

Experiment

Comparison of three notations for the
scenario-based testing of models

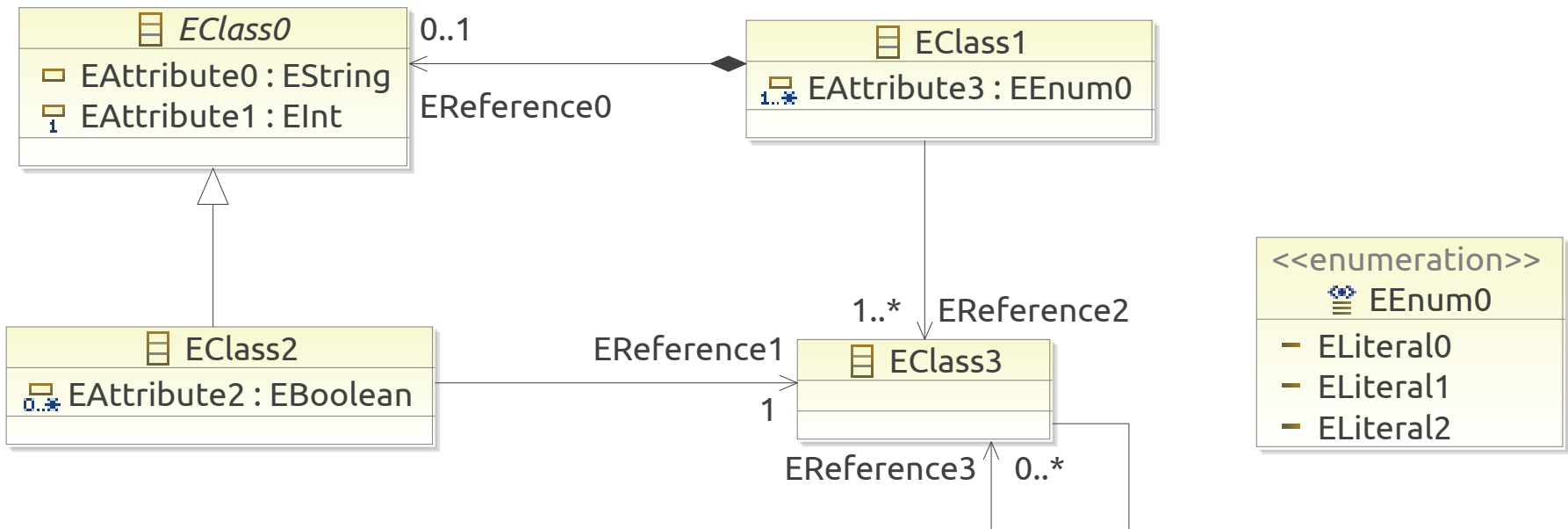
Scenario-based Testing

- Testing requirements via scenarios
- Scenario test
 - Test precondition(s)
 - Fulfilled → continue
 - Not fulfilled → scenario test fails immediately
 - Test condition(s)
 - Fulfilled → continue
 - Not fulfilled → scenario test fails immediately
 - Test expression(s)
 - Fulfilled → scenario test passes
 - Not fulfilled → scenario test fails

Notations

- Semi-structured natural-language
 - Gherkin-inspired
 - Diagrammatic
 - UML sequence diagram
 - Fully-structured textual
 - Epsilon script
-
- For the testing of Ecore-based models

Ecore Model



Semi-structured Natural-Language

Scenario:

Given "..."

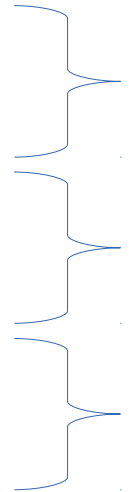
And "..."

When "..."

And "..."

Then "..."

And "..."

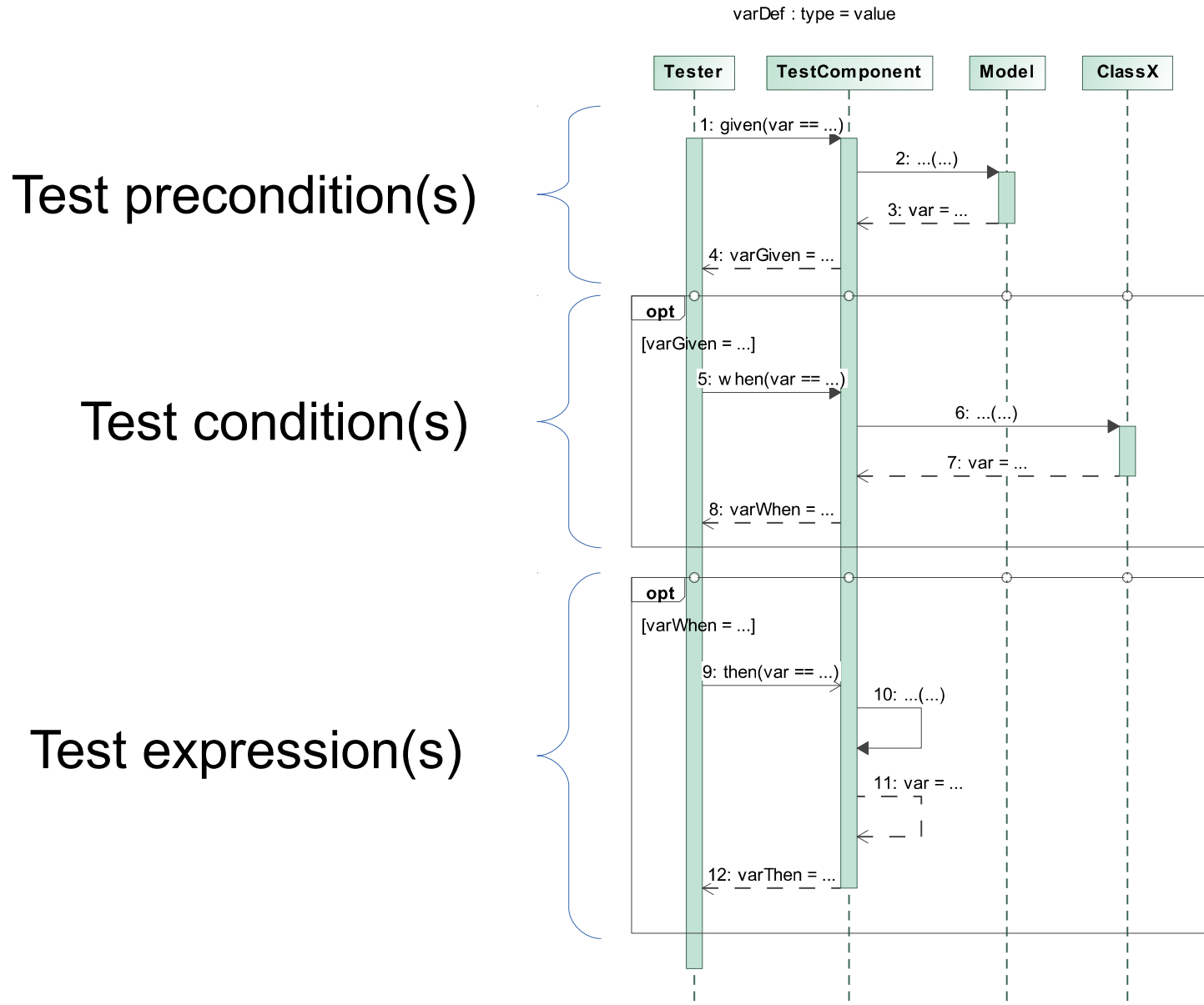


Test precondition(s)

