



M2 INFORMATIQUE AIGLE

HMIN306

ÉVOLUTION ET RESTRUCTURATION

Rapport de TP

(TP 3)

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Chapitre 1

TP3 - Compréhension de programmes

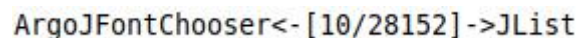
Le but de ce TP est d'étudier les dépendances entre des parties d'un programme. Dans le cadre de l'évolution des logiciels, connaître les dépendances au sein d'un projet est une façon d'en extraire de l'information. Ces informations peuvent être présentées sous la forme de modèles mentaux, d'architectures ou de comportements et sont capitales pour comprendre le programme.

1.1 Exercice 1 : Graphe de couplage entre classes

Ici, la dépendance va être étudiée entre deux classes données d'un programme. Pour ce faire on se base sur une certaine métrique, la *mesure de couplage*. Cette métrique est définie comme le « nombre de relations (relation = appel) entre les couples de méthodes appartenant respectivement aux deux classes en question ($A.m_i$ et $B.m_j$) / nombre de toutes les relations (binaires) entre les couples de méthodes appartenant respectivement à n'importe quelles des classes de l'application analysée. », soit en quelque sorte la fréquence d'appel entre deux classes données sur tous les appels existant dans le projet.

Par exemple, si un petit programme comptabilise 35 appels de méthodes entre toutes les classes le composant et que les classes A et B s'appellent 7 fois entre elles, le score de couplage de (A,B) sera de $\frac{7}{35}$. Un appel entre les classes A et B est défini comme l'appel d'une méthode mB (définie dans la classe B) dans la classe de A ou l'appel d'une méthode mA (définie dans la classe A) dans la classe B.

Pour implémenter ceci dans le TP, nous avons commencé par compter le nombre d'appels faits entre toutes les classes de l'application. On obtient ainsi le dividende de la métrique de couplage. Ensuite, on parcourt les deux classes étudiées (celles dont on veut connaître le couplage) et on compte tous les appels faits entre elles. Un exemple de ceci est disponible en figure 1.1.



```
ArgoJFontChooser->[10/28152]->JList
```

FIGURE 1.1 – Mesure de couple entre les classes `ArgoJFontChooser` et `JList` d'ArgoUML v0.34.

Ces métriques ont ensuite été utilisées dans un graphe de couplage. Ce graphe précise la métrique de couplage pour toutes les classes constituant un projet. De fait, il suffit d'étendre l'algorithme précédemment évoqué à toutes les classes constituant le programme. Un exemple des résultats obtenus est disponible en figure 1.2¹.

1. Toutefois, les sources d'ArgoUML étant conséquentes, les illustrations montrées ici ne seront pas entières

```

ArgoJFontChooser<- [8/28152]->Container
ArgoJFontChooser<- [2/28152]->JScrollPane
ArgoJFontChooser<- [10/28152]->JList
ArgoJFontChooser<- [2/28152]->GraphicsEnvironment
ArgoJFontChooser<- [1/28152]->DefaultListModel
ArgoJFontChooser<- [2/28152]->ListSelectionModel
ArgoJFontChooser<- [16/28152]->Integer
ArgoJFontChooser<- [4/28152]->AbstractButton
SettingsTabAppearance<- [11/28152]->Container
SettingsTabAppearance<- [11/28152]->JComboBox
SettingsTabAppearance<- [6/28152]->JLabel

```

FIGURE 1.2 – Extrait de l’affichage console renseignant le graphe de couplage entre les classes du projet ArgoUML v0.34.

1.2 Exercice 2 : Identification de Modules

Tout au long de cet exercice, on souhaite identifier des modules au sein des sources d’un programme. Avoir ces modules permet dans un contexte de compréhension des programmes, par exemple d’établir un modèle de correspondance conceptuel. Ceci peut être utile dans le cas d’une migration du système.

