**Dependency Metrics**

The dependency metrics are subdivided in Class Metrics, Interface Metrics and Package Metrics. Each one is composed by seven metrics (Package Metrics only have four metrics), which are *number of cyclic dependencies* (Cyclic), *number of dependencies* (Dcy), *number of transitive dependencies* (Dcy\*), *number of dependents* (Dpt), *number of transitive dependents* (Dpt\*), *number of package dependencies* (PDcy) and *number of dependent packages* (PDpt). The four Metrics that are a part of Package Metrics are Cyclic, PDcy, PDpt and PDpt\* (number of transitively dependent packages).

The chosen ones to be analised are Cyclic, Dcy and Dpt (in Class Metrics).

**Cyclic Metric**

The number of cyclic dependencies calculates the number of classes which each class directly or indirectly depends on, and which in turn directly or indirectly depend on it. This means that there is a cycle between two or more classes.

|  |  |  |
| --- | --- | --- |
| **Class** | **Value** | **Source path** |
| ArgumentProcessor | 784 | src/main/java/org/jabref/cli/ArgumentProcessor |
| AuxCommandLine | 784 | src/main/java/org/jabref/cli/AuxCommandLine |
| JabRefCLI | 784 | src/main/java/org/jabref/cli/JabRefCLI |
| ClipBoardManager | 784 | src/main/java/org/jabref/gui/ClipBoardManager |
| DefaultInjector | 784 | src/main/java/org/jabref/gui/DefaultInjector |

There are a lot of classes with high cyclic dependencies, these are just some exemples. This makes the system less maintable beacause understanding and testing the code is harder.

This might indicate the code smell Inappropriate Intimacy (when classes depend too much on each other).

**Dcy Metric**

Calculates the number of classes which each class directly depends on. A higher value means there are a lot of classes that can be changed and affect the class we are talking about.

|  |  |  |
| --- | --- | --- |
| **Class** | **Value** | **Source path** |
| JabRefFrame | 115 | src/main/java/org/jabref/gui/JabRefFrame |
| JabRefPreferences | 101 | src/main/java/org/jabref/preferences/JabRefPreferences |
| LayoutEntry | 86 | src/main/java/org/jabref/logic/layout/LayoutEntry |
| MedlineImporter | 66 | src/main/java/org/jabref/logic/importer/fileformat/MedlineImporter |
| ArgumentProcessor | 59 | src/main/java/org/jabref/cli/ArgumentProcessor |
| LibraryTab | 55 | src/main/java/org/jabref/gui/LibraryTab |

There are six classes with fifty or more dependencies. There are 115 that can affect JabRefFrame class when they are changed.

This might indicate the code smell Shotgun Surgery (when a change is done, and a lot of classes need to be touched). JabRef class is affected 115 other classes.

**Dpt Metric**

The number of dependents calculates the number of classes which directly depend on each class. A high value of dependents might indicate that there are a lot of classes needing changes.

|  |  |  |
| --- | --- | --- |
| **Class** | **Value** | **Source path** |
| BibEntry | 591 | src/main/java/org/jabref/model/entry/BibEntry |
| Localization | 392 | src/main/java/org/jabref/logic/l19n/Localization |
| StandardField | 322 | src/main/java/org/jabref/model/entry/field.StandartField |
| BibDatabaseContext | 256 | src/main/java/org/jabref/model/database/BibDatabaseContext |
| BibDatabase | 227 | src/main/java/org/jabref/model/database/BibDatabase |

There are five classes with 200 or more dependents, which is too much. For exemple, BibEntry have 591 classes depending on it.

This might indicate the code smell Shotgun Surgery (when a change is done, and a lot of classes need to be touched). BibEntry class affect 591 other classes.