Test condition(s)

Test expression(s)

Diagrammatic



Fully-structured Textual

```
@TestSuite
operation testSuite() {
  @TestCase
  operation testCase() {
    @TestScenario
    $pre ...
    operation testScenario() {
      if (...) {
        assertTrue(...);
      } else {
        assertTrue(false);
      }
    }
  }
}
```

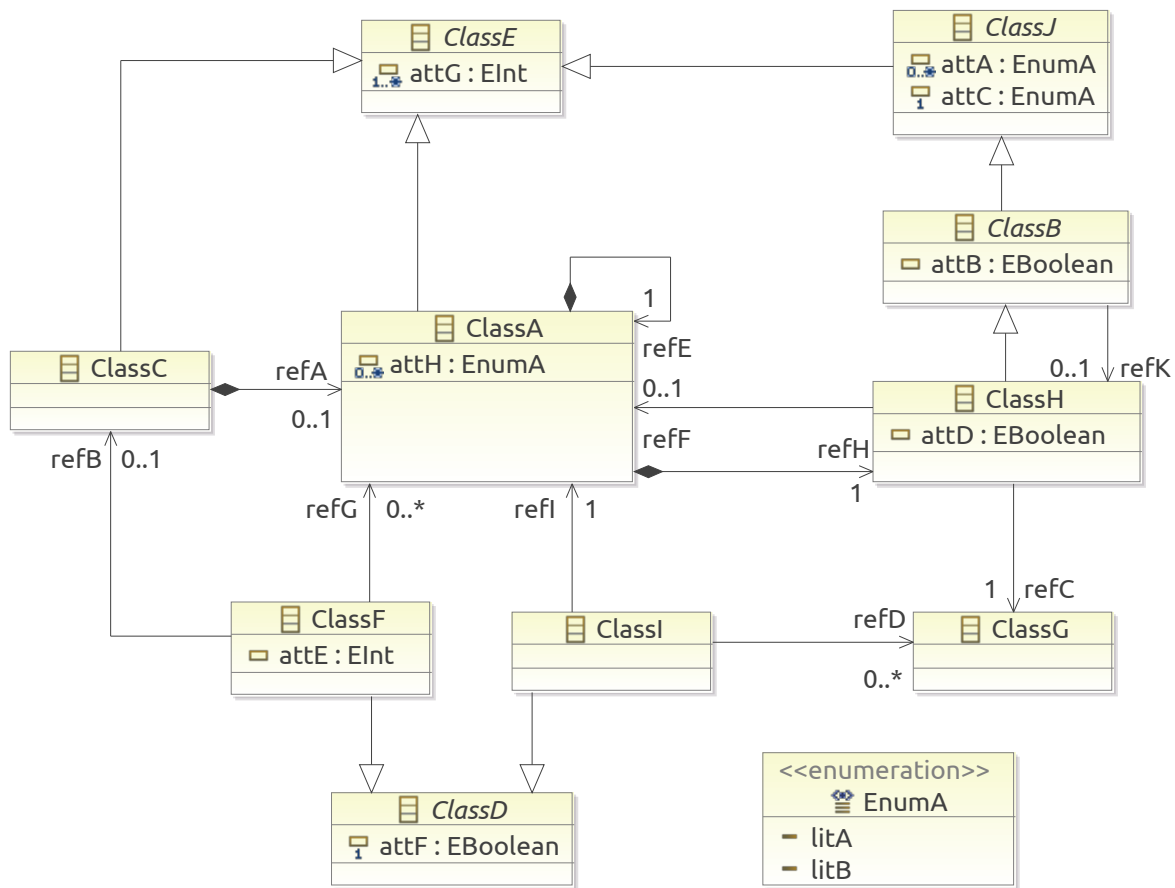
Test precondition(s)

Test condition(s)

Test expression(s)

Example

Task x.1



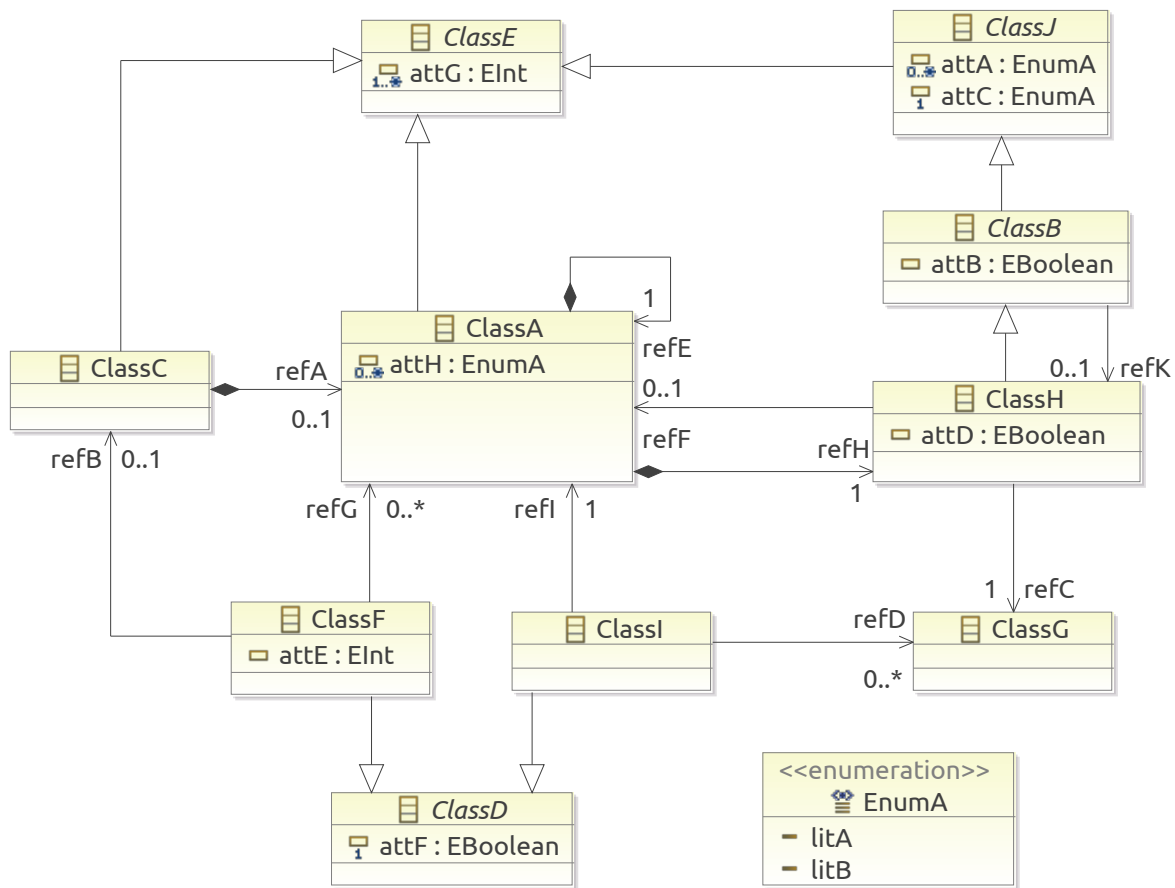
Scenario:

