

Assignment 7: Refactoring

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Task 1

Size

1. 2,187 lines of code in main.java.memoranda
2. The largest single code file in main.java.memoranda is EventsManageg.java with 329 lines of code.
3. CurrentNote.java is measured with Method 2. All lines of codes and comments are accounted for.

Cohesion

1. LCOM2 averages the percentages of methods that don't access an attribute over all attributes in a class. $LCOM2 = 1 - \frac{\text{sum}(\text{numMethodsAccessVariable})}{(\text{numMethods} * \text{numVariables})}$
2. HistoryItem.java class has the highest cohesion as there are only 2 variables and 3 methods. 1 method accesses both variables and the other 2 methods access each variable independently.

Complexity

1. The cyclomatic complexity in the main package is 1.746
2. Start.java has the worst cyclomatic complexity at 3.5
3. I tried reducing the if statements on line 103 of ResourcesListImpl.java by combining the two if statements into one if AND statement. This however had no effect on reducing the complexity of the class.

Package-level Coupling

1. Afferent coupling measures other package's dependency on the classes within the package being evaluated. Efferent coupling measures the dependency, of the classes in the package being evaluated, on classes in other packages.
2. main.java.memoranda.util has the worst Afferent Coupling. 57 external classes are dependent on this package.
3. main.java.mumoranda.ui has the worst Efferent Coupling. 49 classes are dependent on external packages.

Worst Quality:

I made this determination based solely on the main.java.memoranda package.

TaskListImpl.java has both a high LCOM and a high cyclomatic complexity. It is highly likely that there are areas of opportunity to reduce the code complexity of this class while increasing the cohesion of the classes attributes and methods.

Task 2

Before

Metric	Total	Mean	Std. ...	Maximum	Resource causing Maximu...	Method
› McCabe Cyclomatic Complexity (avg/...		2.241	2.851	42	/SER316-Spring-2018-mas...	setTableProperties
› Number of Parameters (avg/max per ...		0.928	1.097	9	/SER316-Spring-2018-mas...	setImageProperties
› Nested Block Depth (avg/max per me...		1.39	0.955	8	/SER316-Spring-2018-mas...	getNotesForPeriod
› Afferent Coupling (avg/max per pack...		19.3...	19.653	57	/SER316-Spring-2018-mas...	
› Efferent Coupling (avg/max per pack...		11.4...	15.276	49	/SER316-Spring-2018-mas...	
› Instability (avg/max per packageFrag...		0.36	0.247	0.778	/SER316-Spring-2018-mas...	
› Abstractness (avg/max per packageFi...		0.111	0.137	0.333	/SER316-Spring-2018-mas...	
› Normalized Distance (avg/max per p...		0.529	0.237	1	/SER316-Spring-2018-mas...	
› Depth of Inheritance Tree (avg/max p...		2.652	1.934	6	/SER316-Spring-2018-mas...	
› Weighted methods per Class (avg/ma...	3254	14.1...	25.54	242	/SER316-Spring-2018-mas...	
› Number of Children (avg/max per typ...	60	0.261	1.405	16	/SER316-Spring-2018-mas...	
› Number of Overridden Methods (avg/...	59	0.257	0.691	4	/SER316-Spring-2018-mas...	
› Lack of Cohesion of Methods (avg/m...		0.262	0.398	1.2	/SER316-Spring-2018-mas...	
› Number of Attributes (avg/max per t...	1326	5.765	14.118	101	/SER316-Spring-2018-mas...	
› Number of Static Attributes (avg/ma...	136	0.591	1.793	12	/SER316-Spring-2018-mas...	
› Number of Methods (avg/max per ty...	1269	5.517	6.833	42	/SER316-Spring-2018-mas...	
› Number of Static Methods (avg/max...	183	0.796	2.51	17	/SER316-Spring-2018-mas...	
› Specialization Index (avg/max per ty...		0.15	0.487	5	/SER316-Spring-2018-mas...	
› Number of Classes (avg/max per pac...	230	25.5...	29.833	92	/SER316-Spring-2018-mas...	
› Number of Interfaces (avg/max per p...	16	1.778	3.292	11	/SER316-Spring-2018-mas...	
› Number of Packages	9					
› Total Lines of Code	22539					
› Method Lines of Code (avg/max per ...	15637	10.7...	28.219	346	/SER316-Spring-2018-mas...	jblnit

After

Metric	Total	Mean	Std. ...	Maximum	Resource causing Maximu...	Method
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› Nested Block Depth (avg/max per me...		1.39	0.955	8	/SER316-Spring-2018-mas...	getNotesForPeriod
› Afferent Coupling (avg/max per pack...		21.6	20.011	57	/SER316-Spring-2018-mas...	
› Efferent Coupling (avg/max per pack...		10.6	14.263	49	/SER316-Spring-2018-mas...	
› Instability (avg/max per packageFrag...		0.335	0.243	0.778	/SER316-Spring-2018-mas...	
› Abstractness (avg/max per packageFi...		0.172	0.301	1	/SER316-Spring-2018-mas...	
› Normalized Distance (avg/max per p...		0.522	0.251	1	/SER316-Spring-2018-mas...	
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› Method Lines of Code (avg/max per ...	15637	10.7...	28.219	346	/SER316-Spring-2018-mas...	jblnit

8. Efferent coupling was reduced from 11.2 to 10.6. This was because there is now an entire package that is not dependent on other packages. It added more dependency to the main package that implements the interfaces. But since that main package already had plenty of external dependencies, the overall Efferent coupling was reduced by adding another package to hold all of the interfaces.

Task 3

1. main.java.memoranda/EventImpl.java getStartDate() method. The code smell here was too short of identifier. The local variable for the Attribute object was a single letter "a". This makes the code difficult to follow on lengthier implementations. I adjusted the variable name to be "attr" to make it easier to follow within this method.
2. I would consider refactoring the NoteImpl.java and or the CalendarDate.java. The CalendarDate.java is in another package though. NoteImpl.java's compareTo method references multiple methods linked together. This could likely get simplified by modifying the type of date format stored by the program. I did not implement a fix for this code smell as I was unable to determine a solution to implement.
3. After:

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› Number of Interfaces (avg/max per p	16	1.6	3.169	11	/SER316-Spring-2018-mas...	
› Number of Packages	10					
› Total Lines of Code	22577					
› Method Lines of Code (avg/max per	15630	10.7...	28.229	346	/SER316-Spring-2018-mas...	jblnit

4. There were no changes made based on the code smell I identified therefore the metrics did not change.