

# Graph Framework Documentation

(Java)

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## **Documentation**

For timesaving purposes I made this report brief. Most of the details are on the javadoc which can be accessed from the Documentation link (if the link doesn't work the javadocs can be accessed through (current folder)/Javadoc/index.html).

You probably want to look at the classes: Graph, Vertex, Edges and the enum Label. Everything else is either an Exception class or the Sandbox. Most of the graph algorithms are located in the Graph class. Note I generated the documentation using a Java 7 Doc generator, but the java source files were made with Java 6. I did this because it is much easier on your eyes.

## **Sample Input**

I have left 4 input files which I derived from your slides each name specifies a graph, e.g. prim.txt comes from the graph on the slides used to run Prim's algorithm from.

In the main folder there is a file, InputFormat.txt, which specifies the format that the file must have for a graph to be constructed from it.

## **Compilation**

I left a Makefile in the folder Source Code. To run the make file type "make all."

## **Running**

I left a Sandbox.java file that you can modify and recompile. I already left some code in there plus the sample input files that you can play with that are in the "Sample Inputs" folder.

## Algorithms and Storage

All the algorithms run with the same runtime as the one you specified on all of your slides.

### Exceptions or ones not on slides

Method	Big-O Runtime
aTopologicalSort	$O(V)$
explorer	$O(V+E)$
getAVertex	$O(1)$
isSpanningSubgraph	$O(V^2)$
conjugate	$O(\text{degree}(e))$
createConjugate	$O(\text{degree}(e))$

## Discrepancy

The hasLoop method actually checks the given graph to see if there is a loop while the containsLoop method checks to see if there are any Back or Cross edges.

## Future Plans

I plan to continue updating the framework, optimizing it, and adding to it. I plan on writing this framework in C++ and Objective-C. Last but not least for educational purposes, I plan on implementing the framework with a GUI so anyone can see properties of a graph, and maybe make an iPhone/Android version that people can play with.