoranda.ui package in the EventsPanel class. This would fall in the Long Parameter List and Primitive Obsession.

| Metric | Total | Mean | Std. Dev. | Maxim... | Resource causing Maximum | Method |
|---|-------|--------|-----------|----------|--|---------------------------|
| ▼ McCabe Cyclomatic Complexity (avg/max per | | 2.234 | 2.846 | 42 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | setTableProperties |
| ▼ src | | 2.234 | 2.846 | 42 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | setTableProperties |
| > main.java.memoranda.ui.htmleditor | | 3.179 | 4.735 | 42 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | setTableProperties |
| > main.java.memoranda.ui.table | | 2.586 | 5.062 | 28 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | compareRowsByColumn |
| > main.java.memoranda.ui | | 2.133 | 2.349 | 23 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | apply |
| > main.java.memoranda | | 2 | 1.722 | 16 | /SER316-Spring-2018/src/main/java/memoranda/Eve... | getRepeatableEventsFor... |
| > main.java.memoranda.util | | 2.299 | 1.864 | 10 | /SER316-Spring-2018/src/main/java/memoranda/util/... | unpack |
| > main.java.memoranda.ui.treetable | | 1.778 | 1.441 | 8 | /SER316-Spring-2018/src/main/java/memoranda/ui/t... | merge |
| > main.java.memoranda.ui.htmleditor.file | | 3.286 | 1.979 | 7 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | accept |
| > main.java.memoranda.date | | 1.273 | 0.617 | 4 | /SER316-Spring-2018/src/main/java/memoranda/dat... | equals |
| > main.java.memoranda.ui.htmleditor.uti | | 2.5 | 1.5 | 4 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | getString |
| > main.java.memoranda.interfaces | | 1 | 0 | 1 | /SER316-Spring-2018/src/main/java/memoranda/inte... | getID |
| > Number of Parameters (avg/max per method) | | 0.927 | 1.089 | 9 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | setImageProperties |
| > Nested Block Depth (avg/max per method) | | 1.389 | 0.954 | 8 | /SER316-Spring-2018/src/main/java/memoranda/Not... | getNotesForPeriod |
| > Afferent Coupling (avg/max per packageFragm | | 21.6 | 20.011 | 57 | /SER316-Spring-2018/src/main/java/memoranda/util | |
| > Efferent Coupling (avg/max per packageFragm | | 10.6 | 14.263 | 49 | /SER316-Spring-2018/src/main/java/memoranda/ui | |
| > Instability (avg/max per packageFragment) | | 0.335 | 0.243 | 0.778 | /SER316-Spring-2018/src/main/java/memoranda/ui | |
| > Abstractness (avg/max per packageFragment) | | 0.172 | 0.301 | 1 | /SER316-Spring-2018/src/main/java/memoranda/inte... | |
| > Normalized Distance (avg/max per packageFra | | 0.522 | 0.251 | 1 | /SER316-Spring-2018/src/main/java/memoranda/inte... | |
| > Depth of Inheritance Tree (avg/max per type) | | 2.645 | 1.933 | 6 | /SER316-Spring-2018/src/main/java/memoranda/ui/J... | |
| > Weighted methods per Class (avg/max per typ | 3260 | 14.113 | 25.486 | 242 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Children (avg/max per type) | 60 | 0.26 | 1.403 | 16 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Overridden Methods (avg/max per | 59 | 0.255 | 0.69 | 4 | /SER316-Spring-2018/src/main/java/memoranda/ui/t... | |
| > Lack of Cohesion of Methods (avg/max per ty | | 0.264 | 0.398 | 1.2 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > src | | 0.264 | 0.398 | 1.2 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Attributes (avg/max per type) | 1329 | 5.753 | 14.088 | 101 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Static Attributes (avg/max per type | 136 | 0.589 | 1.79 | 12 | /SER316-Spring-2018/src/main/java/memoranda/inte... | |
| > Number of Methods (avg/max per type) | 1276 | 5.524 | 6.818 | 42 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Static Methods (avg/max per type) | 183 | 0.792 | 2.505 | 17 | /SER316-Spring-2018/src/main/java/memoranda/Eve... | |
| > Specialization Index (avg/max per type) | | 0.149 | 0.486 | 5 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | |
| > Number of Classes (avg/max per packageFragi | 231 | 23.1 | 28.201 | 92 | /SER316-Spring-2018/src/main/java/memoranda/ui | |
| > Number of Interfaces (avg/max per packageFri | 16 | 1.6 | 3.169 | 11 | /SER316-Spring-2018/src/main/java/memoranda/inte... | |
| > Number of Packages | 10 | | | | | |
| > Total Lines of Code | 22612 | | | | | |
| > Method Lines of Code (avg/max per method) | 15644 | 10.722 | 28.159 | 346 | /SER316-Spring-2018/src/main/java/memoranda/ui/... | jblnit |

4 The Complexity of the code decreased since I made those two code smell changes but probably was the first change since I got rid of one if statement. It was the general mean was 2.241 before but now it is 2.234 so it changed for the better.