When "all supertype classes of ClassB are abstract"

Then "in ClassJ there shall be at least one attribute of type EnumA with an upper bound multiplicity of -1"

Example

Task x.1



Scenario:

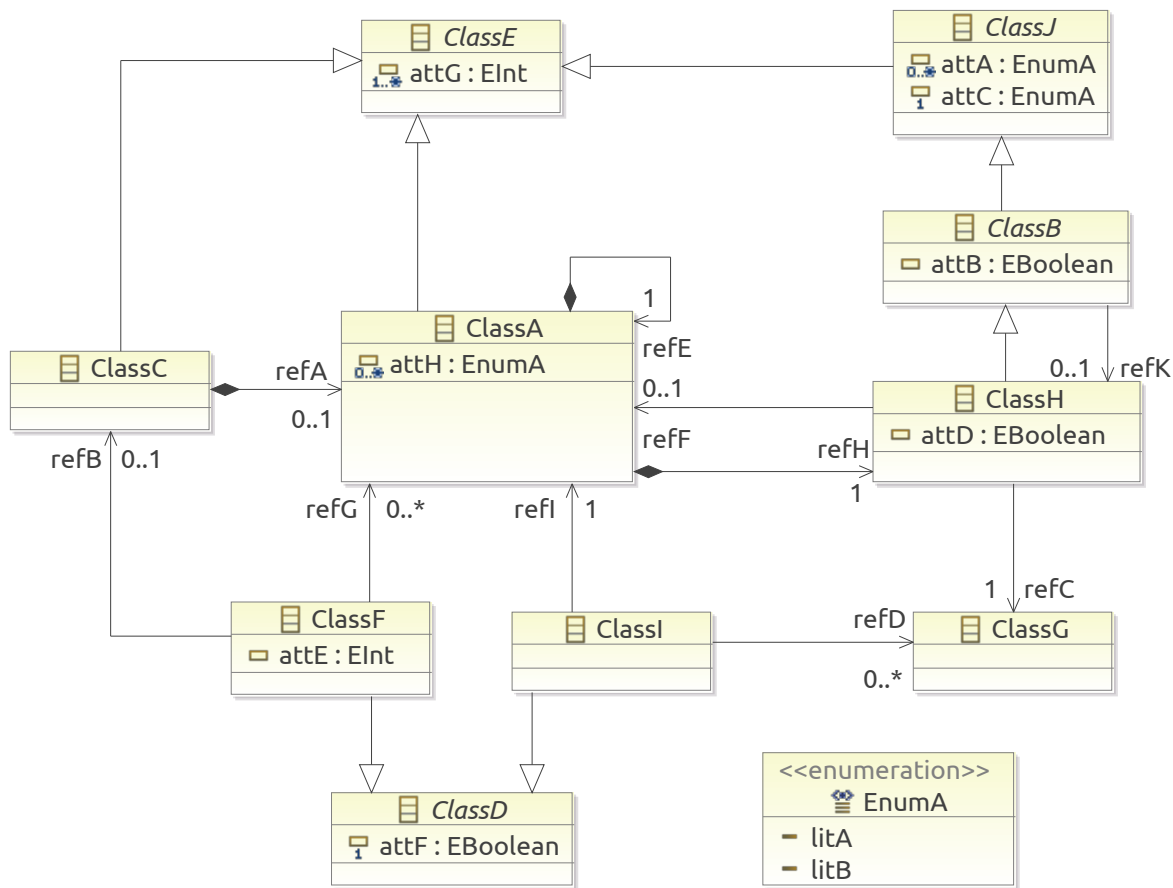
When "all supertype classes of ClassB are abstract"

Then "in ClassJ there shall be at least one attribute of type EnumA with an upper bound multiplicity of -1"

Q: Does the scenario test fail if in ClassJ the attribute attA has a multiplicity of 1..1?

