Software Engineering

Modeling

UML and Objects First

Lecture
2008/09/23

Content

- Scenarios and Examples
- Modeling
- Scenarios for us
- User Scenarios and Usecases (~ 30 min)
- Object Diagrams (~ 30 min)
- Break (10 min)
- Class Diagrams (~ 30 min)
- Activity and Sequence Diagrams (30-60 min)

Scenarios and Examples

- Be specific not abstract
- “A user interacts with a system” is not an example
- “Klaus klicks on the login button and enters his username kla01 and the password klasecret into the name field of the appearing dialog” is an example
- Same analogy as class and object

My Scenario: Towers of Hanoi

http://en.wikipedia.org/wiki/Towers_of_hanoi

Discs should be moved interactively.

Your Scenario

- Application Service Portal
  - Rendering
  - Solve huge linear equation
  - Physics simulation
  - ...

Why Model?

- *“If you were supposed to understand it, we wouldn't call it code.”* -
  from a Federal Expresspromotion, reported by IS Survivalist Matthew Persico
- Enables better communication
- Shows connections, relations, context at once
- Easier to see and estimate risks/costs

How To Model Software?

- Use a standard
- UML
  - Unified Modeling Language
  - accepted Standard of Software Industry
  - managed by Object Management Group (OMG)
  - mainly used in OO-Design
- Stay critical
  - maybe other models more accurate than one of the UML

UML – start for yourself!

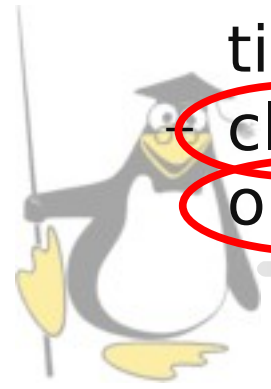
- http://www.uml.org/
- http://www.agilemodeling.com/essays/umlDiagrams.htm
- http://www.sparxsystems.com.au/UML_Tutorial.htm
- http://en.wikipedia.org/wiki/Unified_Modeling_Language
- Estonian translation of Martin Fowler's UML Distilled: http://www.cyber.ee/uml/

Free UML Modeler

- http://argouml.tigris.org/
- http://gaphor.sourceforge.net/
- http://pyut.sourceforge.net/
- http://www.fujaba.de/
  - allows MDA (more in my next lecture on 16th of November, Advances in Software Architecture)

UML Overview

- **Behavior diagrams**
  - behavioral features of a system or business process
  - activity, state machine, use case, and all interaction diagrams
- **Interaction diagrams**
  - subset of behavior diagrams emphasizing object interactions
  - communication, interaction overview, sequence, and timing diagrams
- **Structure diagrams**
  - depicts the elements of a specification irrespective of time
  - class, composite structure, component, deployment, object, and package diagrams



Used Material

- http://www.sparxsystems.com.au/resources/uml2_tutorial/uml2_usecasediagram.html
- http://www.sparxsystems.com.au/resources/uml2_tutorial/uml2_objectdiagram.html
- http://www.sparxsystems.com.au/resources/uml2_tutorial/uml2_classdiagram.html
- http://www.sparxsystems.com.au/resources/uml2_tutorial/uml2_activitydiagram.html
- http://www.sparxsystems.com.au/resources/uml2_tutorial/uml2_sequencediagram.html

Objects First Method

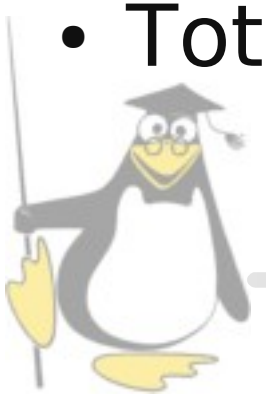
- Agile Software Development Method
- In close contact with customer
- User/Usecase scenarios/stories (textual usecases)
- -> Object and Usecase Diagrams
  - -> Class Diagrams
  - -> Activities
- From specific to abstract.

