SMA: Software Modeling and Analysis

Practical Session

Week 04
Assignment 03

Discussion
Metamodels (2.5 pts)

i) What is a metamodel?
A model of a model; a prescriptive view on an existing model. It determines the syntax and semantics of models that conform to it.

ii) How are metamodels used in Pharo?
Every object is an instance of a class. Every class inherits from Object. Every class is an instance of its (unique) metaclass, which inherits from Class. Every metaclass is an instance of Metaclass, which is itself a class.

iii) What are responsibilities of a metaclass in Pharo?
Instance creation, creating initialized instances of the metaclass’s sole instance, initialization of classvariables, method compilation, ...
A03 - Exercise 01

Metamodels (2.5 pts)

iv) Where is ProtoObject located in Pharo’s class hierarchy?
ProtoObject is the root class for all other classes including Object.
ProtoObject is the superclass of Object.

v) What is the purpose of the class ProtoObject?
The class ProtoObject only contains the core behavior needed to make the system work. The idea of ProtoObject is to have a lean class that separates the concerns.
A03 - Exercise 02

Sub and super classes (3 pts)
(you have to provide your code snippet and the result)

i) How many superclasses does Collection have?
   2: Collection allSuperclasses size.

ii) How many direct subclasses does Collection have?
    32: Collection subclasses size.

iii) How many indirect subclasses does Collection have?
     129: Collection allSubclasses size - Collection subclasses size.
A03 - Exercise 03

Class identity (3 pts)

a) Who new amIClassy.

**True:** Super is used in the context of the class of the method implementation.


**True:** Both elements represent the same object.

c) Who new classy1 = Who new classy2.

**True:** Both elements represent the same object.
A03 - Exercise 04

Object instantiation (1.5 pts)

i) Where is `new` defined?
   *It is first defined in the class Behavior.*

ii) Explain Pharo’s message implementation resolution strategy for the `new` message.
    *When the `new` is sent to a class it is being resolved throughout its metaclass chain. The search ultimately ends in Behavior.*

iii) List the concrete code in GT finally executed by the message `new`.
    *self basicNew initialize in the class Behaviour.*
Assignment 04

Preview
Write a *method*.

Find the *longest inheritance chain* among all Smalltalk classes in the Pharo programming environment.

**NB:**

To access all classes of Smalltalk, you can use

`SystemNavigation default allClasses`
Write a method.

Find all abstract method overrides in the Pharo system.
Write a method.
Find all query method implementing classes.

NB:
Query methods test a property of an object. Such methods are prefixed with "is", "was" or "will".
Write a method.

i) Find all root methods in GT.

NB:

A "root method" is a method whose selector has been implemented in a class, such that the super classes of that class do not understand it.

ii) (BONUS) Find all duck-typed methods in GT.

Duck-typed methods have the same selector but are not related by inheritance. That is, after finding all root methods, find those with the same selector.
Dynamic extension of code.

**Step 1:**
Redefine `Call>>doesNotUnderstand: aMessage`.
-> Add *dynamically* an instance variable to the class `Call`.

**Step 2:**
Add *dynamically* the provided method to the class `Call`.

**Step 3:**
Resend the initial message to `self`.