

CFG for PicoC

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$$\begin{aligned}\text{init}(IfStmt^l) &= l \\ \text{init}(ExprStmt^l) &= l \\ \text{init}(EmptyStmt^l) &= l \\ \text{init}(BlockStmt^l) &= \text{init}(Stmt(0)) \\ \text{init}(VarDeclStmt^l) &= l \\ \text{init}(ForStmt^l) &= \text{init}(InitStmt(0)) \\ \text{init}(WhileStmt^l) &= l \\ \text{init}(DoStmt^l) &= \text{init}(Stmt)\end{aligned}$$

$$\begin{aligned}\text{final}(IfStmt^l) &= \text{final}(Then) \cup \text{final}(Else) \\ \text{final}(ExprStmt^l) &= \{l\} \\ \text{final}(EmptyStmt^l) &= \{l\} \\ \text{final}(BlockStmt^l) &= \text{final}(Stmt(numStmts - 1)) \\ \text{final}(VarDeclStmt^l) &= \{l\} \\ \text{final}(ForStmt^l) &= \{l\} \\ \text{final}(WhileStmt^l) &= \{l\} \\ \text{final}(DoStmt^l) &= \{l\}\end{aligned}$$

$$\begin{aligned}
\text{blocks}(IfStmt^l) &= \{IfStmt^l\} \cup \text{blocks}(Then) \cup \text{blocks}(Else) \\
\text{blocks}(ExprStmt^l) &= \{ExprStmt^l\} \\
\text{blocks}(EmptyStmt^l) &= \{EmptyStmt^l\} \\
\text{blocks}(BlockStmt^l) &= \{BlockStmt^l\} \\
&\quad \cup \left(\bigcup_{0 \leq i < numStmts} \text{blocks}(Stmt(i)) \right) \\
\text{blocks}(VarDeclStmt^l) &= \{VarDeclStmt^l\} \\
\text{blocks}(ForStmt^l) &= \{ForStmt^l\} \cup \text{blocks}(Stmt) \\
&\quad \cup \left(\bigcup_{0 \leq i < numInitStmts} \text{blocks}(InitStmt(i)) \right) \\
&\quad \cup \left(\bigcup_{0 \leq i < numUpdateStmts} \text{blocks}(UpdateStmt(i)) \right) \\
\text{blocks}(WhileStmt^l) &= \{WhileStmt^l\} \cup \text{blocks}(Stmt) \\
\text{blocks}(DoStmt^l) &= \{DoStmt^l\} \cup \text{blocks}(Stmt) \\
\\
\text{labels}(Program) &= \bigcup_{Stmt \in \text{blocks}(Program)} \{Stmt.Label\}
\end{aligned}$$

```

// ForStmt is 8
for(i = 0 /*1*/, j = 0/*2*/; i*j < len; i++ /*3*/, j++/*4*/)
// Block is 7
{
i = i + 2; // 5
j = j + 2; // 6
}
// The conditional is thought of as label 8.
// flow(example) = {(1,2),(2,5),(5,6),(6,3),(3,4),(4,8),(8,5)}

```

Figure 1: For loop example

$$\begin{aligned}
\text{flow}(IfStmt^l) &= \text{flow}(Then) \cup \text{flow}(Else) \cup \{(l, \text{init}(Then)), (l, \text{init}(Else))\} \\
\text{flow}(ExprStmt^l) &= \emptyset \\
\text{flow}(EmptyStmt^l) &= \emptyset \\
\text{flow}(BlockStmt^l) &= \bigcup_{0 \leq i < \text{numStmts}} \text{flow}(Stmt(i)) \\
&\quad \cup \bigcup_{0 \leq i < \text{numStmts}-1} \{(l', l) | l' \in \text{final}(Stmt(i)) \wedge l = \text{init}(Stmt(i+1))\} \\
\text{flow}(VarDeclStmt^l) &= \emptyset \\
\text{flow}(ForStmt^l) &= \bigcup_{0 \leq i < \text{numInitStmts}-1} \{(l', l) | l' \in \text{final}(InitStmt(i)) \wedge l = \text{init}(InitStmt(i+1))\} \\
&\quad \cup \{(l, \text{init}(Stmt)) | l \in \text{final}(InitStmt(\text{numInitStmts} - 1))\} \\
&\quad \cup \text{flow}(Stmt) \\
&\quad \cup \{(l, \text{init}(UpdateStmt(0))) | l \in \text{final}(Stmt)\} \\
&\quad \quad \bigcup_{0 \leq i < \text{numUpdateStmts}-1} \{(l', l) | l' \in \text{final}(UpdateStmt(i)) \wedge l = \text{init}(UpdateStmt(i+1))\} \\
&\quad \cup \{(l', l) | l' \in \text{final}(UpdateStmt(\text{numUpdateStmts} - 1))\} \\
&\quad \cup \{(l, \text{init}(Stmt))\} \\
\text{flow}(WhileStmt^l) &= \{(l, \text{init}(Stmt))\} \cup \{(l', l) | l' \in \text{final}(Stmt)\} \cup \text{flow}(Stmt) \\
\text{flow}(DoStmt^l) &= \{(l, \text{init}(Stmt))\} \cup \{(l', l) | l' \in \text{final}(Stmt)\} \cup \text{flow}(Stmt)
\end{aligned}$$