

Task 1

Size

1. 2187
2. EventsManager.java | 329
3. Method 1, it counted each statement, but it also counted the ending curly brace that are on their own line, unlike Dr. Gary.

Cohesion

1. The definition of LCOM2 is the percentage of methods that do not access a specific attribute averaged over all attributes in the class. The range is [0,2], anything >=1 indicates a class with a problem in regards to lack of cohesion. It is calculated by

$$LCOM2 = 1 - \frac{\sum(m * A)}{m * a}$$

Where m – number of methods in the class, a – number of variables in the class, mA – number of methods that access a variable, sum(mA) sum of mA over attributes of a class.

- 2.

Complexity

1. 1.746
2. Start.java | 3.5
3. In EventsManager.java on line 288 I removed if (y == null) { return null; } because it isn't totally necessary, if y is null then m should be null so the conditional is not necessary and it reduced the complexity from 3.353 to 3.294 on the class.

Package-level Coupling

1. Afferent coupling is a metric on the number of class in other packages that depend upon the classes within the current package (it's an indicator of a package's responsibility). Efferent Coupling is the number of classes in other packages that the classes in a package depend on (an indicator of the packages dependence on external packages). They are opposites. Afferent coupling is the number of outside packages that depend on this certain package, while efferent is the number of outside packages that are depended upon for this certain package.
2. Main.java.memoranda.util has the worst Afferent Coupling at 57.
3. And main.java.memoranda.ui is the package with the highest efferent coupling at 49

Task 2

The screenshot shows the Eclipse IDE with the file `EventsManager.java` open. The code includes a method `createRepeatableEvent` and a `getDay` method. Below the code, the Metrics table for `main.java.memoranda` is displayed.

Metric	Total	Mean	Std. Dev.	Maximum	Resource causing Maximum	Method
▶ McCabe Cyclomatic Complexity (avg/max per...		1.743	1.545	16	/SER316-Spring-2018/src/main/java/memoranda/Eve...	getRepeatableEventsFor...
▶ Number of Parameters (avg/max per method)		0.675	1.004	8	/SER316-Spring-2018/src/main/java/memoranda/Eve...	createRepeatableEvent
▶ Nested Block Depth (avg/max per method)		0.997	0.945	8	/SER316-Spring-2018/src/main/java/memoranda/Not...	getNotesForPeriod
▶ Affluent Coupling	34					
▶ Effluent Coupling	21					
▶ Instability	0.382					
▶ Abstractness	0.275					
▶ Normalized Distance	0.343					
▶ Depth of Inheritance Tree (avg/max per type)		0.854	0.607	2	/SER316-Spring-2018/src/main/java/memoranda/Eve...	
▶ Weighted methods per Class (avg/max per type)	584	14.244	16.016	71	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Number of Children (avg/max per type)	23	0.561	1.624	10	/SER316-Spring-2018/src/main/java/memoranda/Proj...	
▶ Number of Overridden Methods (avg/max per...	3	0.073	0.341	2	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Lack of Cohesion of Methods (avg/max per type)		0.093	0.211	0.679	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Number of Attributes (avg/max per type)	30	0.732	1.037	4	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Number of Static Attributes (avg/max per type)	46	1.122	2.549	12	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Number of Methods (avg/max per type)	274	6.683	7.687	37	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Number of Static Methods (avg/max per type)	61	1.488	3.768	17	/SER316-Spring-2018/src/main/java/memoranda/Eve...	
▶ Specialization Index (avg/max per type)		0.05	0.308	2	/SER316-Spring-2018/src/main/java/memoranda/Star...	
▶ Number of Classes	41					
▶ Number of Interfaces	11					
▶ Total Lines of Code	2184					
▶ Method Lines of Code (avg/max per method)	1257	3.752	5.21	33	/SER316-Spring-2018/src/main/java/memoranda/Eve...	getRepeatableEventsFor...

AFTER main.java.memoranda

The screenshot shows the Eclipse IDE with the file `EventImpl.java` open. The code includes a package declaration, imports, and a class `EventImpl` that implements `IEvent` and `Comparable`. Below the code, the Metrics table for `main.java.memoranda` is displayed.