On cherche donc, grâce à la mesure de similarité définie auparavant (métrique de couplage) à regrouper les éléments du programme (ici les classes) entre eux en *clusters*. À partir de ces *clusters* on cherche à identifier les composants les constituant.

1.2.1 Construction du *cluster* hiérarchique

L’algorithme utilisé pour cette partie est disponible en figure 1.3. Il a été implémenté dans notre TP à partir de la mesure de couplage décrite précédemment. On retrouve le résultat de la construction de la hiérarchie de *clusters* ci-dessous. L’algorithme a été expérimenté sur le code réalisé pour le TP et sur le code d’ArgoUML v0.34, cependant le processus obtenu avec ArgoUML v0.34 n’a pas pu être récupéré car il s’agit d’un projet trop conséquent (la sortie console a été effacée à de multiples reprises, l’exécution a pris plus d’une demi-heure contre moins d’une minute pour notre projet).

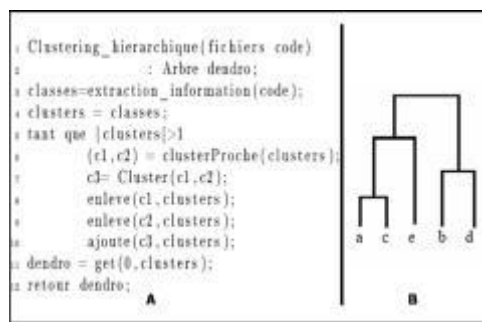


FIGURE 1.3 – Algorithme de regroupement hiérarchique des classes d’une application.

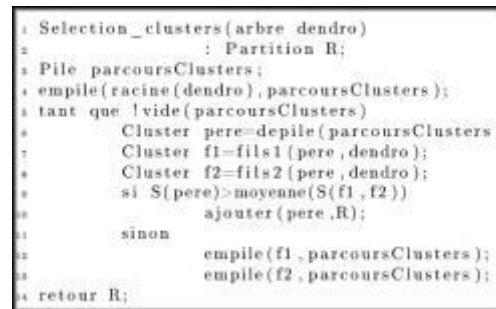
Dans le listing 2.1, on remarque qu’il y a plusieurs *clusters* finaux : au vu du travail demandé, nous avons pris le choix de ne pas réunir deux *clusters* s’ils ne sont pas couplés. La trace totale de l’exécution de l’algorithme est disponible en annexe 1.3.

Listing 1.1 – Clusters finaux obtenus lors de la construction d'un *cluster* hiérarchique à partir des classes de notre projet.

```
Final clusters :
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph,
StatsParser, Parser, MethodDeclarationVisitor, CouplingParser, Spoon,
Cluster, Couple, MethodInvocationVisitor, TypeDeclarationVisitor,
FieldDeclarationVisitor, PackageDeclarationVisitor], couplingScore=72]
```

1.2.2 Partitionnement

L'algorithme utilisé pour cette partie est disponible en figure 1.4. Ce dernier a été implémenté dans notre TP à l'aide du *cluster* hiérarchique précédemment construit. Comme indiqué précédemment, réaliser un tel exemple est assez chronophage. Par souci de simplicité, l'algorithme est appliqué sur le code réalisé dans le cadre de ce TP. On retrouve le résultat de cette exécution dans le *listing* suivant, ainsi que l'exécution totale en annexe 1.3.



```
1 Selection_clusters(arbre dendro)
2   : Partition R;
3   Pile parcoursClusters;
4   empile(racine(dendro),parcoursClusters);
5   tant que !vide(parcoursClusters)
6       Cluster pere=depile(parcoursClusters)
7       Cluster f1=fils1(pere,dendro);
8       Cluster f2=fils2(pere,dendro);
9       si S(pere)>moyenne(S(f1,f2))
10          ajouter(pere,R);
11       sinon
12           empile(f1,parcoursClusters);
13           empile(f2,parcoursClusters);
14   retour R;
```

FIGURE 1.4 – Algorithme d'identification des groupes de classes couplées.