User Scenarios

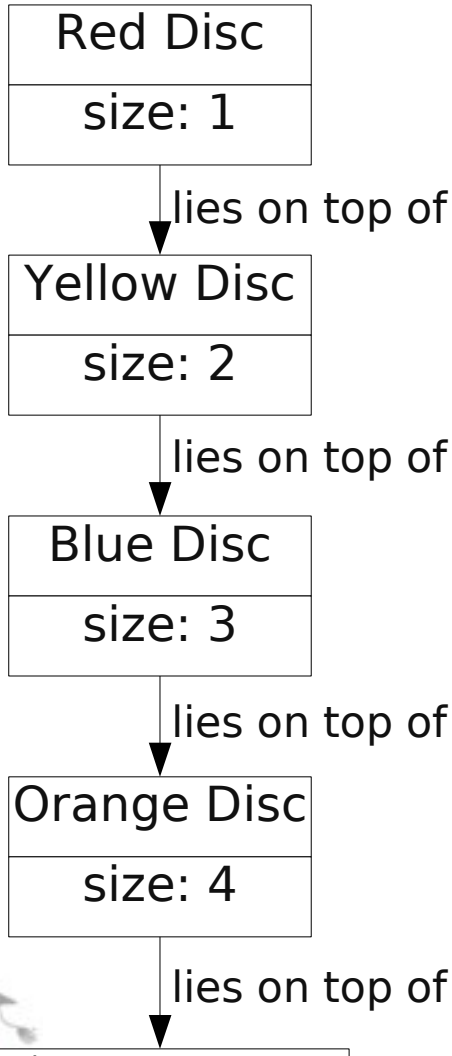
- Name: Move red disk to second place
- Precondition: red (size 1), yellow(size 2), blue (size 3), and orange (size4) disc sorted on initial towerplace (of 3)
- The player moves the red disc onto the second towerplace
- Postcondition: yellow, blue, and orange disc sorted on initial towerplace (of 3), red on second towerplace

User Scenarios Tasks

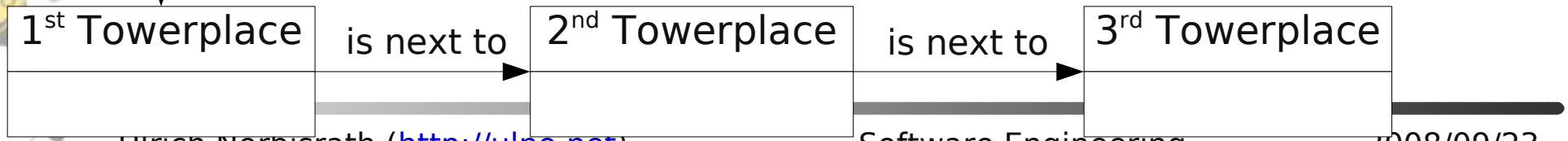
- Form your teams
- One takes role of customer and describes what he wants, other developer
- Together create Usecase Scenarios
- Result will be compared to selected other groups
- Note down difficulties/problems
- Total time for activity: 20min