Example

Task x.1

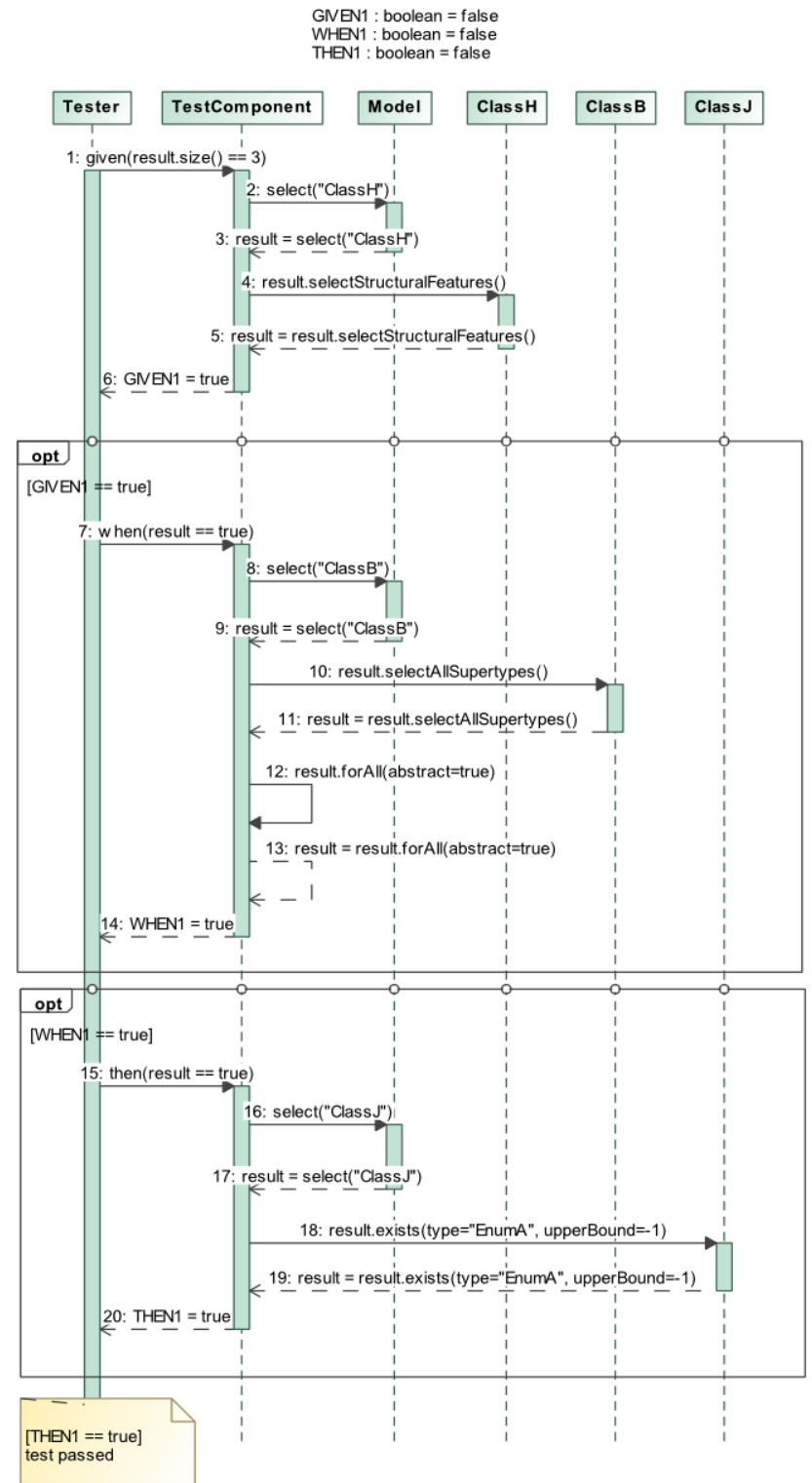
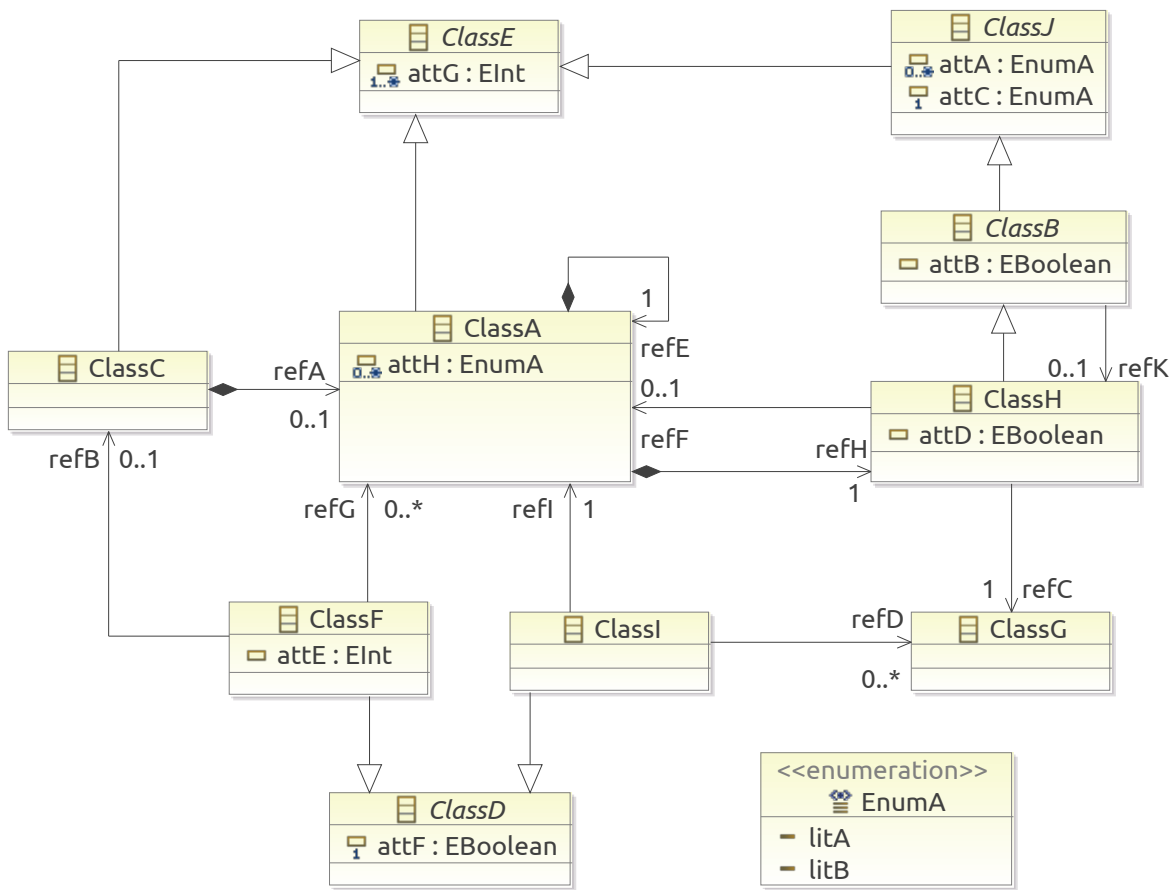


Scenario:

When "all supertype classes of ClassB are abstract"

