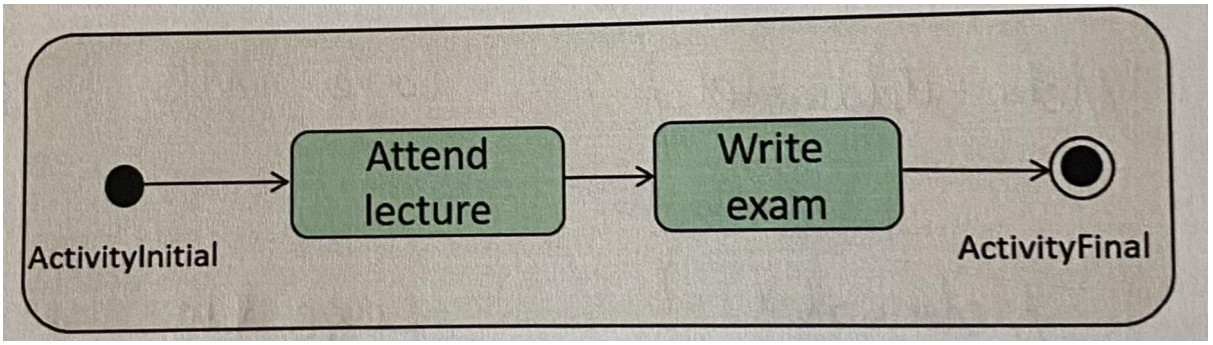
Model Engineering Midterm Exam WS22

Part I: Metamodeling Stack (9 points)

Outline the OMG (Object Management Group) metamodeling stack including the relationships among its levels and briefly explain each level with an example.

Part II: Metamodeling (10 points)

Define a graphical Ecore metamodel for UML activities. Use the full power of the metamodeling language Ecore, i.., datatypes, multiplicities, different kinds of references, etc. Below, an example UML activity model is given. The most important elements are the following:
An Activity (e.g."Complete lecture") has a name and consists of Activity Nodes which also have a name.
There are different kinds of Activity Nodes: Initial Nodes (e.g, "ActivityInitial"), Final Nodes (e.g., "ActivityFinal"), and Action (e.g., "Attend lecture").
Two Activity Nodes can be connected via Activity Edges. An Activity Edge is directed, i.e., it connects a Source Activity Node with a Target Activity Node. E.g., the Actions "Attend lecture" and "Write exam" are connected via an Activity Edge ("Attend lecture" is the Source Activity Node and "Write exam" is the Target Activity Node).



Part III: Graphical Concrete Syntax (9 points)

Outline and briefly explain the three general approaches for defining the graphical concrete syntax of a modeling language in the Eclipse Modeling Framework.

Part IV: MC Questions (12 points)

- If an Ecore metaclass A defines a containment reference to the meta-class B, it means that an instance of metaclass B is part of at most one instance of metaclass A.
- Any OCL constraint needs to be assigned a context, except if the context instance is unique.
- A metamodel defines the concrete syntax of a modeling language.
- OCL invariants can be used to further constrain the models conforming to a metamodel.
- Eugenia is a framework for defining the textual concrete syntax of a modeling language
- One abstract syntax can be represented by multiple concrete syntaxes.
- The Platform Independent Model specifies the structure while the Platform Specific Model specifies the behavior of a system.
- With Xtext the textual concrete syntax and the abstract syntax of a modeling language can be defined.
- OCL invariants are OCL expressions that return a Boolean value indicating whether a model element fulfills the invariant.
- MOF (MetaObject Facility) is an OMG standard for the definition of metamodels.
- A general-purpose modeling language is a language that is designed specifically for a certain domain.
- A model is an instance of a metamodel.