GPL: GPL is a Programming Language

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Why Graphs?

- Many algorithms are based on graphs – shortest path, breadth first search, topological sort.
- Real-world networks are interesting objects of study in themselves.
- Many languages can deal with graphs reasonably well, but often in an inflexible or cumbersome way.
What is GPL?

- General-purpose graph programming language
- Make graphs simple to work with
  - Manipulate data naturally in an adjacency list setting
  - Many common algorithms built in: no hassle
  - Interpreted for ease of use
- To graphs what MATLAB is to matrices
Features of GPL

- Interpreter based
- Procedural
- Weakly-typed
- Visualizable
- Easy to use
- Enforces Good Programming Practices
- Awesome
Syntax

- Simple: Nothing too crazy
- Spare: Skip the curly brackets
- Intuitive: Not hard to figure out
- Traditional: Stick to standards of other interpreted languages
Graph-Centric

● Three atomic data types
  ○ String: Symbols are important
  ○ Number: Quantities are important
  ○ Graph: Collections of things and their binary relationships are most important!

● Graph has a set of Nodes and Edges
  ○ Encapsulated: No unsupervised access
  ○ Manipulate from Graph level, for simplicity and safety

● Graph can be visualized
  ○ Beauty of Swing representation unparalleled
  ○ 3D... representation of a perfectly flat surface
Built-in Libraries

- **Graph Algorithms (CLRS style)**
  - MST, BFS, BFS with target node, DFS
- **Network Algorithms**
  - PageRank
  - Matrices and Vectors that can manipulate stored quantities
Development Environment

- Eclipse: IDE for Java backend development
- 'Liu'Lex: custom-written lexical analyzer
- Jacc: Java-native version of yacc
- Perl: Interpreted Shell
Graph h = ["h", "e", "l", "l", "o"]
String s = h.printNodes()
print(s)

Output:
hello
Sample Code

def printNumber(Number n)
    print("Number is passed to printNumber ")
    print(n)
end

Number i = 2
Number j = 2
while (i>0)
    printNumber(i)
    i = i-1
end

i = 4
if (i%2 == 0)
    print("i is even ")
elsif (i%3 == 0)
    print("i is divisible by 3 ")
else
    print("i is neither even nor divisible by 3 ")
end

Graph h = ["h", "e", "l", "l", "o"]
print(h.printNodes())

h.addEdge(1,2,1)
h.addEdge(1,3,1)
h.addEdge(1,4,1)
h.addEdge(1,5,1)
h.addEdge(3,4,1)
h.addEdge(4,2,1)

h.bfs(1)
h.dfs(1)
h.topologicalSort()
Translator Architecture

Shared resources:
- Scope (symbol table stack)
- Runtime statistics (ID, Object, Current line number, Error information, Etc.)

InputStream stack

Preprocessor
Source code → Modified source code → GPLLexer: lexer → Program code

GPLParser: parser
Evaluates the main program source code

Code for evaluating conditional jumps
Result of evaluation → GPLParser: liner
Evaluates short snippets of code for flow decision

Output
Integration and Testing

- Unit tested every back end method.
- Every time a method was checked in or any change was made, we made it a point to run the tests so that the application is always in a stable state.
- Integration with the parser was made due to our script which enabled us to test the back end with the front end and run our test suite.
- We also had a command line interpreter to quickly check the state of the parser and how it behaves.