

COMP-533 Object-Oriented Software Development

Concern-Oriented Reuse Project

(45% of final grade)

February 16, 2021

As already announced at the beginning of the class, the COMP-533 project consists in developing a reusable concern. There are two options you can choose from:

- Option a) - Develop a new concern
- Option b) - If you happen to be an expert in some existing Java framework or library, you can also decide to create a concern for the framework.

Remember that you are working in groups of 6, so you should have a meeting where each student can propose one or several concern ideas and then you discuss which one you want to pursue. Also, whether you choose option a) or b), please talk to me before starting any significant work on the project so I can ensure that the scope of the project is adequate, and that no other group has chosen to work on the same topic.

Part 1 - Variation Interface, Domain Model and Example Application Domain (20%)

For part 1 of the project you are to elaborate:

- a variation interface (feature model + impact models) for your concern
- a concern-oriented domain model (i.e., a domain model in which all model elements are modularized according to the features they belong to)
- a sample application domain that reuses your reusable concern

Variation Interface

Option a) - Developing a New Concern If you decide to develop a new software development concern, ensure that in the (first version of the) feature model of the variation interface of the concern the variability is such that it allows for at least 4 different valid configurations. The variation interface should also have at least 2 impacts defined to discriminate between the different possible configurations. Please justify the specified contribution values.

Option b) - Developing a Concern-Oriented Interface for an existing Java Framework Depending on the size of the framework, the goal is to identify all the features of the framework (or at least a significant number of them), and as many impacts as possible.

Concern-Oriented Domain Model

In addition to the variation interface, you are also asked to create domain models for the features of your concern. Make sure that the domain concepts, attributes and relationships are correctly modularized according to the features you determined in the variation interface. As a reminder, domain models do not contain any operations (a constraint enforced in TouchCORE if you choose the Domain Modelling perspective).

Sample Application Domain

Finally, to showcase the use of your concern, you are to create a sample application domain model. To do that, create a new concern with just one root feature, and specify the domain model of the sample application in a class diagram associated with the root feature. In that domain model, reuse your concern, and establish customization mappings that connect the domain concepts from your reusable concern with the sample application domain.

Part 1 - Hand-In (by Friday March 12th 2021)

Please join one of the project groups in *myCourses* and upload your solution, i.e., a **zip** file containing:

- The concern folder of the concern you are developing (i.e., the folder with the **.core** file that contains (a first version of) the variation interface specification of the concern that you decided to develop, and a subfolder **Class Diagrams** that contains the **.cdm** files for each domain model),
- The concern folder of the sample application domain that reuses your concern (which should contain a **.core** file, a **Class Diagrams** subfolder, which contains one **.cdm** file with the domain model of the application).
- A short text with a description of the concern, the features, the impacts and the justification of the contribution values.

Part 2 - Realization Models (25%)

In the second part of the project you are to focus on creating *design realization models* for the features in your concern.

Option a)

Once you elaborate design realizations, it is of course possible that you want to update the variation interface you created in part 1. In particular you might discover new impacts due to your design. In this case, please update the impact model accordingly.

I am not expecting you to create a complete, executable design of your concern. However, your design should be reasonably complex. In addition to the structural design of the concern features (class diagrams), it is also mandatory to provide at least a partial behavioural design (aspectual sequence diagram) related to the key functionality that the concern offers.

If you are working on a low-level concern, I would even like you to attempt to create a design from which executable code can be generated. You are encouraged to reuse already existing TouchCORE concerns within your design (e.g. Singleton or Observer), or import existing Java code from libraries, if needed. As a guideline, you should elaborate around 4-6 design realization models, but in the feedback for the 1st part of the project I will be more specific.

Also, please submit again small sample application concern that illustrates how to reuse your concern, including some behaviour that demonstrates how to use the API of your concern.

Option b)

If you decided to create a concern for an existing Java framework, you are asked to elaborate design models that modularize the API of the framework according to the features you identified in part 1. Make sure you also correctly specify the customization interface of the framework (e.g., create partial subclasses to force the users to implement interfaces required by the framework). Try to modularize any required initialization behaviour with sequence diagrams. Model usage protocols, if any, with state diagrams.

Also, please submit again a small sample application concern that illustrates how to reuse your concern.

Part 2 - Hand-In (by Friday April 16th 2021)

The idea is that you continue to work with the partners you had for part 1 of the project. Please submit a **zip** file of the concern folder (i.e., the folder with the **.core** file that contains the concern that you decided to develop and **.ram** files for each design model) as well as a short text that contains a description of the concern, and the designed features. Also, submit a zip file of the concern folder of the application that reuses your concern together with a short text describing the application and the reuse by Friday April 16th 2021. Late hand-ins are accepted.