In this document, we illustrate the clone classes duplication on one example.

We extract one clone class from NiCad results of Eclipse-ant system. Table I shows the NiCad results before applying the clone reduction procedure. The second column shows the XM file name that is generated by NiCad;

* “*src\_functions-clones-0.00-classes”* file shows the NiCad results at threshold 0%
* “*src\_functions-clones-0.10-classes”* file shows the NiCad results at threshold 10%
* “*src\_functions-clones-0.20-classes”* file shows the NiCad results at threshold 20%
* “*src\_functions-clones-0.30-classes”* file shows the NiCad results at threshold 30%.

Clone class column shows an extracted clone class form the corresponding file.

The following is a comparison of the clone classes characteristics:

1. All clone classes have 100% similarity
2. All clone class size is equal to 2
3. All clone fragment size is equal to 4 LOC
4. Now, we compare the first fragment’s characteristics:
   1. The start line is equal to 93
   2. The end line is equal to 95
   3. The fragment appears in the same file
   4. Therefore, we can conclude that the first fragment in CC-1, CC-2, CC-3, and CC-4 are equal
5. Now, we compare the second fragment’s characteristics:
   1. The start line is equal to 163
   2. The end line is equal to 165
   3. The second fragment appears in the same file
   4. Therefore, we can conclude that the second fragment in CC-1, CC-2, CC-3, and CC-4 are equal

Since the clone classes hold the same characteristics, then we can conclude that CC-1, CC-2, CC-3, and CC-4 are equivalent clone classes.

When we use our clone reduction procedure, we look for these equivalent clone classes and remove them from the higher threshold, and we keep only one instance of the clone classes at the lowest threshold.

For instance, the CC-1 appears at threshold 0%, the CC-2 appears at threshold 10% , the CC-3 appears at threshold 20% , and the CC-4 appears at threshold 30%, since CC-1, CC-2, CC-3, and CC-4 are equivalent clone classes, then we remove clone classes CC-2, CC-3, and CC-4 from the NiCad results because they are duplicated, and we keep only one instance of the clone class CC-1 at threshold 0% . CC-2, CC-3, and CC-4 disappear after applying the clone reduction procedure.

The results of applying the clone reduction procedure show no duplications between different NiCad clone results.

**Table I example of clone class duplication**

|  |  |  |
| --- | --- | --- |
| **Clone class** | **Filename** | **Clone class** |
| **CC-1** | src\_functions-clones-0.00-classes.xml | [<class similarity="**100**" nlines="**4**" nclones="**2**" classid="**1**">](file:///C:\Users\ewafhas\Documents\Thesis\publication\CloneReduction%20paper\open%20source%20Data\eclipse-ant-src_functions-clones-AfterRemovingDuplication\src_functions-clones-0.00-classes.xml)  <source startline="**93**" pcid="**44**" file="**/home/ewafhas/bellon-sources/systems/main/eclipse-ant/src/ant/BuildEvent.java**" endline="**95**"/>  <source startline="**163**" pcid="**54**" file="**/home/ewafhas/bellon-sources/systems/main/eclipse-ant/src/ant/BuildEvent.java**" endline="**165**"/>  </class> |
| **CC-2** | src\_functions-clones-0.10-classes.xml | [<class similarity="**100**" nlines="**4**" nclones="**2**" classid="**1**">](file:///C:\Users\ewafhas\Documents\Thesis\publication\CloneReduction%20paper\open%20source%20Data\eclipse-ant-src_functions-clones\src_functions-clones-0.10-classes.xml)  <source pcid="**44**" endline="**95**" startline="**93**" file="**/home/ewafhas/bellon-sources/systems/main/eclipse-ant/src/ant/BuildEvent.java**"/>  <source pcid="**54**" endline="**165**" startline="**163**" file="**/home/ewafhas/bellon-sources/systems/main/eclipse-ant/src/ant/BuildEvent.java**"/>  </class> |
| **CC-3** | src\_functions-clones-0.20-classes.xml | [<class similarity="**100**" nlines="**4**" nclones="**2**" classid="**1**">](file:///C:\Users\ewafhas\Documents\Thesis\publication\CloneReduction%20paper\open%20source%20Data\eclipse-ant-src_functions-clones\src_functions-clones-0.20-classes.xml)  <source pcid="**44**" endline="**95**" startline="**93**" file="**/home/ewafhas/bellon-sources/systems/main/eclipse-ant/src/ant/BuildEvent.java**"/>  <source pcid="**54**" endline="**165**" startline="**163**" file="**/home/ewafhas/bellon-sources/systems/main/eclipse-ant/src/ant/BuildEvent.java**"/>  </class> |
| **CC-4** | src\_functions-clones-0.30-classes.xml | [<class similarity="**100**" nlines="**4**" nclones="**2**" classid="**1**">](file:///C:\Users\ewafhas\Documents\Thesis\publication\CloneReduction%20paper\open%20source%20Data\eclipse-ant-src_functions-clones\src_functions-clones-0.30-classes.xml)  <source pcid="**44**" endline="**95**" startline="**93**" file="**/home/ewafhas/bellon-sources/systems/main/eclipse-ant/src/ant/BuildEvent.java**"/>  <source pcid="**54**" endline="**165**" startline="**163**" file="**/home/ewafhas/bellon-sources/systems/main/eclipse-ant/src/ant/BuildEvent.java**"/>  </class> |