Assignment 7 – Refactoring/Metrics

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Task 1: Evaluate Metrics

Size

1. What is the Total Lines of Code (LOC) in the project?

   22539 LOC

2. What is the largest single code file in the project and its Total LOC?

   HTMLEditor.java with 2144 LOC

3. Inspect CurrentNote.java – what method did the Metrics tool use to determine Total LOC? Describe the method.

   They did not count blank lines or comments when determining the LOC in the file.

Cohesion

1. The tool calculates "Lack of Cohesion of Methods" (LCOM) using the HendersonSellers method, or what is commonly referred to as LCOM2 (there are LCOM1 through LCOM4 and different methods to calculate them). What is the definition of LCOM2 and how is it calculated? (there are different methods used to calculate LCOM2).

   LCOM2 is measuring how far a class is from cohesion. It is calculated by measuring the degree in which the methods share the fields.

2. Which class has the highest Cohersion and do you have an idea why?

   CharTablePanel.java

Complexity

1. What is the cyclomatic complexity in the main package?
   1.746

2. What class has, on average, the worst McCabe Cyclomatic Complexity (CC) and what is it?
   In the main package, Start.java has the worst CC that is 3.5

3. Go back to your code and reduce the Cyclomatic Complexity. You can choose any class but the Cyclomatic Complexity needs to be reduced at least by a small amount somewhere. Explain what you changed and why, and why it reduced the complexity and how much you were able to reduce the complexity.

Package-Level Coupling

1. What do Afferent and Efferent coupling mean? Look these terms up on Wikipedia and summarize the distinction.

   Afferent coupling basically calculates the number of classes that are in other packages that depend on classes within its package. Efferent coupling is very similar. It calculates the number of classes in other packages that the classes in the package depend on.

2. What package has the worse Afferent Coupling measure and what is the value?

   The 'util' package has the worst with 57

3. What package has the worse Efferent Coupling measure and what is the value?

   The 'ui' package has the worst with 49

Worst Quality

I think the ProjectPackager.java has the worst quality because not only does it belong to the worst Afferent coupling package, it has the highest Cyclomatic Complexity in the package as well.

Task 2: Eclipse Refactorings

Metric	Total	Mean	Std. Dev.	Maximum	Resource causing Maximum	Method
McCabe Cyclomatic Complexity (avg/max per method)		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 packageFragment)		19.333	19.653	57	/SER316-Spring-2018/src/main/java/memoranda/util	
Efferent Coupling (avg/max per packageFragment)		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 packageFragment)		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 type)	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 type)	59	0.257	0.691	4	/SER316-Spring-2018/src/main/java/memoranda/ui/t...	
Lack of Cohesion of Methods (avg/max per type)		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 type)	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 packageFragment)	230	25.556	29.833	92	/SER316-Spring-2018/src/main/java/memoranda/ui	
Number of Interfaces (avg/max per packageFragment)	16	1.778	3.292	11	/SER316-Spring-2018/src/main/java/memoranda	
Number of Packages	9					
Total Lines of Code	22539					
Method Lines of Code (avg/max per method)	15637	10.769	28.219	346	/SER316-Spring-2018/src/main/java/memoranda/ui/...	jbInit

After

Metric	Total	Mean	Std. Dev.	Maximum	Resource causing Maximum	Method
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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 packageFragment)		21.6	20.011	57	/SER316-Spring-2018/src/main/java/memoranda/util	
Efferent Coupling (avg/max per packageFragment)		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 packageFragment)		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...	
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Number of Classes (avg/max per packageFragment)	230	23	28.174	92	/SER316-Spring-2018/src/main/java/memoranda/ui	
Number of Interfaces (avg/max per packageFragment)	16	1.6	3.169	11	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Number of Packages	10					
Total Lines of Code	22586					
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Compare Results:

The only Metric I see that changed from before to after refactoring the code is the "Abstractness." It changed from 0.333 initially to 1 after the code was refactored. I think this changed because although we still have all the same files, we moved the interfaces into another package.

Task 3: Find Code Smells and Refactor

1. Smell: Switch Statements
   Class: NotesControlPanel.java
   Located in: main.java.memoranda.ui

   The code had a switch statement for getting what 'tabbedPane' was selected. I changed this smell into if statements. If statements will work the same way but are not considered a smell. I left the smell there just commented out and refactored the code using If statements above it.

2. Smell: Too short identifiers
   Class: TaskDialog.java and ProjectDialog.java
   Located in: main.java.memoranda.ui

   The code smells was having too short of an identifier. These two classes used the same block of code for getting date values. In order to fix this smell, the identifier will need to be changed to something longer and more meaningful. I fixed this smell by changing the identifiers from 'sd' and 'ed' to 'stDate' and 'edDate' respectively.

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Number of Packages	10					
Total Lines of Code	22584					
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Compare

Between this and the last Metrics check, there has not been any changes or at least any changes that I can tell. One of my code smells was changing from switch statements to If statements. And the other was identifiers that were too short. These changes did not seem to change anything in terms of Metrics for the program.