Metric	Total	Mean	Std. Dev.	Maximum	Resource causing Maximum	Method
▶ McCabe Cyclomatic Complexity (avg/max per...		2.029	1.735	16	/SER316-Spring-2018/src/main/java/memoranda/Eve...	getRepeatableEventsFor...
▶ Number of Parameters (avg/max per method)		0.707	1.009	8	/SER316-Spring-2018/src/main/java/memoranda/Eve...	createRepeatableEvent
▶ Nested Block Depth (avg/max per method)		1.38	0.841	8	/SER316-Spring-2018/src/main/java/memoranda/Not...	getNotesForPeriod
▶ Affluent Coupling	31					
▶ Effluent Coupling	16					
▶ Instability	0.34					
▶ Abstractness	0					
▶ Normalized Distance	0.66					
▶ Depth of Inheritance Tree (avg/max per type)		1.167	0.373	2	/SER316-Spring-2018/src/main/java/memoranda/Eve...	
▶ Weighted methods per Class (avg/max per type)	491	16.367	17.776	71	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Number of Children (avg/max per type)	0	0	0	0	/SER316-Spring-2018/src/main/java/memoranda/Eve...	
▶ Number of Overridden Methods (avg/max per...	3	0.1	0.396	2	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Lack of Cohesion of Methods (avg/max per type)		0.127	0.237	0.679	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Number of Attributes (avg/max per type)	30	1	1.095	4	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Number of Static Attributes (avg/max per type)	29	0.967	2.008	7	/SER316-Spring-2018/src/main/java/memoranda/Eve...	
▶ Number of Methods (avg/max per type)	181	6.033	7.834	37	/SER316-Spring-2018/src/main/java/memoranda/Tas...	
▶ Number of Static Methods (avg/max per type)	61	2.033	4.278	17	/SER316-Spring-2018/src/main/java/memoranda/Eve...	
▶ Specialization Index (avg/max per type)		0.068	0.359	2	/SER316-Spring-2018/src/main/java/memoranda/Star...	
▶ Number of Classes	30					
▶ Number of Interfaces	0					
▶ Total Lines of Code	2061					
▶ Method Lines of Code (avg/max per method)	1257	5.194	5.485	33	/SER316-Spring-2018/src/main/java/memoranda/Eve...	getRepeatableEventsFor...

AFTER main.java.memoranda.interfaces

The screenshot shows the Eclipse IDE with the `EventImpl.java` file open. The file content is as follows:

```

20 * EventImpl.java
9 package main.java.memoranda;
10
11 import java.util.Calendar;
12
13 /**
14  *
15  */
16 /**Id: EventImpl.java,v 1.9 2004/10/06 16:00:11 ivanrise Exp $*/
17 public class EventImpl implements IEvent, Comparable {
18
19     private Element _element = null;
20
21     /**
22      * Constructor for EventImpl
23      */
24
25 }

```

Below the code editor, the Metrics table for `main.java.memoranda.interfaces` is displayed:

Metric	Total	Mean	Std. Dev.	Maximum	Resource causing Maximum	Method
McCabe Cyclomatic Complexity (avg/max per type)	1	0	0	1	/SER316-Spring-2018/src/main/java/memoranda/inte...	getID
Number of Parameters (avg/max per method)	0.591	0.986	7	/SER316-Spring-2018/src/main/java/memoranda/inte...	createTask	
Nested Block Depth (avg/max per method)	0	0	0	0	/SER316-Spring-2018/src/main/java/memoranda/inte...	getID
Afferent Coupling	45					
Efferent Coupling	8					
Instability	0.151					
Abstraction	1					
Normalized Distance	0.151					
Depth of Inheritance Tree (avg/max per type)	0	0	0	0	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Weighted methods per Class (avg/max per type)	93	8.455	6.972	25	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Number of Children (avg/max per type)	23	2.091	2.575	10	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Number of Overridden Methods (avg/max per type)	0	0	0	0	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Lack of Cohesion of Methods (avg/max per type)	0	0	0	0	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Number of Attributes (avg/max per type)	0	0	0	0	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Number of Static Attributes (avg/max per type)	17	1.545	3.602	12	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Number of Methods (avg/max per type)	93	8.455	6.972	25	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Specialization Index (avg/max per type)	0	0	0	0	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Number of Classes	11					
Number of Interfaces	11					
Total Lines of Code	157					
Method Lines of Code (avg/max per method)	0	0	0	0	/SER316-Spring-2018/src/main/java/memoranda/inte...	getID