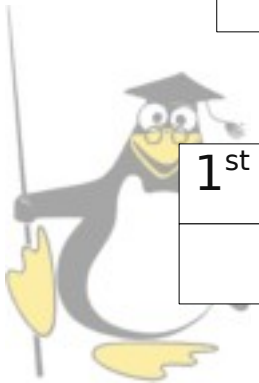


Object Diagram

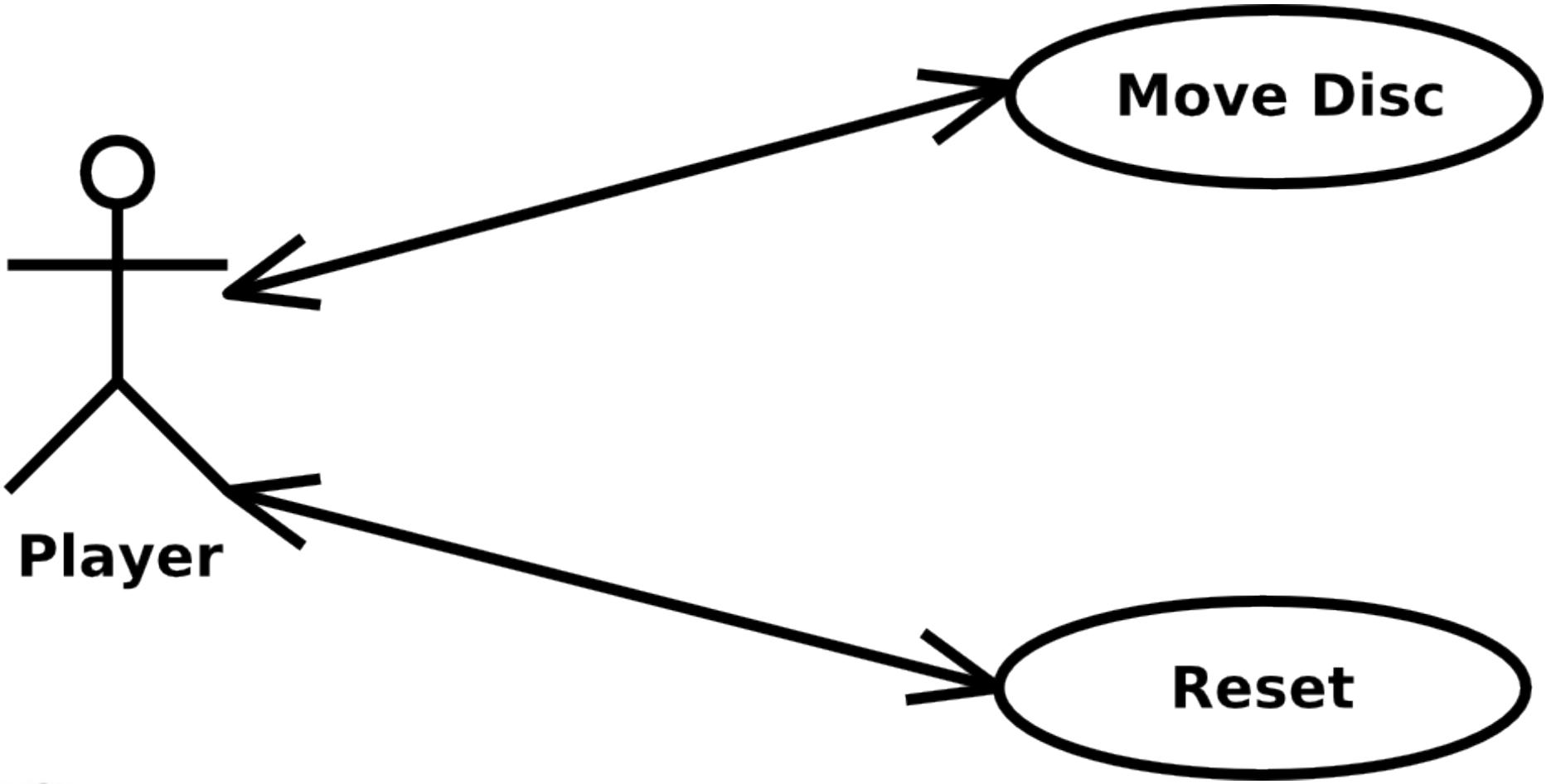


Precondition for move disc





Usecase diagram



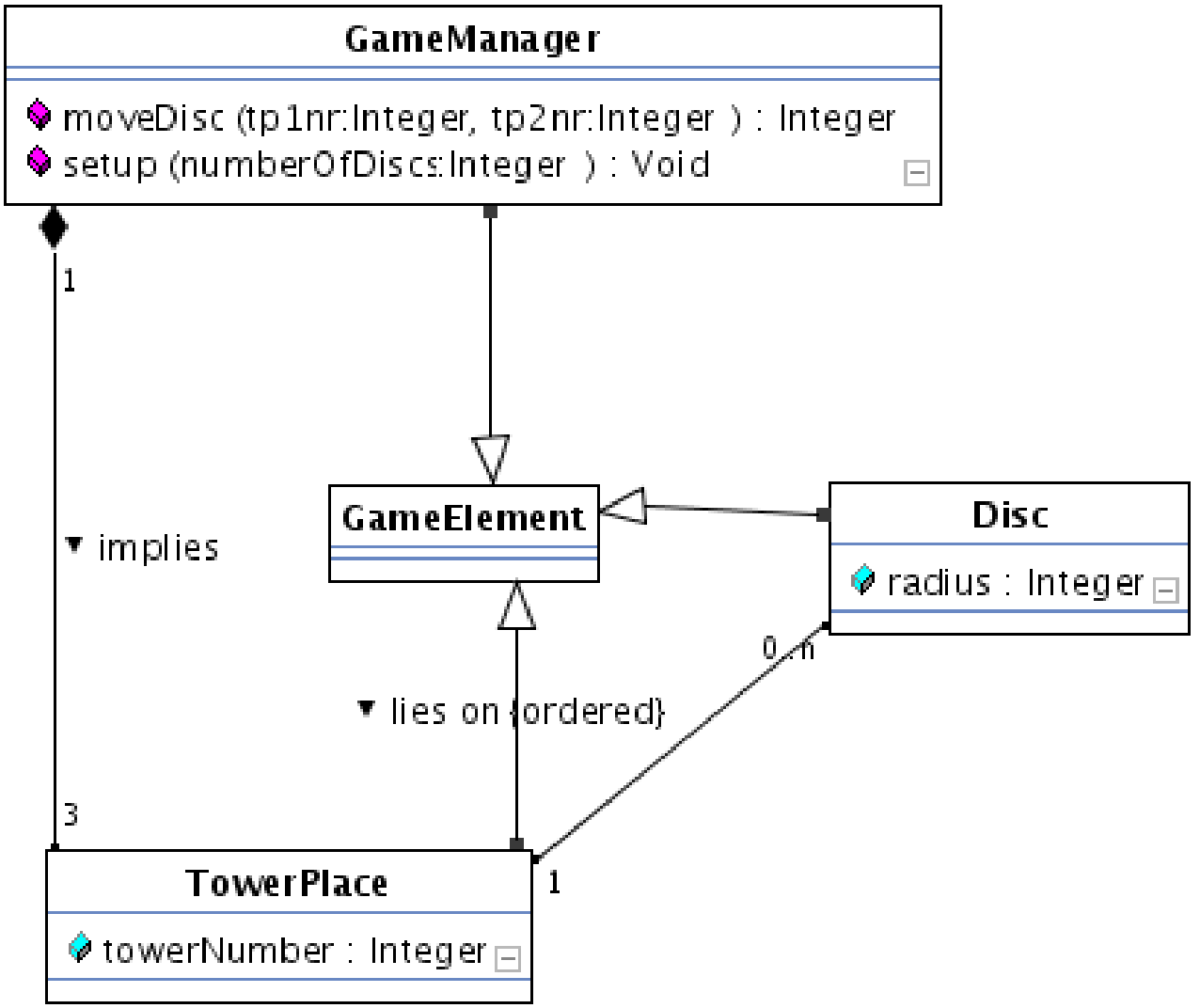
Object Diagram Tasks

- Create object diagrams (before and after) for 3 user scenarios
- Create corresponding usecase diagram
- Result will be compared to selected other groups
- Note down difficulties/problems
- Total time for activity: 30min

