159.251 – software metrics and code quality analysis tools

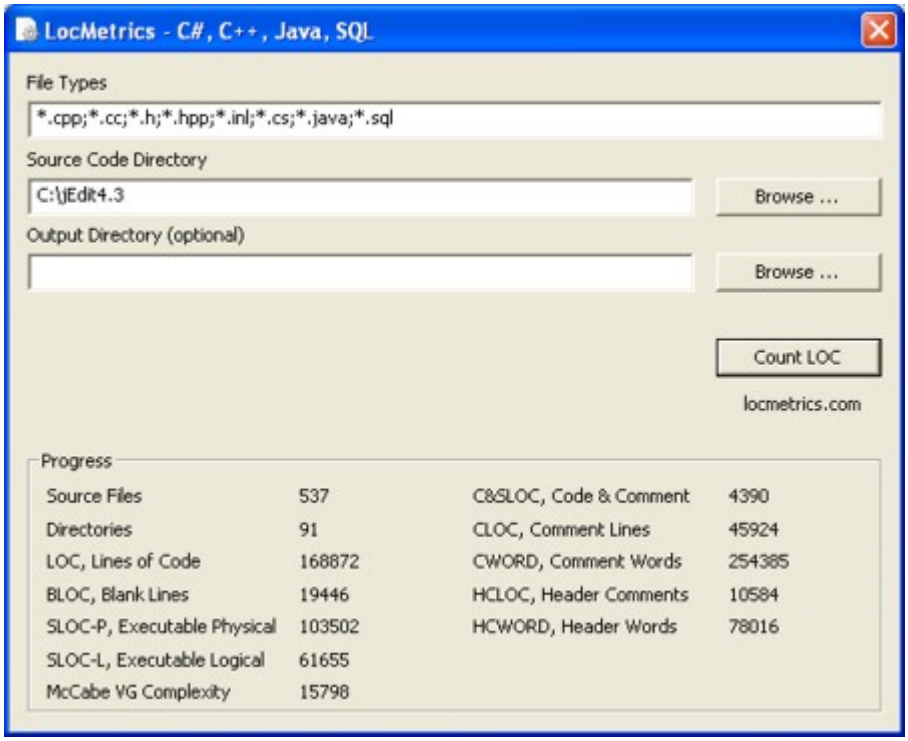
In this tutorial you will learn how to use software metrics tools to measure several aspects of your programs. You will also learn about other aspects of static analysis tools such finding issues and bugs in your software projects.

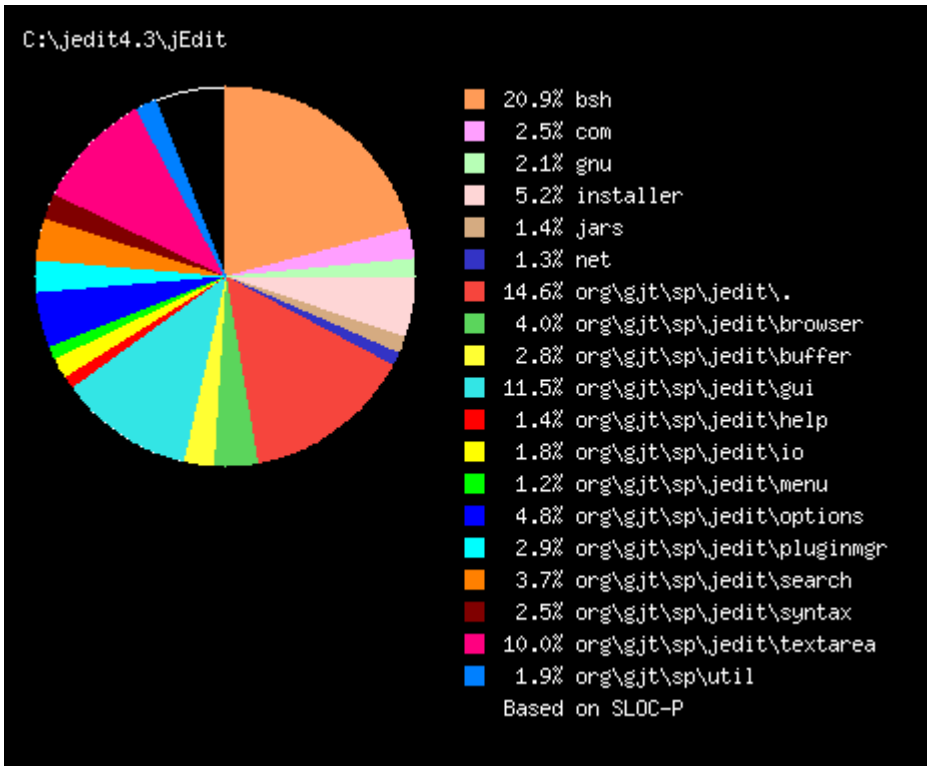
Part 1: measure your code size and complexity using LOCMetrics