Listing 1.2 – Partition obtenue sur les classes de notre projet.

```
Final partition :
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph,
StatsParser, Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster,
Couple, MethodInvocationVisitor, TypeDeclarationVisitor,
FieldDeclarationVisitor, PackageDeclarationVisitor], couplingScore=72]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph,
StatsParser, Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster,
Couple, MethodInvocationVisitor, TypeDeclarationVisitor,
FieldDeclarationVisitor], couplingScore=71]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph,
StatsParser, Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster,
Couple, MethodInvocationVisitor, TypeDeclarationVisitor], couplingScore=69]
Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor,
CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor,
TypeDeclarationVisitor], couplingScore=35]
Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon,
Cluster, Couple, MethodInvocationVisitor, TypeDeclarationVisitor],
couplingScore=29]
```

```

Cluster [classes=[CallGraph, StatsParser], couplingScore=2]
Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple,
MethodInvocationVisitor, TypeDeclarationVisitor], couplingScore=25]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple,
MethodInvocationVisitor], couplingScore=22]
Cluster [classes=[AA, BB], couplingScore=3]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo],
couplingScore=32]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]
Cluster [classes=[Spoon, Cluster, Couple], couplingScore=14]
Cluster [classes=[Spoon, Cluster], couplingScore=7]
Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27]
Cluster [classes=[VariabilityParser, ClassInfo], couplingScore=20]

```

1.3 Exercice 3 : Spoon pour Identification de Modules

Les mêmes exercices, à savoir le graphe de couplage, le *cluster* hiérarchique et les groupes de classes couplées ont été réalisés à l'aide de Spoon. Les mêmes algorithmes que ceux précédemment présentés ont été utilisés mais ce qui change ici est que les informations d'appel dans le code ont été trouvées grâce à des *Queries*.

Annexes du TP3

Exercice 2 - *Clustering* hiérarchique

Trace complète de l'exécution de l'algorithme de *clustering* hiérarchique sur le code réalisé pour ces TPs.

Original classes are put in clusters :

```
Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[VariabilityParser], couplingScore=0]
Cluster [classes=[Main], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[ClassInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Spoon], couplingScore=0]
Cluster [classes=[Couple], couplingScore=0]
Cluster [classes=[Cluster], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]
```

Creation of hierarchical clusters :

Fusion of : Cluster [classes=[VariabilityParser], couplingScore=0] and Cluster [classes=[Parser], couplingScore=0]
Clusters :

```
Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[Main], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
```

```

Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Spoon], couplingScore=0]
Cluster [classes=[Couple], couplingScore=0]
Cluster [classes=[Cluster], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]
Cluster [classes=[VariabilityParser, ClassInfo], couplingScore=20]

```

Fusion of: Cluster [classes=[Main], couplingScore=0] and Cluster [classes=[VariabilityParser, ClassInfo], couplingScore=20]
Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Spoon], couplingScore=0]
Cluster [classes=[Couple], couplingScore=0]
Cluster [classes=[Cluster], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27]

```

Fusion of: Cluster [classes=[Spoon], couplingScore=0] and Cluster [classes=[Cluster], couplingScore=0]
Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]

```



```

Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Couple], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27]
Cluster [classes=[Spoon, Cluster], couplingScore=7]

```

Fusion of: Cluster [classes=[Spoon, Cluster], couplingScore=7] and Cluster [classes=

Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27]
Cluster [classes=[Spoon, Cluster, Couple], couplingScore=14]

```

Fusion of: Cluster [classes=[CouplingParser], couplingScore=0] and Cluster [classes=

Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]

```

Fusion of: Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27] a

Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]

```

```

Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]

```

Fusion of: Cluster [classes=[AA], couplingScore=0] and Cluster [classes=[BB], couplingScore=0]
Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB], couplingScore=3]

```

Fusion of: Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]
Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB], couplingScore=3]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], couplingScore=19]

```

Fusion of: Cluster [classes=[AA, BB], couplingScore=3] and Cluster [classes=[CC], couplingScore=0]

Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], couplingScore=6]
Cluster [classes=[AA, BB, CC], couplingScore=6]

