SWEN430 - Compiler Engineering (2018)

Lecture 10 - Static Analysis III: Definite Assignment 2

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Definite Assignment for While Programs

- Do the analysis on the AST.
  - Check that all variables used are defined in the initial "environment".
  - Construct/return a new environemnt containing variables that are definitely assignment after the statement.
- Focus here on constructing the new environment (E') from the old one (E).
  - Assert, print, call: $E' = E$.
  - Assignment, variable declaration $E' = E \cup \{x\}$.
  - `if (B) S1 else S2`: $E' = E1 \cap E2$,
    where $E1$ ($E2$) is resulting environment for $S1$ ($S2$).
  - `while (B) S`, `for ... S`: $E' = E$.

Loops

- Consider `while (B) S`, with initial environment E.
- Equation for E' is:
  $E' = E \cap (E \cup F)$
  where F is the set of variable defined by S.
- E' is the largest set such that $E' \subseteq E$ and $E' \subseteq E \cup F$.
  which is E.

Break, Continue and Return

- Break, Continue and Return don't continue to next statement.
- Return null in these cases (different from empty!).
- null is ignored in computing join.

Switch

- What about switch statements?
- Like if .. else if ...
- Except that ...
- So ...???