Break

10 Minutes Break

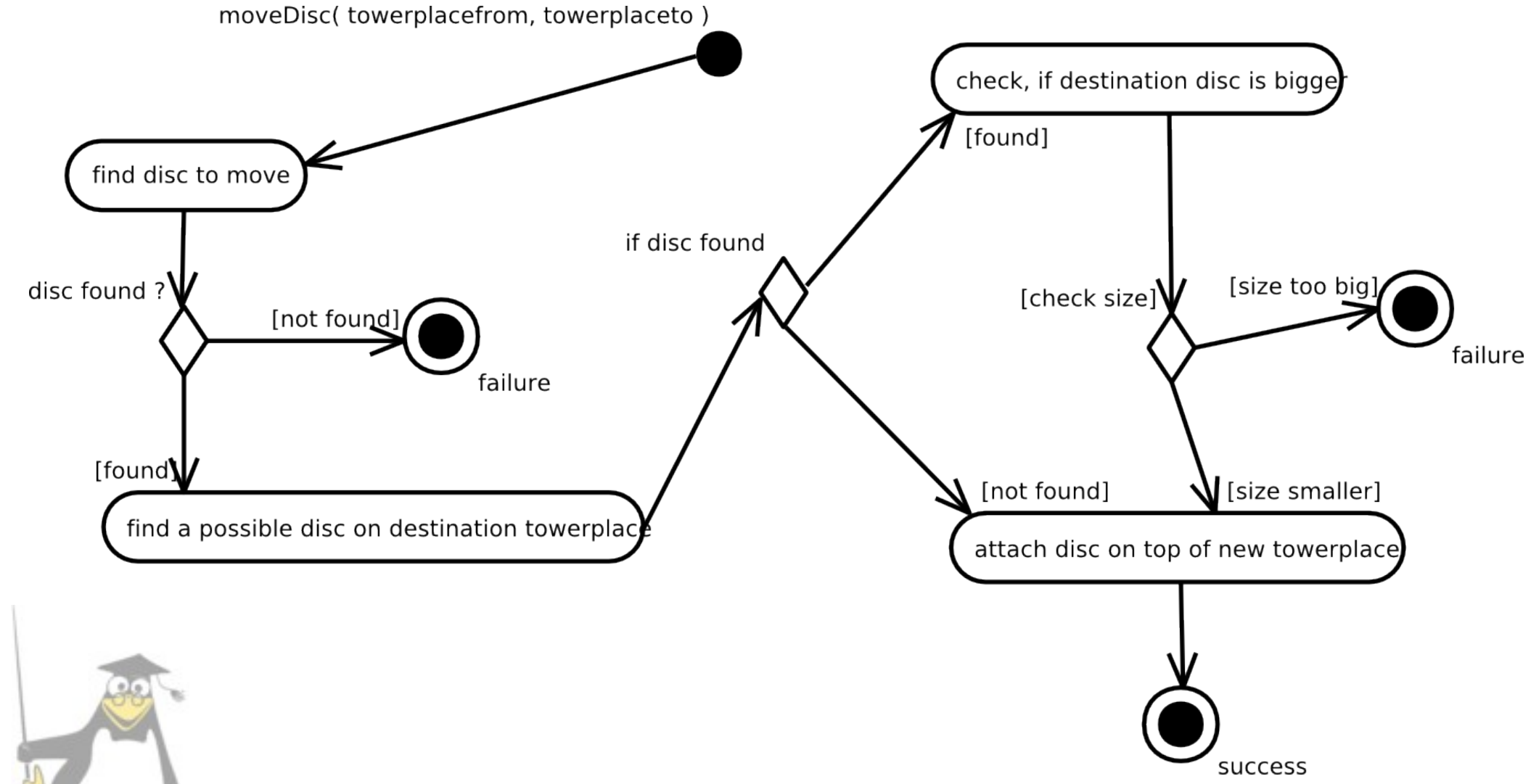
Class Diagram



Class Diagram Tasks

- Derive class diagrams from object diagrams
- One team at blackboard
- Result will be compared to selected other groups
- Note down difficulties/problems
- Total time for activity: 30min