```

Fusion of : Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], couplingScore=6] and Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]

Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor, T], couplingScore=6]

```

Fusion of : Cluster [classes=[Parser], couplingScore=0] and Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]

Clusters :

```

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor, T], couplingScore=6]
Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]

```

Fusion of : Cluster [classes=[CallGraph], couplingScore=0] and Cluster [classes=[StatsParser], couplingScore=0]

Clusters :

```

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]

```

Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor, T
Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CallGraph, StatsParser], couplingScore=2]

Fusion of: Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2] and
Clusters :

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CallGraph, StatsParser], couplingScore=2]
Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster, C

Fusion of: Cluster [classes=[CallGraph, StatsParser], couplingScore=2] and Cluster [c
Clusters :

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP

Fusion of: Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplin
Clusters :

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Fusion of: Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGrap
Clusters :

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]

```

Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Fusion of: Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGrap
Clusters :
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Process done.
Final clusters :
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph,
StatsParser, Parser, MethodDeclarationVisitor, CouplingParser, Spoon,
Cluster, Couple, MethodInvocationVisitor, TypeDeclarationVisitor,
FieldDeclarationVisitor, PackageDeclarationVisitor], couplingScore=72]

```

Exercice 3 - Partition

Here is the partitionnement process :

```

Partition construction
Original classes are put in clusters :
Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[VariabilityParser], couplingScore=0]
Cluster [classes=[Main], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[ClassInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Spoon], couplingScore=0]

```

```

Cluster [classes=[Couple], couplingScore=0]
Cluster [classes=[Cluster], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]

```

Creation of hierarchical clusters :

Fusion of : Cluster [classes=[VariabilityParser], couplingScore=0] and Cluster [classes=[CouplingParser], couplingScore=0]
Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[Main], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Spoon], couplingScore=0]
Cluster [classes=[Couple], couplingScore=0]
Cluster [classes=[Cluster], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]
Cluster [classes=[VariabilityParser, ClassInfo], couplingScore=20]

```

Fusion of : Cluster [classes=[Main], couplingScore=0] and Cluster [classes=[VariabilityParser, ClassInfo], couplingScore=20]
Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Spoon], couplingScore=0]
Cluster [classes=[Couple], couplingScore=0]
Cluster [classes=[Cluster], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27]

```

Fusion of: Cluster [classes=[Spoon], couplingScore=0] and Cluster [classes=[Cluster],
Clusters :
Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Couple], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27]
Cluster [classes=[Spoon, Cluster], couplingScore=7]

Fusion of: Cluster [classes=[Spoon, Cluster], couplingScore=7] and Cluster [classes=
Clusters :
Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[CouplingParser], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27]
Cluster [classes=[Spoon, Cluster, Couple], couplingScore=14]

Fusion of: Cluster [classes=[CouplingParser], couplingScore=0] and Cluster [classes=
Clusters :
Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodInfo], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]

```

Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]

```

Fusion of: Cluster [classes=[Main, VariabilityParser, ClassInfo], couplingScore=27] and Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[AA], couplingScore=0]
Cluster [classes=[BB], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]

```

Fusion of: Cluster [classes=[AA], couplingScore=0] and Cluster [classes=[BB], couplingScore=0] and Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB], couplingScore=3]

```

Fusion of: Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19] and Clusters :

```

Cluster [classes=[Parser], couplingScore=0]

```



```

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[CC], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB], couplingScore=3]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], couplingScore=0]

```

Fusion of: Cluster [classes=[AA, BB], couplingScore=3] and Cluster [classes=[CC], couplingScore=0]
Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[TypeDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]

```

Fusion of: Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], couplingScore=0] and Cluster [classes=[AA, BB, CC], couplingScore=6]
Clusters :

```

Cluster [classes=[Parser], couplingScore=0]
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[MethodDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor, Test], couplingScore=0]

```

Fusion of: Cluster [classes=[Parser], couplingScore=0] and Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Clusters :

```

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]