LOCMetrics is a stand-alone tool that collects various size metrics including Line of Code (LOC), Comment LOC, Physical LOC (PLOC) and Logical LOC (LLOC). It can be also used to collect Cyclomatic Complexity ([CC] or [VG]).

LOCMetrics was designed to work for the following languages: **C#, C++, Java, and SQL.** The tool is available from here: http://www.locmetrics.com/

No installation is required to use this tool. All you need to do is to run the .exe file. Unfortunately, this tool is only available for Windows OS. If you are using Linux or Mac OS, you will need to use an emulator to be able to run .exe files. For example, see this https://www.winehq.org/





Tasks

Please download the attached zip file- which contains a number of source code files that you will need to use for this task. v

Task 1

First, run **LocMetrics** to analyse the attached leapYear.java file. Report the values of **ALL** metrics data.

Save your results as a .txt file show it when marking

Task 2

For this task, you will analyse an open-source Java project using LOCMetrics. The project that you are going to analyse is JDepend - a popular Java source code analyser!

Clone JDepend repository from here: https://github.com/clarkware/jdepend

Run **LocMetrics** to analyse the source code of JDepend (the whole project!). Report the values of the following metrics:

LOC, Physical LOC, Logical LOC and Comment LOC.

Task 3

For this task, you will analyse an open-source Java project using LOCMetrics. Analyse Apache Commons Lang (a popular Java library).

Run **LocMetrics** to analyse the source code of Apache Commons Lang (the whole project!). Report the values of the following metrics:

Physical LOC, Logical LOC and Cyclomatic Complexity.

Clone the Apache Commons Lang from the following git repository:

https://github.com/apache/commons-lang

Show us your results in a .txt file.

Also, you need to display the graph output (generated by the tool)

Part 2: measure code quality using PMD

PMD is a popular Java source code analyser that statistically checks for potential bugs a flaws in your code. It finds problems and issues in your code caused by programming behaviour or just due to the introduction of software bugs.

In the following we will use PMD Eclipse plugin to analyse the source code of the two projects above, JDepend and Apache Commons Lang.

Note that if you use IntelliJ or any other IDE then you need to find the configuration for this.

After obtaining the source code of the two projects, now import those projects into Eclipse :

File ➔ Import ➔ General ➔ Existing projects into workplace.

To install this in your personal computer (no need to do this in the lab as this has already been installed), follow the steps below:

1. In Eclipse, click on **Help** -> **Install New Software**...
2. Click on **Add**..
3. Enter the following:
    - **Name**: PMD for Eclipse Update Site

- **URL**: https://dl.bintray.com/pmd/pmd-eclipse-plugin/updates/

  and click **OK**.

4. You should see *PMD for Eclipse 4*. Select the checkbox next to it and click **Next >.**
5. You'll need to accept the license and confirm you want to install a plugin that is not digitally signed. Go ahead and install it anyway.
6. Restart Eclipse.

Now go the selected project and apply PMD. Then generate a report that contains the results of your analysis. Once the report is generated, the results can be obtained from **<Project_Home>/reports.**

Highlight two of the issues that has been included in the report and explain this to us when we mark your tutorial.

Part 3: Use Findbugs to detect possible bugs in your code

Findbugs is a powerful static code analyser that detects possible bugs and issues in your Java code. This include issues such as Dead Code and complex code.

You need to install Findbugs Eclipse plugin following the same steps that your followed for PMD.

Your task is to learn how to do the analysis yourself! Read the manual here (**findbugs.sourceforge.net**).

You need to produce a report of all the violation that you found in Apache Commans Lang. You will also need to show us your report once you are done.