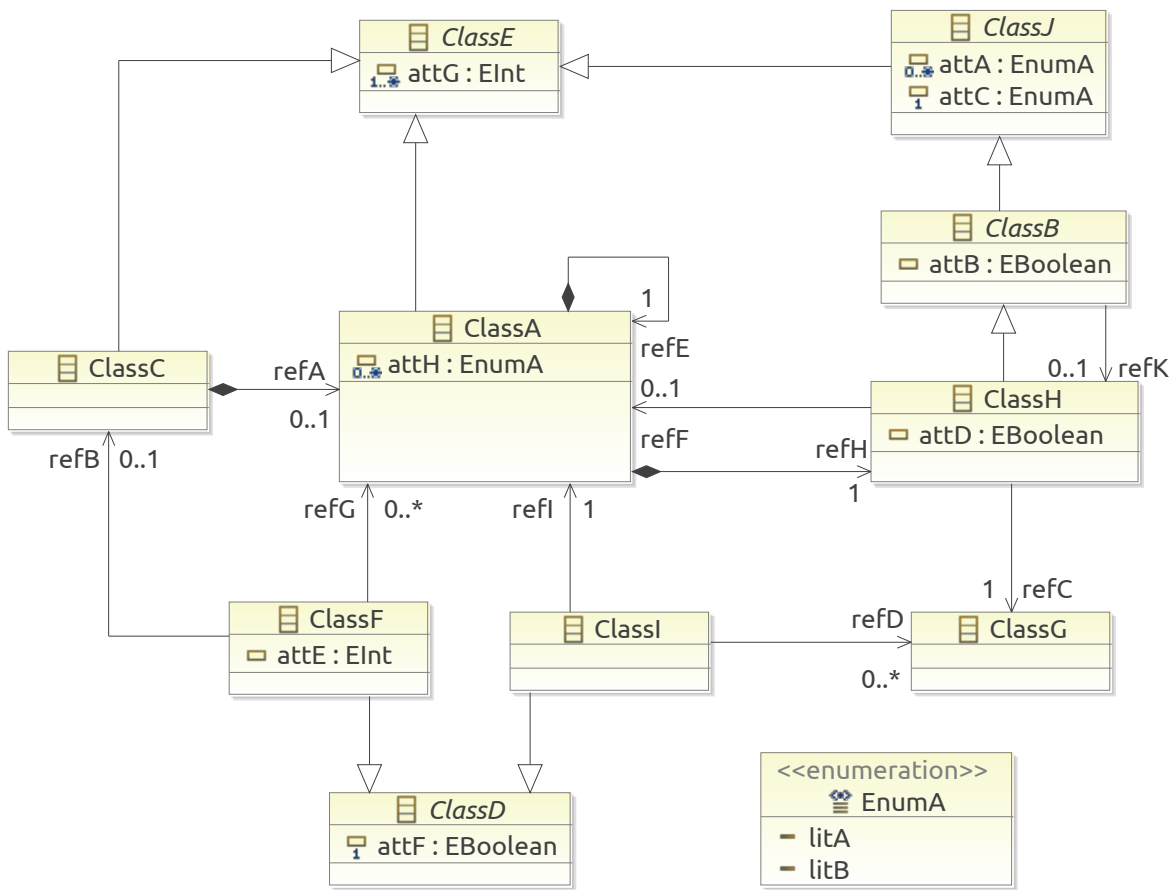
Then "in ClassJ there shall be at least one attribute of type EnumA with an upper bound multiplicity of -1"

Q: Does the scenario test fail if in ClassJ both attributes have a multiplicity of 1..*?