```

Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[StatsParser], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[CallGraph], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor, T
Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]

Fusion of: Cluster [classes=[CallGraph], couplingScore=0] and Cluster [classes=[Stats
Clusters :

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor, T
Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CallGraph, StatsParser], couplingScore=2]

Fusion of: Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2] and
Clusters :

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CallGraph, StatsParser], couplingScore=2]
Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster, C

Fusion of: Cluster [classes=[CallGraph, StatsParser], couplingScore=2] and Cluster [c
Clusters :

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP

Fusion of: Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplin
Clusters :

```

Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[FieldDeclarationVisitor], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Fusion of: Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph
Clusters :
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[PackageDeclarationVisitor], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Fusion of: Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph
Clusters :
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Process done.
Final clusters :
Cluster [classes=[MethodBodyLineNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassAttributeNumberReverseComparator], couplingScore=0]
Cluster [classes=[ClassMethodNumberReverseComparator], couplingScore=0]
Cluster [classes=[MethodParamNumberComparator], couplingScore=0]
Cluster [classes=[TestSon], couplingScore=0]
Cluster [classes=[Test], couplingScore=0]
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Father weight : 72
Average of sons weight : 35.0
We add father to partition.
Partition(s) :
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Father weight : 71
Average of sons weight : 34.0
We add father to partition.
Partition(s) :
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Father weight : 69
Average of sons weight : 33.0

```

We add father to partition.

Partition(s):

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Father weight: 35

Average of sons weight: 15.0

We add father to partition.

Partition(s):

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP

Father weight: 29

Average of sons weight: 13.0

We add father to partition.

Partition(s):

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP

Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster, C

Father weight: 2

Average of sons weight: 0.0

We add father to partition.

Partition(s):

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP

Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster, C

Cluster [classes=[CallGraph, StatsParser], couplingScore=2]

Father weight: 2

Average of sons weight: 0.0

We add father to partition.

Partition(s):

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP

Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster, C

Cluster [classes=[CallGraph, StatsParser], couplingScore=2]

Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]

Father weight: 25

Average of sons weight: 11.0

We add father to partition.

Partition(s):

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar

Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP

Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster, C

Cluster [classes=[CallGraph, StatsParser], couplingScore=2]

Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]

```

Cluster [classes=[CouplingParser , Spoon , Cluster , Couple , MethodInvocationVisitor , T
Father weight : 6
Average of sons weight : 1.0
We add father to partition.
Partition(s):
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[CallGraph , StatsParser , Parser , MethodDeclarationVisitor , CouplingP
Cluster [classes=[Parser , MethodDeclarationVisitor , CouplingParser , Spoon , Cluster , C
Cluster [classes=[CallGraph , StatsParser], couplingScore=2]
Cluster [classes=[Parser , MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CouplingParser , Spoon , Cluster , Couple , MethodInvocationVisitor , T
Cluster [classes=[AA, BB, CC], couplingScore=6]

```

```

Father weight : 22
Average of sons weight : 9.0
We add father to partition.
Partition(s):
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[CallGraph , StatsParser , Parser , MethodDeclarationVisitor , CouplingP
Cluster [classes=[Parser , MethodDeclarationVisitor , CouplingParser , Spoon , Cluster , C
Cluster [classes=[CallGraph , StatsParser], couplingScore=2]
Cluster [classes=[Parser , MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CouplingParser , Spoon , Cluster , Couple , MethodInvocationVisitor , T
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser , Spoon , Cluster , Couple , MethodInvocationVisitor], c

```

```

Father weight : 3
Average of sons weight : 0.0
We add father to partition.
Partition(s):
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[CallGraph , StatsParser , Parser , MethodDeclarationVisitor , CouplingP
Cluster [classes=[Parser , MethodDeclarationVisitor , CouplingParser , Spoon , Cluster , C
Cluster [classes=[CallGraph , StatsParser], couplingScore=2]
Cluster [classes=[Parser , MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CouplingParser , Spoon , Cluster , Couple , MethodInvocationVisitor , T
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser , Spoon , Cluster , Couple , MethodInvocationVisitor], c
Cluster [classes=[AA, BB], couplingScore=3]

