Brandon Light
SER316 Spring B 2018

Assignment 7

Task 1

Size

1. There are **22539** lines of code in the project.
2. The largest single code file is **AppFrame.java** and it has **945** lines of code.
3. It seems like it counts lines with actual code/characters on them and skips lines that only contain whitespace.

Cohesion

1. m Number of methods in a class
   a Number of variables in a class
   mA Number of methods that access a variable
   sum(mA) Sum of mA over attributes of a class

   Calculation for LCOM2 = $1 - \text{sum}(mA)/(m * a)$

2. The class with the lowest Lack of Cohesion (High Cohesion) is **TaskListImpl.java**. If I were to guess why, I would say that it's because the number of methods out of the total number of methods is relatively high in addition to there being fewer variables.

Complexity

1. The mean cyclomatic complexity of the main package is **1.746**
2. The class with the worst average McCabe CC is **EventsManager.java** with a mean value of **2.5**.
3. I changed the **compareTo()** method in **TaskImpl.java**. I adjusted the method so that instead of having three if-statements to determine the return value, it calculates the difference between the two rates and returns the difference divided by itself. This will always return a -1, 0, or 1—exactly the same as it would with the if-statements. This small change replaced three paths with one, reducing the complexity from **1.919** to **1.865**—a difference of **0.054**.

Coupling

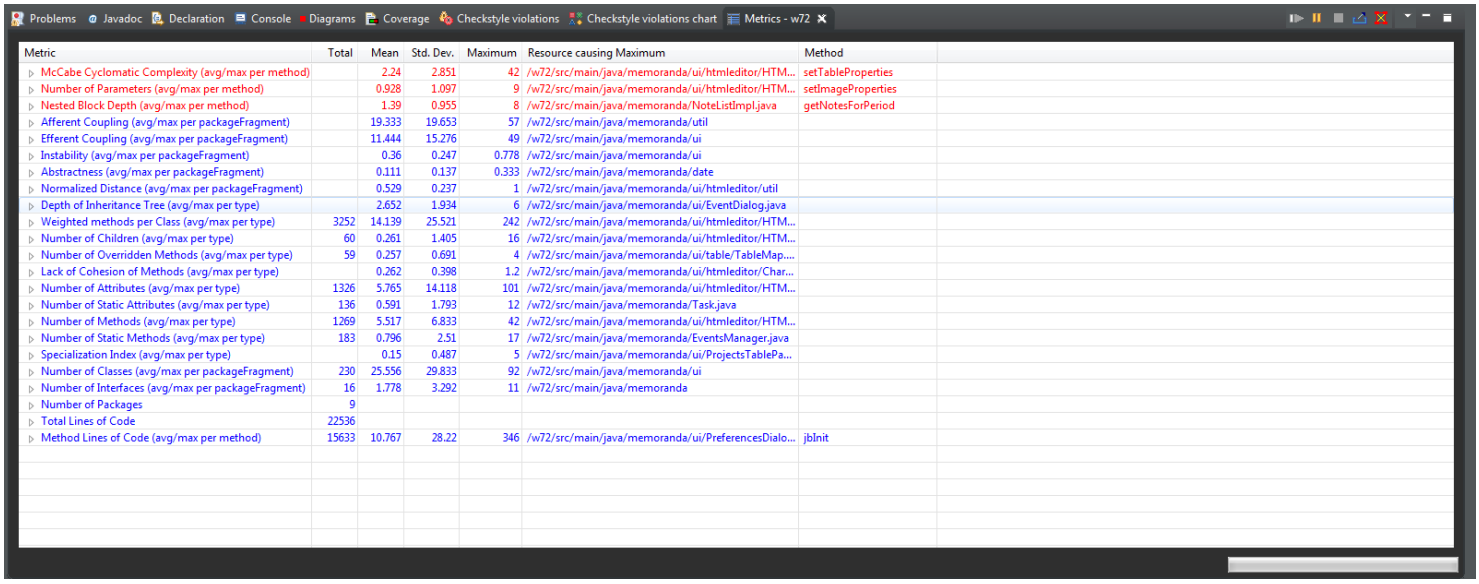
1. Afferent Coupling is the number of classes outside of a given package that depend on classes inside the given package.
   Efferent Coupling is the number of classes outside of a given package that the classes inside of the given package depend on.
2. **main.java.memoranda.util** has the worst Afferent Coupling value at **57**.
3. **main.java.memoranda.ui** has the worst Efferent Coupling value at **49**.