Example

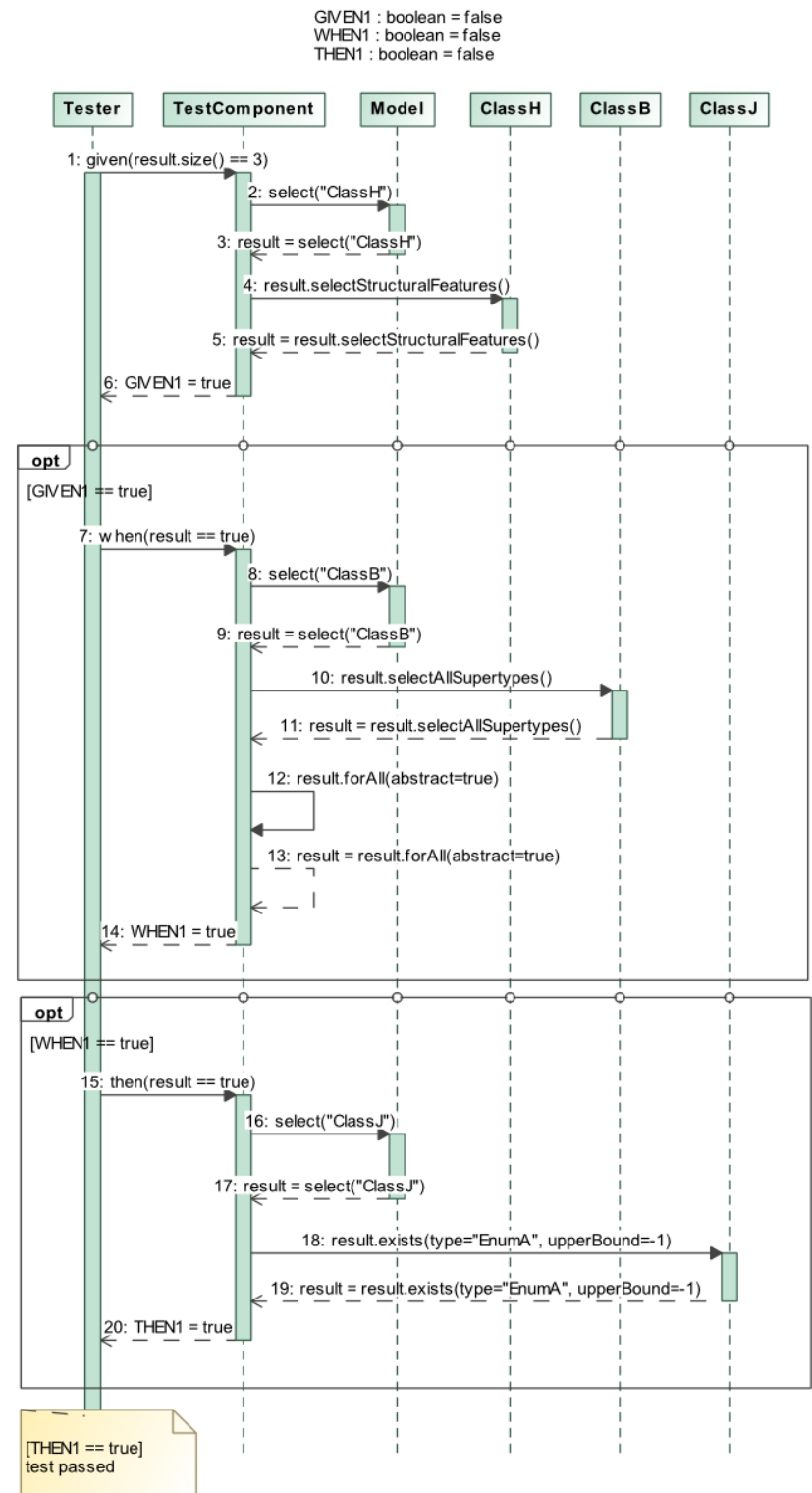
Task x.1

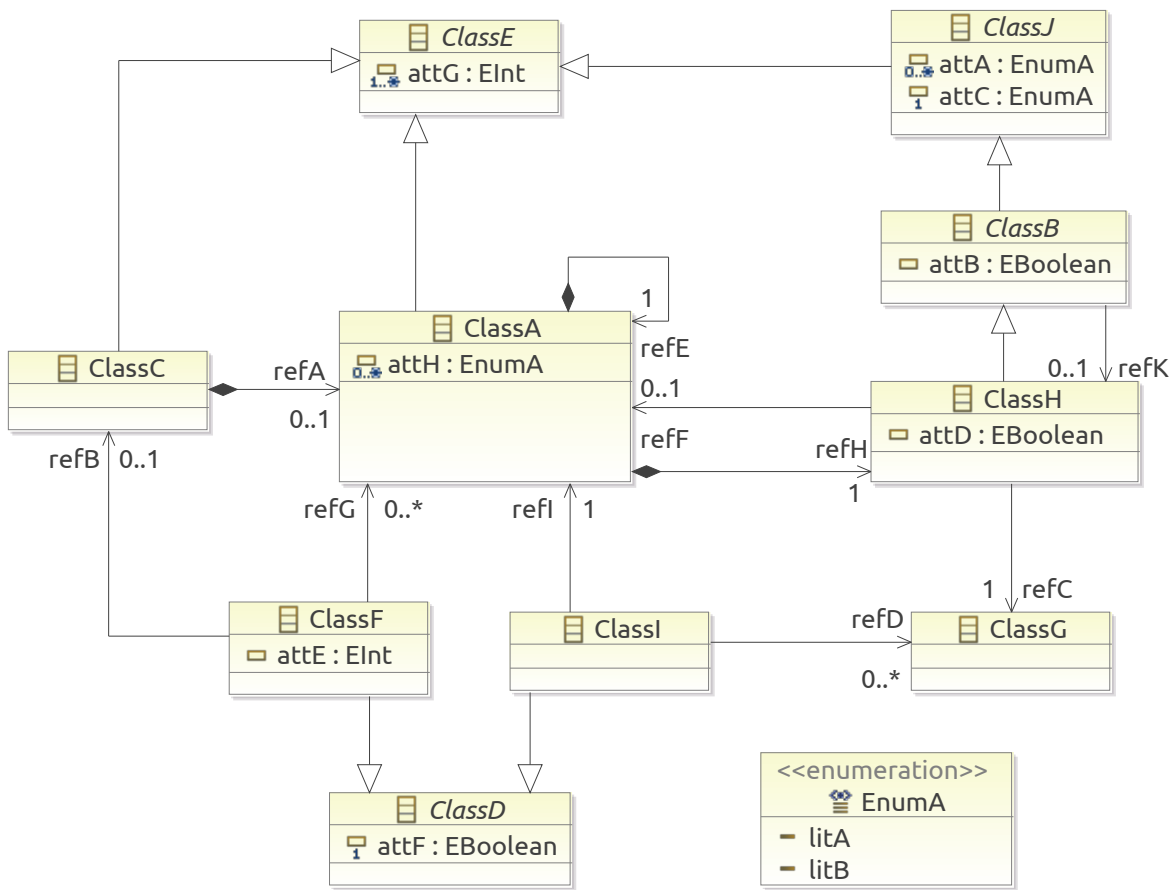


Q: Does the scenario test fail if in ClassA the navigability of reference refH is inverted?

Example

Task x.1

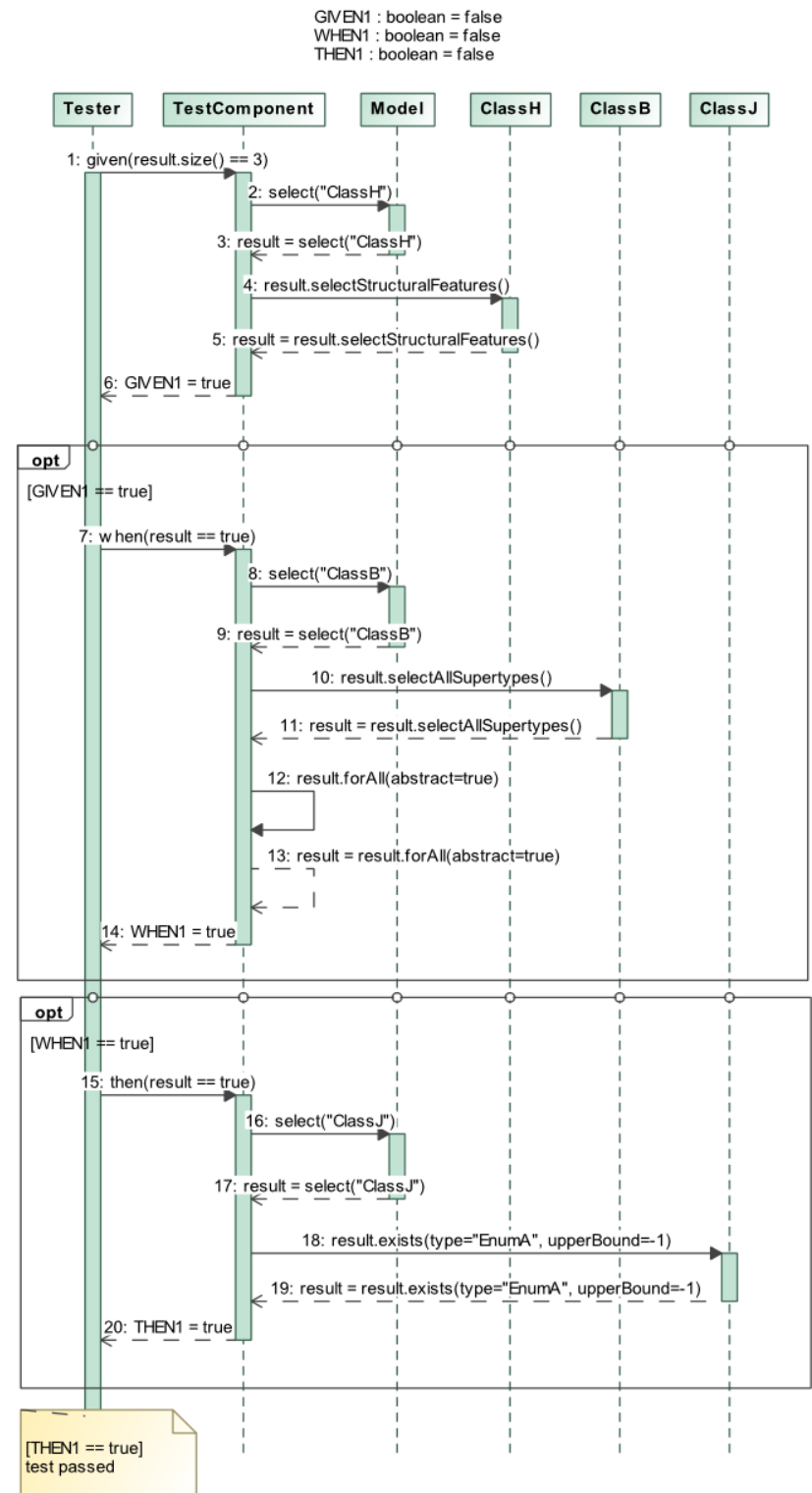




Q: Does the scenario test fail if in ClassA the navigability of reference refH is inverted and in ClassH the attribute attD is deleted?