```

```

Father weight : 32
Average of sons weight : 13.0
We add father to partition.
Partition(s):
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo , CallGraph , StatsPar
Cluster [classes=[CallGraph , StatsParser , Parser , MethodDeclarationVisitor , CouplingP
Cluster [classes=[Parser , MethodDeclarationVisitor , CouplingParser , Spoon , Cluster , C
Cluster [classes=[CallGraph , StatsParser], couplingScore=2]
Cluster [classes=[Parser , MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CouplingParser , Spoon , Cluster , Couple , MethodInvocationVisitor , T

```

```

Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], c
Cluster [classes=[AA, BB], couplingScore=3]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]

```

Father weight : 19

Average of sons weight : 7.0

We add father to partition.

Partition(s) :

```

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP
Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster, C
Cluster [classes=[CallGraph, StatsParser], couplingScore=2]
Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor, T
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], c
Cluster [classes=[AA, BB], couplingScore=3]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]

```

Father weight : 14

Average of sons weight : 3.0

We add father to partition.

Partition(s) :

```

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP
Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster, C
Cluster [classes=[CallGraph, StatsParser], couplingScore=2]
Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor, T
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], c
Cluster [classes=[AA, BB], couplingScore=3]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]
Cluster [classes=[Spoon, Cluster, Couple], couplingScore=14]

```

Father weight : 7

Average of sons weight : 0.0

We add father to partition.

Partition(s) :

```

Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo, CallGraph, StatsPar
Cluster [classes=[CallGraph, StatsParser, Parser, MethodDeclarationVisitor, CouplingP
Cluster [classes=[Parser, MethodDeclarationVisitor, CouplingParser, Spoon, Cluster, C
Cluster [classes=[CallGraph, StatsParser], couplingScore=2]
Cluster [classes=[Parser, MethodDeclarationVisitor], couplingScore=2]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor, T
Cluster [classes=[AA, BB, CC], couplingScore=6]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple, MethodInvocationVisitor], c
Cluster [classes=[AA, BB], couplingScore=3]
Cluster [classes=[Main, VariabilityParser, ClassInfo, MethodInfo], couplingScore=32]
Cluster [classes=[CouplingParser, Spoon, Cluster, Couple], couplingScore=19]

```



```

CouplingParser , Spoon , Cluster , Couple , MethodInvocationVisitor ,
TypeDeclarationVisitor] , couplingScore=35]
Cluster [classes=[Parser , MethodDeclarationVisitor , CouplingParser , Spoon ,
Cluster , Couple , MethodInvocationVisitor , TypeDeclarationVisitor] ,
couplingScore=29]
Cluster [classes=[CallGraph , StatsParser] , couplingScore=2]
Cluster [classes=[Parser , MethodDeclarationVisitor] , couplingScore=2]
Cluster [classes=[CouplingParser , Spoon , Cluster , Couple ,
MethodInvocationVisitor , TypeDeclarationVisitor] , couplingScore=25]
Cluster [classes=[AA, BB, CC] , couplingScore=6]
Cluster [classes=[CouplingParser , Spoon , Cluster , Couple ,
MethodInvocationVisitor] , couplingScore=22]
Cluster [classes=[AA, BB] , couplingScore=3]
Cluster [classes=[Main, VariabilityParser , ClassInfo , MethodInfo] ,
couplingScore=32]
Cluster [classes=[CouplingParser , Spoon , Cluster , Couple] , couplingScore=19]
Cluster [classes=[Spoon , Cluster , Couple] , couplingScore=14]
Cluster [classes=[Spoon , Cluster] , couplingScore=7]
Cluster [classes=[Main, VariabilityParser , ClassInfo] , couplingScore=27]
Cluster [classes=[VariabilityParser , ClassInfo] , couplingScore=20]

```