8. Afferent Coupling changed for the better in regards to `main.java.memoranda`. Because now the Interfaces that are depended upon by other classes is the `main.java.memoranda.interfaces` responsibility.

Task 3

1. For the Code smell within a class I fixed The `EventManager.java` `#getRepeatableEventsForDate()` method, it was big and nasty. I removed the responsibility in that method of checking if a date belongs into `#checkIfEventBelongs()` to separate responsibilities and make it easier to read the `getRepeatableEventsForDate()` method. Other than that, it is naturally complicated to check on dates, so the method is still a bit long.
2. I noticed some Feature Envy in `TaskPanel.java` a long list of chained methods was being called on a `taskTable` instance in `TaskPanel`, so I moved it into a method `#getParentTaskId` in `TaskTable.java`. The comments explain it in `TaskPanel.java:613-625` & `TaskTable.java:239-244`
3. This is of the `src` package, because the code smells between classes that I refactored were in the `main.java.memoranda.ui` package. I was having a hard time finding smells in

main.java.memoranda. the After export is of the src package as well.

The screenshot shows the Eclipse IDE with the `CalendarDate.java` file open. The code defines a `CalendarDate` class with methods for setting year, month, and day, and a constructor. The `Package Explorer` on the left shows the project structure, including the `main.java.memoranda` package. The `Metrics` view at the bottom displays a table of code quality metrics.

Metric	Total	Mean	Std. Dev.	Maximum	Resource causing Maximum	Method
McCabe Cyclomatic Complexity (avg/max per method)	2.239	2.839		42	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	setTableProperties
Number of Parameters (avg/max per method)	0.928	1.097		9	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	setImageProperties
Nested Block Depth (avg/max per method)	1.39	0.953		8	/SER316-Spring-2018/src/main/java/memoranda/Not...	getNotesForPeriod
Afferent Coupling (avg/max per packageFrag...	21.6	20.011		57	/SER316-Spring-2018/src/main/java/memoranda/uti...	
Efferent Coupling (avg/max per packageFrag...	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 packageFrag...	0.522	0.251		1	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	
Depth of Inheritance Tree (avg/max per type)	2.652	1.934		6	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	
Weighted methods per Class (avg/max per type)	3255	14.152	25.541	242	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	
Number of Children (avg/max per type)	60	0.261	1.405	16	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	
Number of Overridden Methods (avg/max per type)	59	0.257	0.691	4	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	
Lack of Cohesion of Methods (avg/max per type)	0.262	0.398		1.2	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	
Number of Attributes (avg/max per type)	1326	5.765	14.118	101	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	
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)	1270	5.522	6.835	42	/SER316-Spring-2018/src/main/java/memoranda/ui/ht...	
Number of Static Methods (avg/max per type)	184	0.8	2.539	18	/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/P...	
Number of Classes (avg/max per packageFrag...	230	23	28.174	92	/SER316-Spring-2018/src/main/java/memoranda/ui...	
Number of Interfaces (avg/max per packageFrag...	16	1.6	3.169	11	/SER316-Spring-2018/src/main/java/memoranda/inte...	
Number of Packages	10					
Total Lines of Code	22590					
Method Lines of Code (avg/max per method)	15638	10.755	28.198	346	/SER316-Spring-2018/src/main/java/memoranda/ui/P... jblnit	

- After my refactoring the TaskPanel's efferent coupling measure should have gone down because I removed it's dependency on the TaskTable. For TaskTable it's Afferent coupling should have gone down due to the exact opposite.