CALL GRAPHS IN PYTHON

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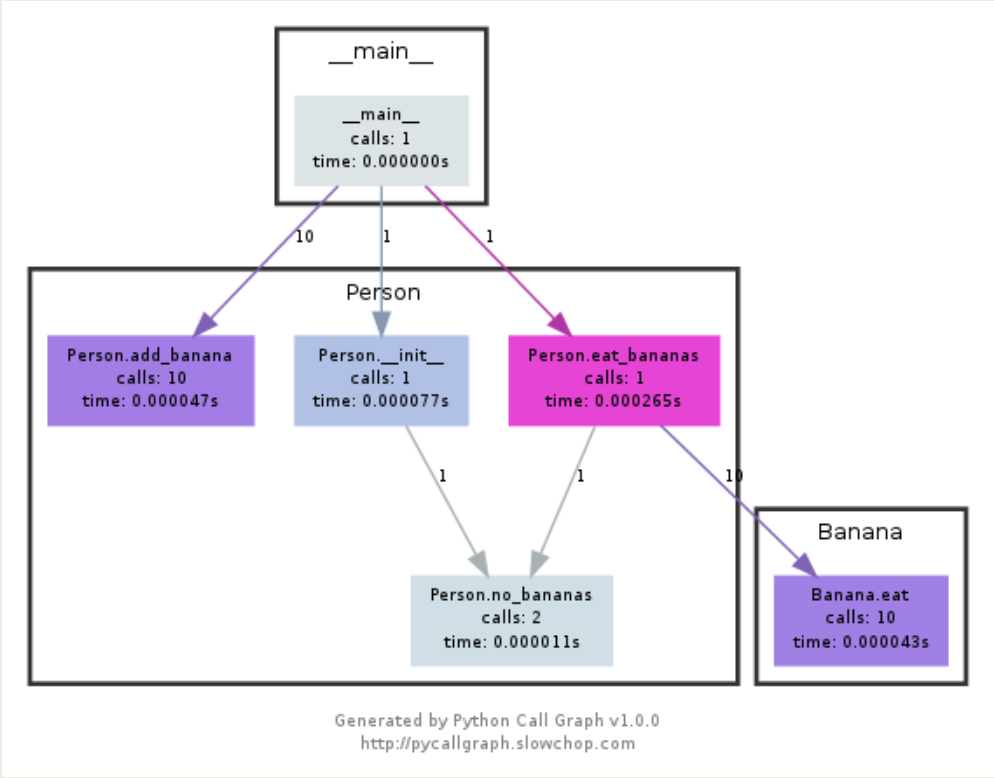
Call Graphs

- A graph that represents the calling relation between methods.



The task

- To develop a call graph generation scheme for python programs.

Why Python?

- Quite popular and widely used.
- Not as many static program analysis tools as Java.
  - *Example : PyLint, PyFlakes, PyChecker.*
- Multi paradigm programming language.

The Solution

- Scheme based on RTA.
- Parse the code and build metadata of variables, classes and functions.
- Figure out the variable type at the allocation statements.
- Build the call graph by identifying the call statements and use previous information if necessary.

Implementation Details

- Python
- Abstract Syntax Tree (AST) module
- Pygraphviz module

Pros

- Works quite well for simple programs
- Works even with inherited classes

Cons

- Does not resolve imported modules
- Assumes a global namespace
- Inefficient - multiple passes required - limitation of the syntax tree module.

Demo

References

- https://en.wikipedia.org/wiki/Call_graph
- https://docs.python.org/2/library/ast.html
- http://greentreesnakes.readthedocs.io/en/latest/nodes.html#function-and-class-definitions
- http://pygraphviz.github.io/documentation/pygraphviz-1.3.1/tutorial.html
- Lecture 3 slides

Thank you

Questions?