Worst Quality

I'd say that the **EventsManager** class is the worst quality class in the main.java.memoranda package due to its high Cyclomatic Complexity. When the CC is high, there are more paths the program must take, increasing the difficulty in readability and the possibility of defects being injected, as well as decreasing the efficiency of the program.

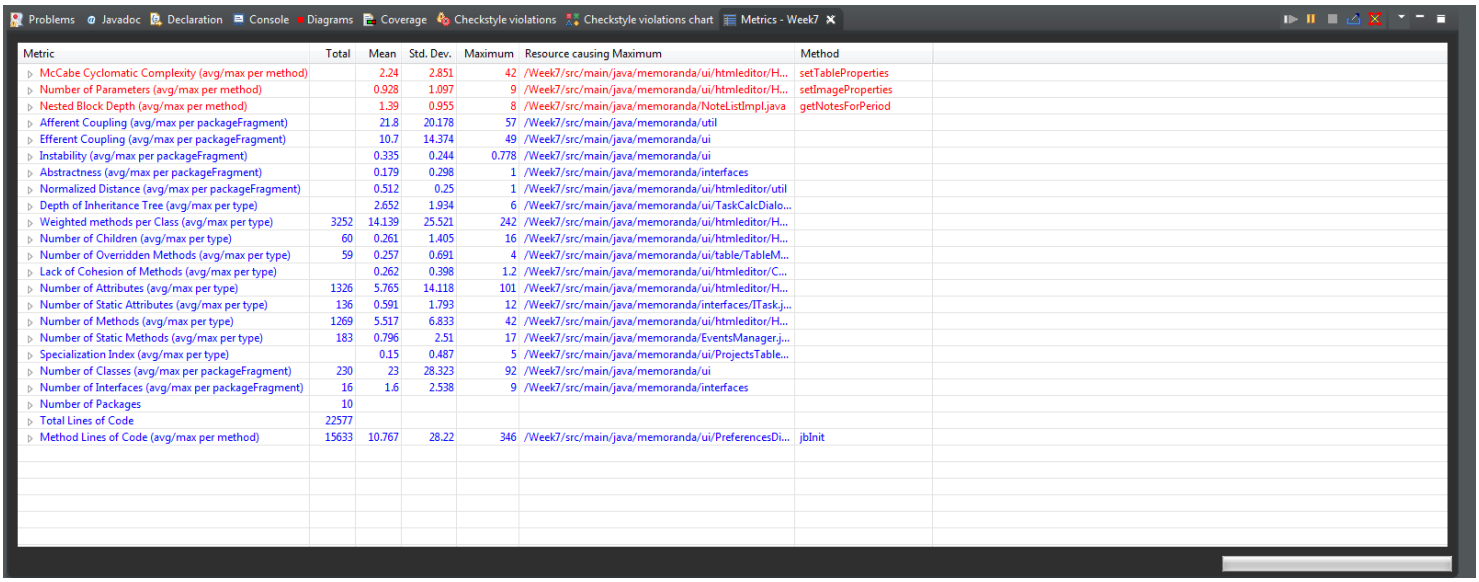
Task 2

Before:



