

Assignment 2

Task 1

CFG link: https://drive.google.com/file/d/1W3VGeRnzWthhw3l33vg48723Au_wd6fd/view?usp=sharing

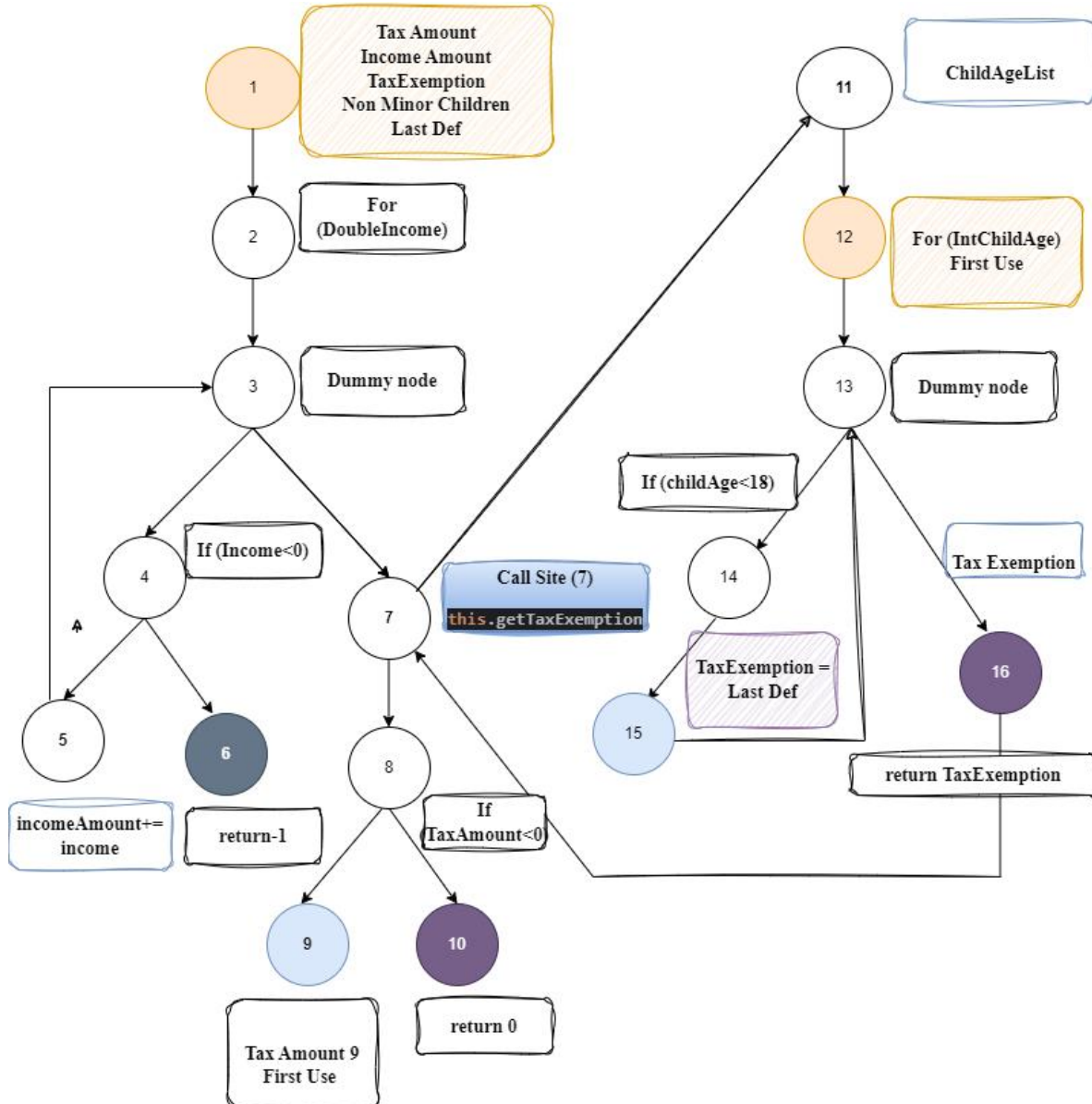


Fig: CFG of 2 methods with annotation with last defs and first uses for the call and return parameters

For The Call parameters

- **last def is in node 1 (Variable)**
- **First call is in node 12 (Child Age)**

For the Return Parameters

- **Last Def in node 15 (Tax Exemption)**
- **First use in node 9 (Tax Amount)**

2. List test requirements for All-Coupling-Defs coverage (for direct and return call)

****Cover a path from every last def to at least a first use****

For Direct:

Call parameter: 7

last def node: 1

first use node: 12

For Return Call:

Call parameter: 7

last def node: 15

first use node: 9

3. List test requirements for All-Coupling-Use coverage (for direct and return call)

****Cover a path from every last def to every a first use****

For Direct:

Call parameter: 7

last def node: 1

first use node: 12

for Return Call:

Call parameter: 7

last def node: 15

first use node: 9

4. List test paths to satisfy all test requirements above.

For above Coupling the test requirement is

- 1-12 (1-2-3-7-11-12)
- 15-9 (15-13-12-11-7-8-9)

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Test	Test Path in graph	input	Expected Output	EC	EPC	PC
1	1-2-3-7-11-12	{incomeList: [50000, 30000], childAgeList: [10, 5]}	Tax Amount: 16000	YES	NO	YES
2	15-13-12-11-7-8-9	{incomeList: [45000], childAgeList: [10, 5, 2]}	Tax Amount 10800	NO	YES	YES

6. This is attached in GraphTests.java

TASK 2

Mutation Analyses

For my mutation test analysis I found PrimitiveReturnsMutator, VoidMethodCallMutator

```
> org.pitest.mutationtest.engine.gregor.mutators.returns.PrimitiveReturnsMutator
>> Generated 5 Killed 3 (60%)
> KILLED 3 SURVIVED 0 TIMED_OUT 0 NON_VIABLE 0
> MEMORY_ERROR 0 NOT_STARTED 0 STARTED 0 RUN_ERROR 0
> NO_COVERAGE 2
-----
> org.pitest.mutationtest.engine.gregor.mutators.VoidMethodCallMutator
>> Generated 6 Killed 0 (0%)
> KILLED 0 SURVIVED 6 TIMED_OUT 0 NON_VIABLE 0
> MEMORY_ERROR 0 NOT_STARTED 0 STARTED 0 RUN_ERROR 0
> NO_COVERAGE 0 |
-----
> org.pitest.mutationtest.engine.gregor.mutators.MathMutator
```

In this 2 generation PrimitiveReturnsMutator killed 3 out 5 & PrimitiveReturnsMutator killed 0/6

Killed Mutant/ Total Mutant (3/11) =0.27

So for Integration Mutant operators calculation is 27%