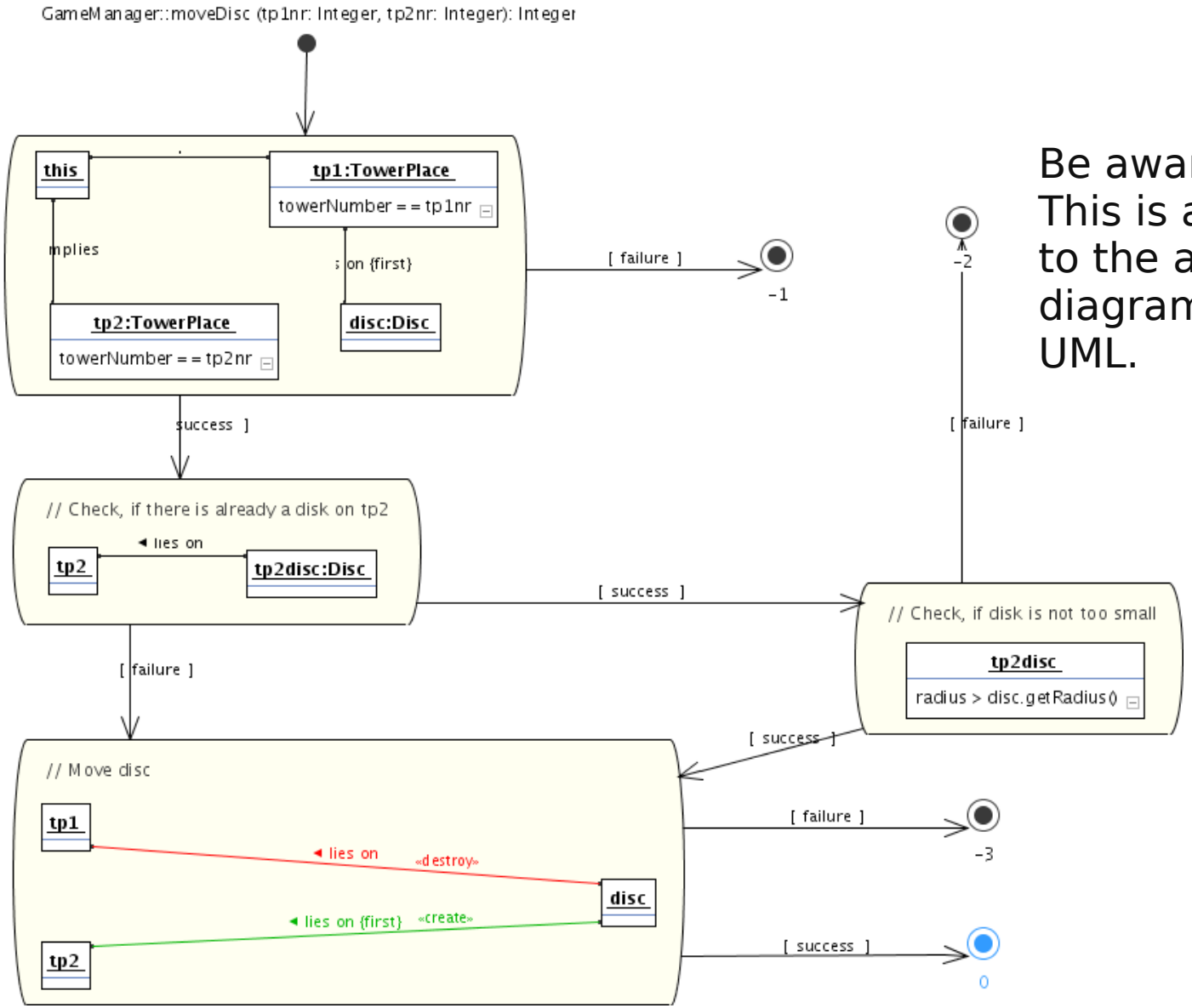
Activity Diagram



Activity Diagram Tasks

- Read description
- One team at blackboard
- Create 2 activity diagrams
- Result will be compared to selected other groups
- Note down difficulties/problems
- Total time for activity: 30min

Story Diagram (Outlook)



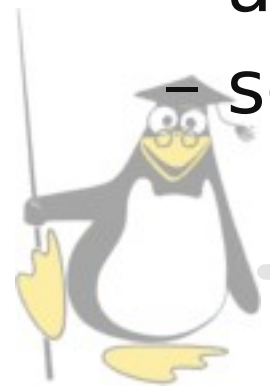
Be aware!
This is an extension to the activity diagram defined in UML.

Sequence Diagram Tasks

- Read description
- One team at blackboard
- Create 2 sequence diagrams
- Result will be compared to selected other groups
- Note down difficulties/problems
- Total time for activity: 30min

Summary

- Why do we model?
- What is the Objects First Method?
- UML
  - user scenario (textual usecase,...)
  - usecase
  - object diagram
  - class diagram
  - activity diagram
  - sequence diagram



Appendix

User Scenario Example

- User Jaanus Viirtuaal registers as a new user in the system
- **State before:** The persons Klaus Klaas and Maria Viirtuaal are already registered
- User Jaanus selects “create new user”
- He is presented a form
- He enters his name and email and financial information
- He submits his information
- **State after:** 3 persons including Jaanus are in the system