Metric	Total	Mean	Std. Dev.	Maximum	Resource causing Maximum	Method
McCabe Cyclomatic Complexity (avg/max per method)		2.24	2.851	42	/w72/src/main/java/memoranda/ui/htmleditor/HTM...	setTableProperties
Number of Parameters (avg/max per method)		0.928	1.097	9	/w72/src/main/java/memoranda/ui/htmleditor/HTM...	setImageProperties
Nested Block Depth (avg/max per method)		1.39	0.955	8	/w72/src/main/java/memoranda/NoteListImpl.java	getNotesForPeriod
Afferent Coupling (avg/max per packageFragment)		19.333	19.653	57	/w72/src/main/java/memoranda/util	
Efferent Coupling (avg/max per packageFragment)		11.444	15.276	49	/w72/src/main/java/memoranda/ui	
Instability (avg/max per packageFragment)		0.36	0.247	0.778	/w72/src/main/java/memoranda/ui	
Abstractness (avg/max per packageFragment)		0.111	0.137	0.333	/w72/src/main/java/memoranda/date	
Normalized Distance (avg/max per packageFragment)		0.529	0.237	1	/w72/src/main/java/memoranda/ui/htmleditor/util	
Depth of Inheritance Tree (avg/max per type)		2.652	1.934	6	/w72/src/main/java/memoranda/ui/EventDialog.java	
Weighted methods per Class (avg/max per type)	3252	14.139	25.521	242	/w72/src/main/java/memoranda/ui/htmleditor/HTM...	
Number of Children (avg/max per type)	60	0.261	1.405	16	/w72/src/main/java/memoranda/ui/htmleditor/HTM...	
Number of Overridden Methods (avg/max per type)	59	0.257	0.691	4	/w72/src/main/java/memoranda/ui/table/TableMap....	
Lack of Cohesion of Methods (avg/max per type)		0.262	0.398	1.2	/w72/src/main/java/memoranda/ui/htmleditor/Char...	
Number of Attributes (avg/max per type)	1326	5.765	14.118	101	/w72/src/main/java/memoranda/ui/htmleditor/HTM...	
Number of Static Attributes (avg/max per type)	136	0.591	1.793	12	/w72/src/main/java/memoranda/Task.java	
Number of Methods (avg/max per type)	1269	5.517	6.833	42	/w72/src/main/java/memoranda/ui/htmleditor/HTM...	
Number of Static Methods (avg/max per type)	183	0.796	2.51	17	/w72/src/main/java/memoranda/EventsManager.java	
Specialization Index (avg/max per type)		0.15	0.487	5	/w72/src/main/java/memoranda/ui/ProjectsTablePa...	
Number of Classes (avg/max per packageFragment)	230	25.556	29.833	92	/w72/src/main/java/memoranda/ui	
Number of Interfaces (avg/max per packageFragment)	16	1.778	3.292	11	/w72/src/main/java/memoranda	
Number of Packages	9					
Total Lines of Code	22536					
Method Lines of Code (avg/max per method)	15633	10.767	28.22	346	/w72/src/main/java/memoranda/ui/PreferencesDialo...	jbInit

After:



