Lab: Code Verification and Z3 Theorem Prover

(Week 7)

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Assignment 2

You need to implement the following six functions in `Assignment_2.cpp` or `Assignment_2.py`:

- `SSE::reachability`
- `SSE::collectAndTranslatePath`
- `SSE::handleCall`
- `SSE::handleRet`
- `SSE::handleNonBranch`
- `SSE::handleBranch`
- The required implementation parts are indicated with TODO comments and you only need to fill up the code template if a method is partially implemented.

Python `handleIntra` implementations

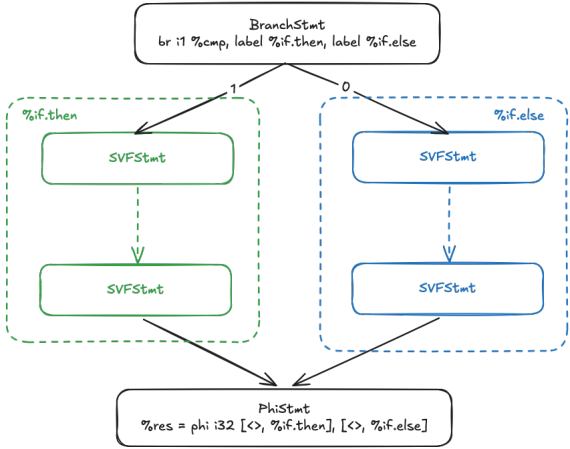
In C++, implementations for handling the intraprocedural nodes `BinaryOpStmt`, `PhiStmt` and `SelectStmt` are in the initial template, which are not in Python.

Reference implementations for these statements (for parity between C++ and Python implementations) can be found here:
`https://webcms3.cse.unsw.edu.au/COMP6131/26T2/resources/124132`

ICFG branch structure

```
int res;

if (cmp) {
    res = /* ... */;
} else {
    res = /* ... */;
}
```



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Tip

Use `solver.check()` to check if existing constraints are satisfiable, and print either the solver (C++) or use `solver.sexpr()` (Python) to output all current constraints.

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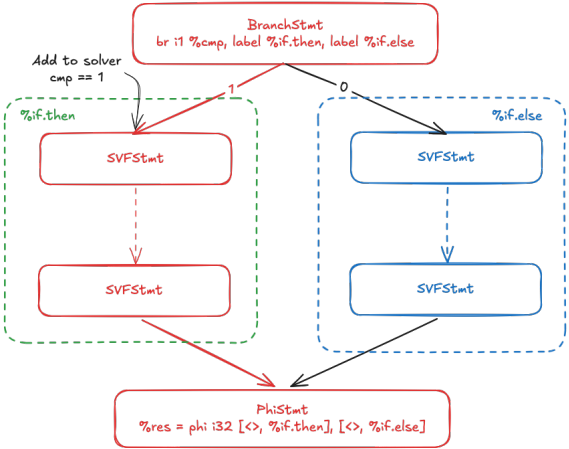

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Tip

Print out your constraints to check whether the constraints you have at each point in time are correct and not excessively restrictive!

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For every callPE...

1. Grab the RHS Z3 expr (`getZ3Expr`),
   - (`getOpVarID(i)` where the call node associated with `i` matches your call node)
2. Push to your callstack (`pushCallingCtx`),
3. Grab the LHS Z3 expr (`getZ3Expr`), and
   - (`getResID`)
4. Produce your constraint (`addToSolver`).

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Be aware of functions which return nothing!