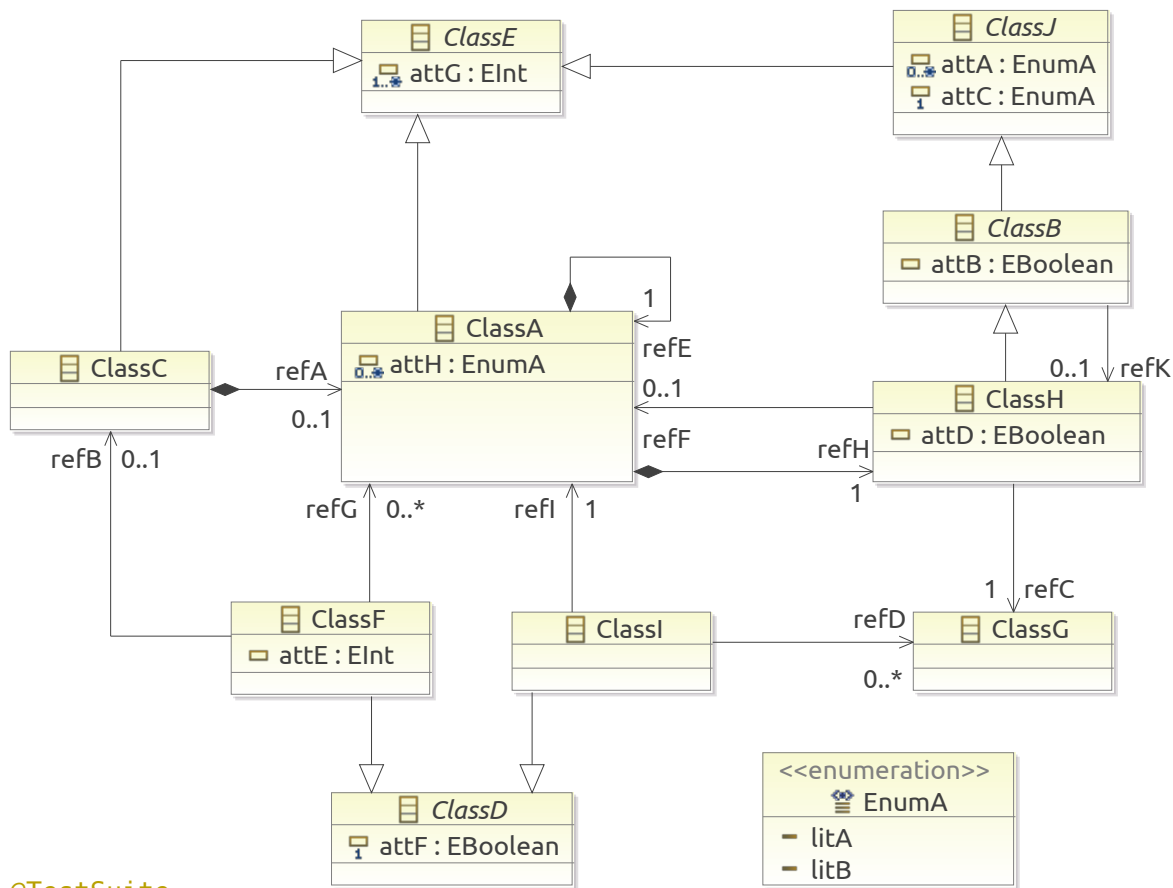
Example

Task x.1



Example

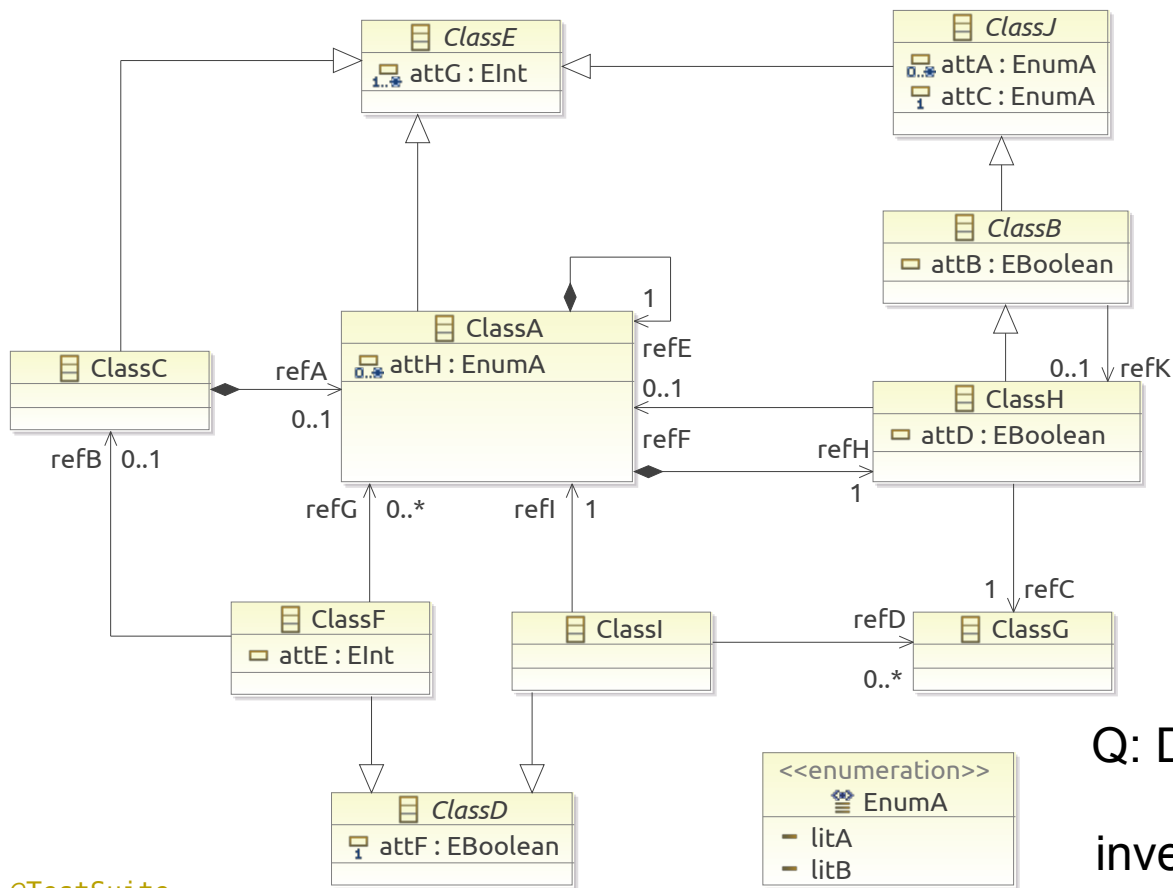
Task x.2



```
@TestSuite
operation testSuite() {
    @TestCase
    operation testCase() {
        @TestScenario
        $pre Model!EClass.all().selectOne(x|x.name="ClassH").eStructuralFeatures.size() = 3
        operation testScenario() {
            if (
                Model!EClass.all().selectOne(x|x.name="ClassB").closure(x|x.eSuperTypes).forall(x|x.abstract=true)
            ) {
                assertTrue(Model!EClass.all().selectOne(x|x.name="ClassJ").eStructuralFeatures.exists(x|x.isTypeOf(EAttribute) and
                    x.eType.name="EnumA" and x.upperBound=-1));
                assertTrue(Model!EClass.all().selectOne(x|x.name="ClassB").eStructuralFeatures.selectOne(x|x.name="refK").eType.
                    eStructuralFeatures.selectOne(x|x.name="refH").eType.name = "ClassA");
            } else {
                assertTrue(false);
            }
        }
    }
}
```