Metric	Total	Mean	Std. Dev.	Maximum	Resource causing Maximum	Method
McCabe Cyclomatic Complexity (avg/max per method)		2.24	2.851	42	/Week7/src/main/java/memoranda/ui/htmleditor/H...	setTableProperties
Number of Parameters (avg/max per method)		0.928	1.097	9	/Week7/src/main/java/memoranda/ui/htmleditor/H...	setImageProperties
Nested Block Depth (avg/max per method)		1.39	0.955	8	/Week7/src/main/java/memoranda/NoteListImpl.java	getNotesForPeriod
Afferent Coupling (avg/max per packageFragment)		21.8	20.178	57	/Week7/src/main/java/memoranda/util	
Efferent Coupling (avg/max per packageFragment)		10.7	14.374	49	/Week7/src/main/java/memoranda/ui	
Instability (avg/max per packageFragment)		0.335	0.244	0.778	/Week7/src/main/java/memoranda/ui	
Abstractness (avg/max per packageFragment)		0.179	0.298	1	/Week7/src/main/java/memoranda/interfaces	
Normalized Distance (avg/max per packageFragment)		0.512	0.25	1	/Week7/src/main/java/memoranda/ui/htmleditor/util	
Depth of Inheritance Tree (avg/max per type)		2.652	1.934	6	/Week7/src/main/java/memoranda/ui/TaskCalcDialo...	
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Lack of Cohesion of Methods (avg/max per type)		0.262	0.398	1.2	/Week7/src/main/java/memoranda/ui/htmleditor/C...	
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Number of Classes (avg/max per packageFragment)	230	23	28.323	92	/Week7/src/main/java/memoranda/ui	
Number of Interfaces (avg/max per packageFragment)	16	1.6	2.538	9	/Week7/src/main/java/memoranda/interfaces	
Number of Packages	10					
Total Lines of Code	22577					
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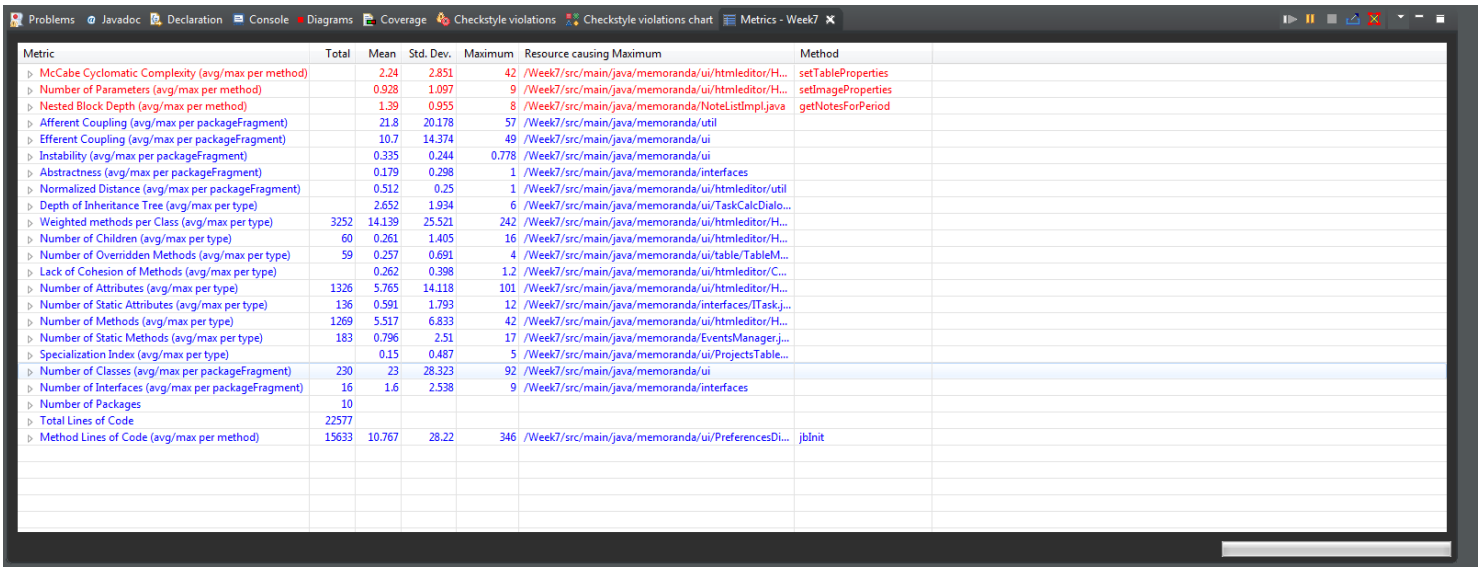
After refactoring, a few of the metrics improved. Most did not. The Efferent Coupling decreased due to the refactoring. The Afferent Coupling increased.

Task 3

1. I altered **ProjectManager.java**. There were two methods, getActiveProjects and getActiveProjectsNumber that used virtually identical code. I made it so that getActiveProjectsNumber returned the size of the vector returned by getActiveProjects.



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My refactoring did not change any of the metrics.