

**Dear Student,**

We would like to invite you to participate in this research study. The main objective of this survey is to compare and evaluate two metric formalism languages: software metrics definition language (SPMDL) and Formal Specification of Software Design Metrics (FSSDM). Please fill the below questionnaire for both languages to the best of your knowledge.

Name (optional): \_\_\_\_\_

Experience in Software Metrics: \_\_\_\_\_ Yes \_\_\_\_\_ No

1. Please fill the below table

Defining Metrics	SPMDL	FSSDM
<b>The time taken to perform the tasks</b>		
• Task 1		
• Task 2		

## Task 1:

Update DIT metric to calculate the number of children i.e. the length from the parent to the root (only the maximum path should be considered)

### FSSDM

$$\begin{array}{|l} \text{DIT: } ObjectDef \times RedefinableElement \rightarrow \mathbb{N} \\ \hline \forall o: ObjectDef; r: RedefinableElement \mid isRoot(o, r) = TRUE \cdot DIT(o, r) = 0 \\ \forall o: ObjectDef; r: RedefinableElement; R: \mathbb{P} RedefinableElement; n: \mathbb{N}; S: \mathbb{P} \mathbb{N} \\ \mid PARN(o, r) \geq 1 \\ \wedge R = parents(o, r) \\ \wedge S = \{ depth: \mathbb{N} \mid \forall r': R \cdot depth = DIT(o, r') \} \\ \wedge n = \max S \cdot DIT(o, r) = n \end{array}$$

### SPMDL

```
<metric>
  <acronym>DIT</acronym>
  <title>Depth of Inheritance Tree</title>
  <authority>
    <authors name="C&K" date="1994" />
  </authority>
  <computation>
    <dmmQuery>
      <unit>Class</unit>
      <visitor scope="class" variable="c">
        <variable name="DIT" type="list" scope="class" />
        <invalidationCriteria affectedElement="Class"variableName="parent"
          condition="parent eq null" scope="Package" />
        <variable name="isVisited" type="long" scope="class" />
        <math:expression>
          <linkLong name="dit"/>
          <add datatype="long">
            <long value="1"/>
          </add>
        </linkLong>
      </math:expression>
    </visitor>
  </dmmQuery>
</computation>
</metric>
```

## **Task 2:**

Write a metric to count number of lines of code (LOC)

**FSSDM**

**SPMDL**

## SPMDL and FSSDM Examples

SPMDL	FSSDM
<p><b>Weighted Methods Complexity (WMC):</b> the sum of the complexity of all methods for a class. If all method complexities are considered to be unique, WMC is equal to the number of methods.</p>	
<pre> &lt;metric&gt;   &lt;acronym&gt;WMC&lt;/acronym&gt;   &lt;title&gt;Weighted Method per Class&lt;/title&gt;   &lt;authority&gt;     &lt;authors name="C&amp;K" date="1994" /&gt;   &lt;/authority&gt;   &lt;computation&gt;     &lt;dmmQuery&gt;       &lt;visitor scope="class"&gt;         &lt;variable name="numMethods" type="long" scope="class" /&gt;       &lt;/visitor&gt;       &lt;visitor scope="method"&gt;         &lt;math:expression&gt;           &lt;linkLong name="numMethods"/&gt;           &lt;add datatype="long"&gt;             &lt;long value="1"/&gt;           &lt;/add&gt;         &lt;/linkLong&gt;       &lt;/math:expression&gt;     &lt;/visitor&gt;   &lt;/dmmQuery&gt; &lt;/computation&gt; &lt;/metric&gt; </pre>	$WMC: ObjectDef \times Classifier \rightarrow \mathbb{N}$ <hr/> $\forall o: ObjectDef; c: Classifier; S: \mathcal{P} Operation \mid S = allOperations(o, c)$ $\bullet WMC(o, c) = \# S$
<p><b>Depth of Inheritance Tree (DIT):</b> measures the length of the inheritance chain from the current class to the root.</p>	
<pre> &lt;metric&gt;   &lt;acronym&gt;DIT&lt;/acronym&gt;   &lt;title&gt;Depth of Inheritance Tree&lt;/title&gt;   &lt;authority&gt;     &lt;authors name="C&amp;K" date="1994" /&gt;   &lt;/authority&gt;   &lt;computation&gt;     &lt;dmmQuery&gt;       &lt;unit&gt;Class&lt;/unit&gt;       &lt;visitor scope="class" variable="c"&gt;         &lt;variable name="DIT" type="list" scope="class" /&gt;         &lt;invalidationCriteria affectedElement="Class" variableName="parent"&gt;           condition="parent eq null" scope="Package" /&gt;         &lt;variable name="isVisited" type="long" scope="class" /&gt;         &lt;math:expression&gt;           &lt;linkLong name="dit"/&gt;           &lt;add datatype="long"&gt;             &lt;long value="1"/&gt;           &lt;/add&gt;         &lt;/linkLong&gt;       &lt;/math:expression&gt;     &lt;/visitor&gt;   &lt;/dmmQuery&gt; &lt;/computation&gt; &lt;/metric&gt; </pre>	$DIT: ObjectDef \times RedefinableElement \rightarrow \mathbb{N}$ <hr/> $\forall o: ObjectDef; r: RedefinableElement \mid isRoot(o, r) = TRUE \bullet DIT(o, r) = 0$ $\forall o: ObjectDef; r: RedefinableElement; R: \mathcal{P} RedefinableElement; n: \mathbb{N}; S: \mathcal{P} \mathbb{N}$ $\mid PARN(o, r) \geq 1$ $\wedge R = parents(o, r)$ $\wedge S = \{ depth: \mathbb{N} \mid \forall r': R \bullet depth = DIT(o, r') \}$ $\wedge n = max S \bullet DIT(o, r) = n$