Example

Task x.2

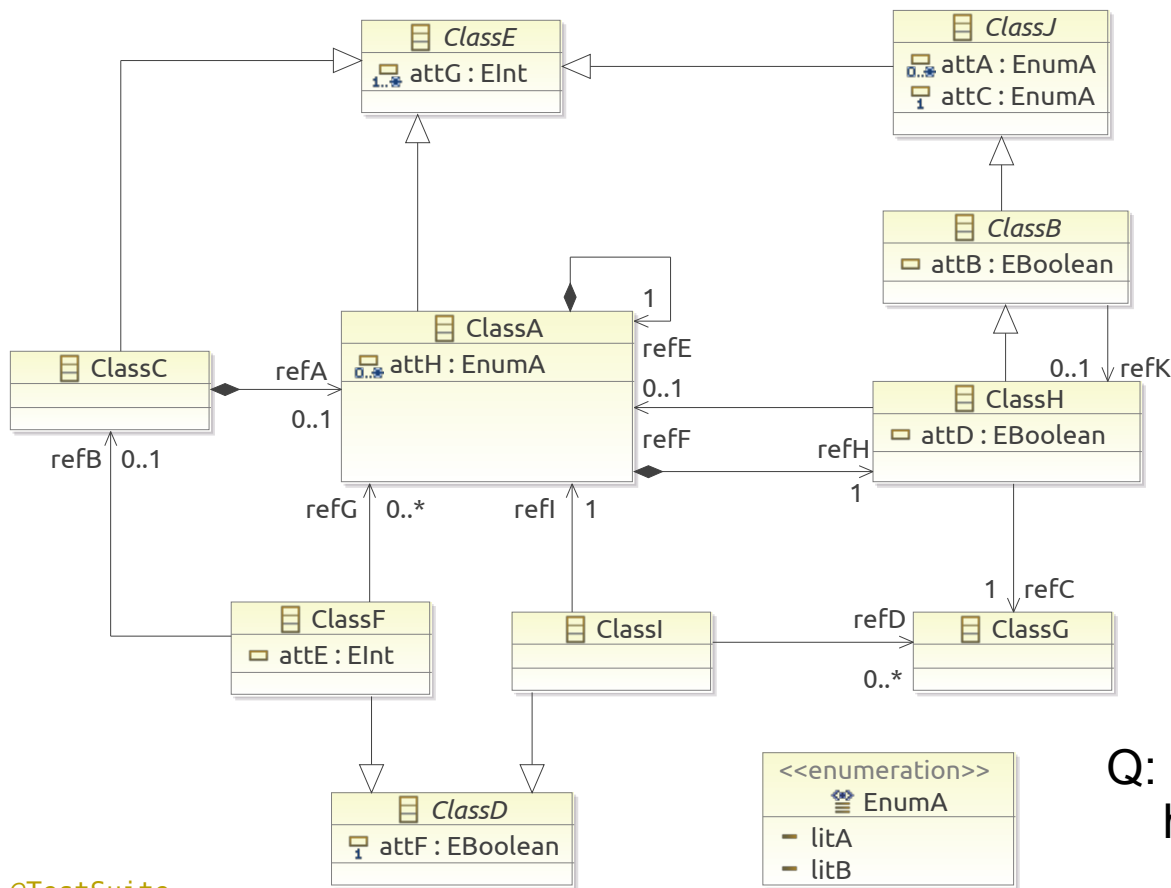


Q: Does the scenario test pass if in ClassA the navigability of reference refH is inverted and in ClassH the attribute attD is deleted?

```
@TestSuite
operation testSuite() {
    @TestCase
    operation testCase() {
        @TestScenario
        $pre Model!EClass.all().selectOne(x|x.name="ClassH").eStructuralFeatures.size() = 3
        operation testScenario() {
            if (
                Model!EClass.all().selectOne(x|x.name="ClassB").closure(x|x.eSuperTypes).forall(x|x.abstract=true)
            ) {
                assertTrue(Model!EClass.all().selectOne(x|x.name="ClassJ").eStructuralFeatures.exists(x|x.isTypeOf(EAttribute) and
                    x.eType.name="EnumA" and x.upperBound=-1));
                assertTrue(Model!EClass.all().selectOne(x|x.name="ClassB").eStructuralFeatures.selectOne(x|x.name="refK").eType.
                    eStructuralFeatures.selectOne(x|x.name="refH").eType.name = "ClassA");
            } else {
                assertTrue(false);
            }
        }
    }
}
```

Example

Task x.2



Q: Does the scenario test pass if ClassE has ClassG as its supertype class?

```
@TestSuite
operation testSuite() {
    @TestCase
    operation testCase() {
        @TestScenario
        $pre Model!EClass.all().selectOne(x|x.name="ClassH").eStructuralFeatures.size() = 3
        operation testScenario() {
            if (
                Model!EClass.all().selectOne(x|x.name="ClassB").closure(x|x.eSuperTypes).forall(x|x.abstract=true)
            ) {
                assertTrue(Model!EClass.all().selectOne(x|x.name="ClassJ").eStructuralFeatures.exists(x|x.isTypeOf(EAttribute) and
                    x.eType.name="EnumA" and x.upperBound=-1));
                assertTrue(Model!EClass.all().selectOne(x|x.name="ClassB").eStructuralFeatures.selectOne(x|x.name="refK").eType.
                    eStructuralFeatures.selectOne(x|x.name="refH").eType.name = "ClassA");
            } else {
                assertTrue(false);
            }
        }
    }
}
```


Your Exercise

- 6 tasks
 - 2 tasks per notation
 - 1 passing scenario test
 - 1 failing scenario test
 - Per task
 - 1 Ecore model under test
 - 1 scenario test description (in one notation)
 - 5 questions (yes / no / don't know) → please no guessing :-)
 - Plus: mention the line number(s) / message number(s) responsible for failing a scenario test
 - Plus for task x.2: mention the line number(s) / message number(s) responsible for failing the scenario test in the first place
 - Each question must be answered independently
 - Write down your start + end time per task!!!