CptS 422 Deliverable 3 Report
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Mutation Test Results
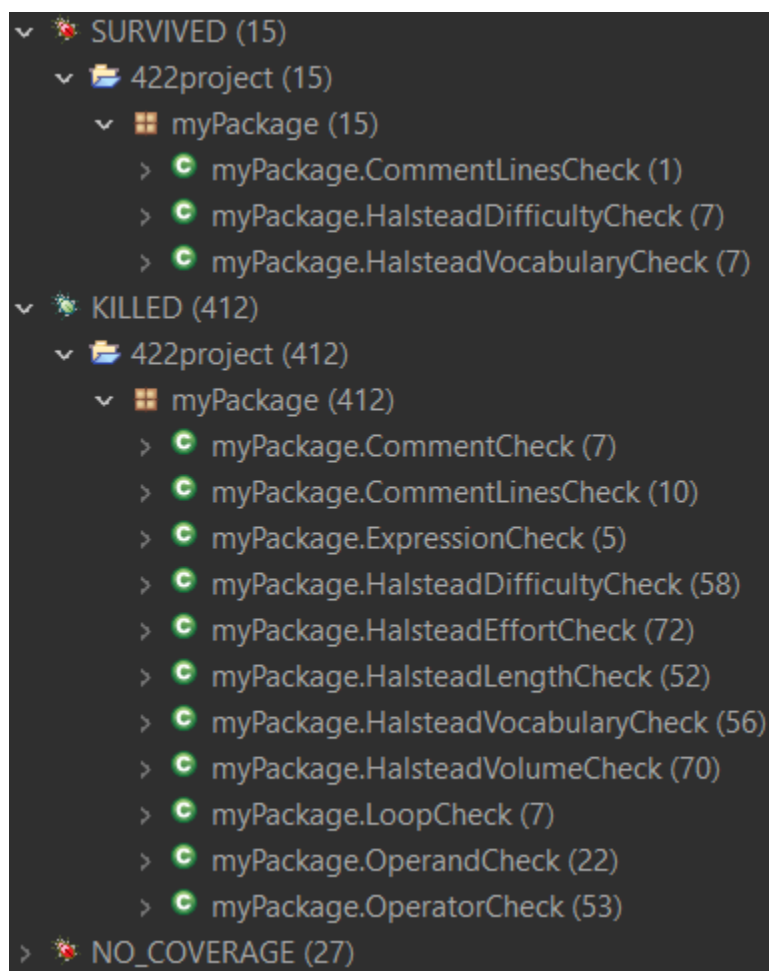
Pit Test Coverage Report

Project Summary

Number of Classes	Line Coverage	Mutation Coverage	Test Strength
11	96% 856/890	91% 412/454	96% 412/427

Breakdown by Package

Name	Number of Classes	Line Coverage	Mutation Coverage	Test Strength
myPackage	11	96% 856/890	91% 412/454	96% 412/427

```
v  🐞 SURVIVED (15)
   v  📁 422project (15)
      v  ▦ myPackage (15)
         >  Ⓒ myPackage.CommentLinesCheck (1)
         >  Ⓒ myPackage.HalsteadDifficultyCheck (7)
         >  Ⓒ myPackage.HalsteadVocabularyCheck (7)
v  🐞 KILLED (412)
   v  📁 422project (412)
      v  ▦ myPackage (412)
         >  Ⓒ myPackage.CommentCheck (7)
         >  Ⓒ myPackage.CommentLinesCheck (10)
         >  Ⓒ myPackage.ExpressionCheck (5)
         >  Ⓒ myPackage.HalsteadDifficultyCheck (58)
         >  Ⓒ myPackage.HalsteadEffortCheck (72)
         >  Ⓒ myPackage.HalsteadLengthCheck (52)
         >  Ⓒ myPackage.HalsteadVocabularyCheck (56)
         >  Ⓒ myPackage.HalsteadVolumeCheck (70)
         >  Ⓒ myPackage.LoopCheck (7)
         >  Ⓒ myPackage.OperandCheck (22)
         >  Ⓒ myPackage.OperatorCheck (53)
>  🐞 NO_COVERAGE (27)
```

The majority of the missing coverage is due to the incomplete finishTree test methods. If we do not count the mutations with no coverage the percentage is 96.49%

Blackbox Testing
Fault Models
Operand
- Something is incorrectly counted as an operand
- Something that is an operand is not counted

Operator
- Something is incorrectly counted as an operator
- Something that is an operator is not counted
- Something is considered more than operator

Halstead
- Operand and Operator faults
- Unique operands and operators counted more than once
- Calculation is incorrect

Comment
- Single line comments counted more than once

CommentLines
- Comments counted more than once
- Block comments calculation is incorrect

Expression
- Something is incorrectly counted as an expression
- Something that is an expression is not counted

Loop
- Something is incorrectly counted as an loop
- Something that is an loop is not counted
- Do while is counted counted more than once

Bugs found
Following the testing based on the fault models a few bugs were found within the code. These bugs were found within two different checks; the HalsteadDifficultyCheck and the HalsteadEffortCheck.
- Halstead difficulty calculation was incorrect
  - A rounding error occurs in the calculation
  - Fixed by casting integers to doubles
- Halstead effort calculation was incorrect
  - Difficulty error causes this error
  - Fixed by casting integers to doubles