Static Program Analysis

Program Slicing

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Outline

- Definitions
- Program Representation
- Example – Wisconsin Program-Slicing Tool
- Future Work
- Questions

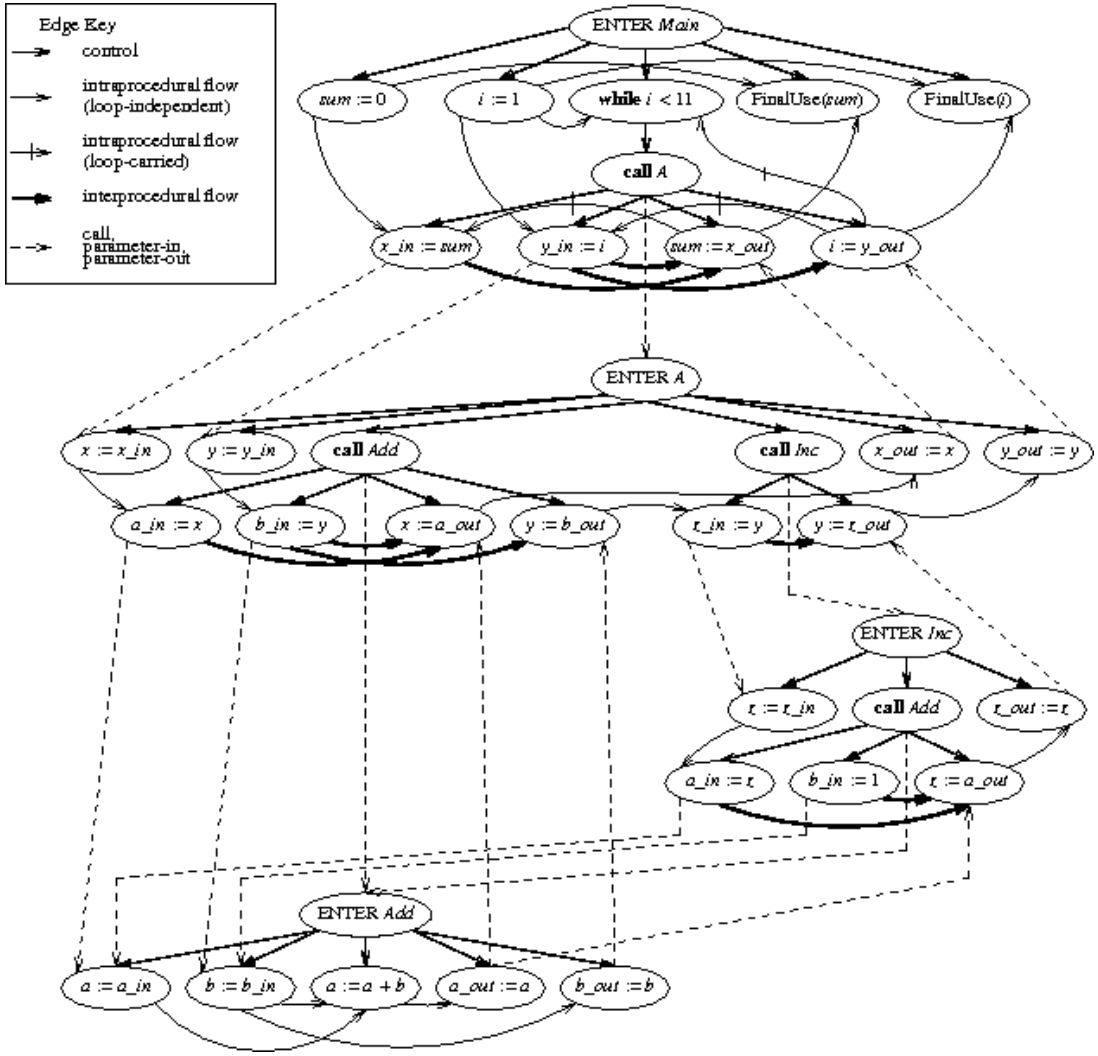
Definitions

- Program Slicing
  - Determine what statements affect/are affected by a given state of a program.
    - Forward Slicing
      - What later statements are affected by this state?
    - Backward Slicing
      - What earlier statements affected this state?

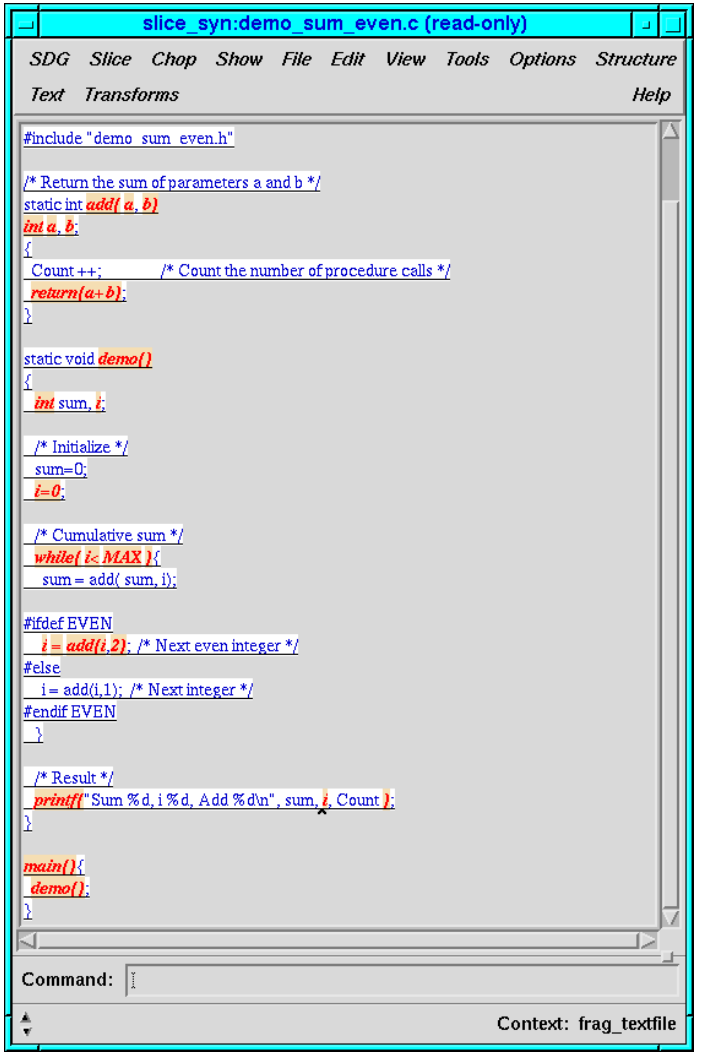
Definitions

- Control-Flow Graph (CFG)
  - A graph showing the possible execution paths through a procedure.
- Program Dependence Graph (PDG)
  - A graph showing data and control dependences between statements in a procedure.
- System Dependence Graph (SDG)
  - An extension to PDG that includes dependences across function calls.

Program Representation (SDG)



Example



- Wisconsin Program-Slicing Tool
  - Supports forward and backward slicing of C programs.
  - Has been used on C sources containing over 51000 lines.

[1] http://www.cs.wisc.edu/wpis/slicing_tool/

Future Work

(By Spring Break)

- Memory Aliasing
  - These slicing techniques all specify that the algorithms assume there are no aliasing problems, e.g. a call-by-reference system where the call ***f(x,x)*** occurs. Aliasing is too common to ignore in languages such as C.
- Concurrent Programs
  - These slicing techniques work well for systems with a single thread of execution. What changes are necessary to analize multi-threaded systems?

Questions?