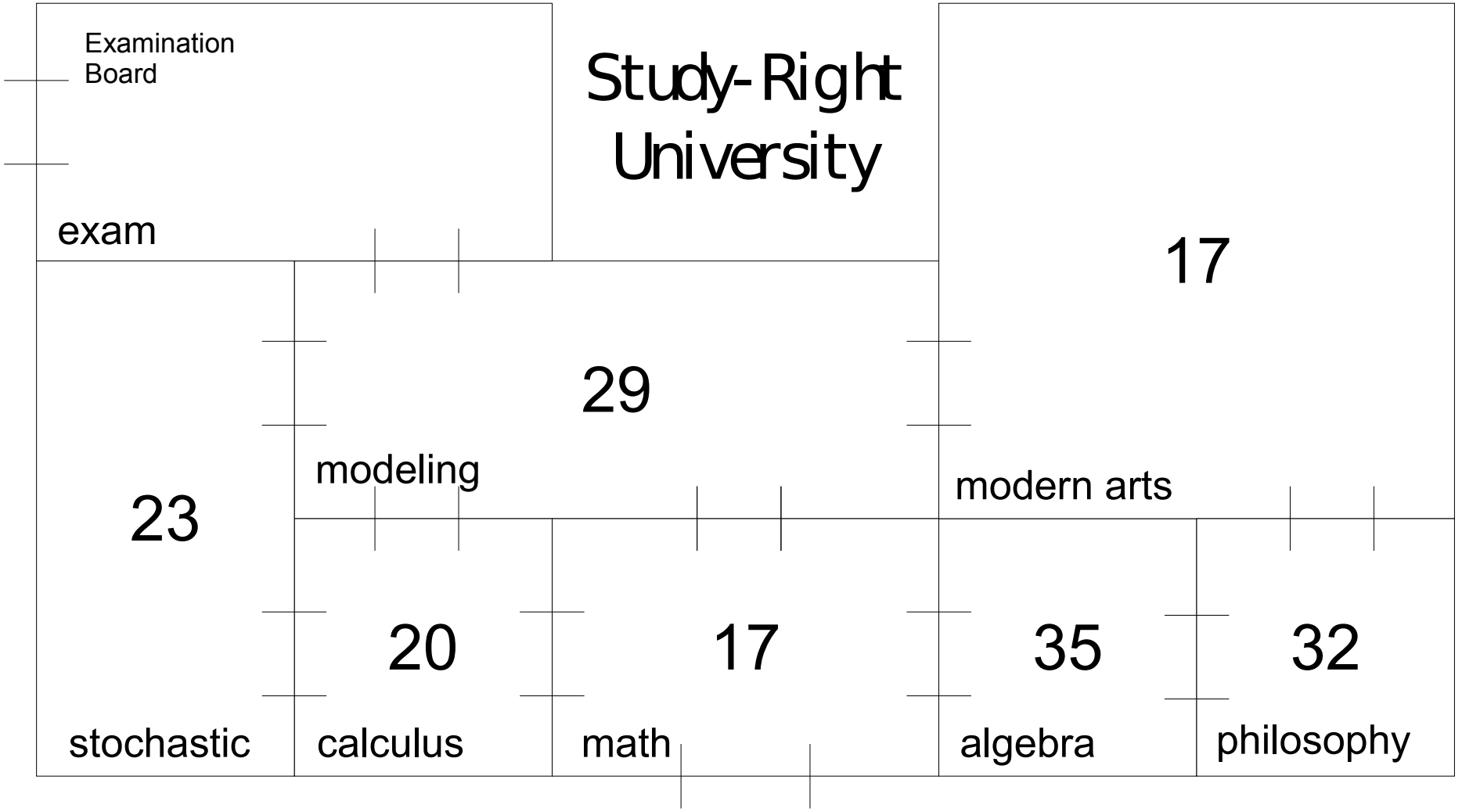
Software Architecture

Lecture 5
Scenario → Objects → Classes

Back to Study Right



Bad examples

- There is a university, where a student can move from room to room and earn credit points and lose at the same time motivation points. The student has to have a fixed number of credit points to be able to enter an exam room to pass the exam and graduate from the university.
- A student is studying and has to get a number of credit points.
- This case deals with a very specific curriculum.
- Karli takes a fitting course.

Why do we think these are bad?

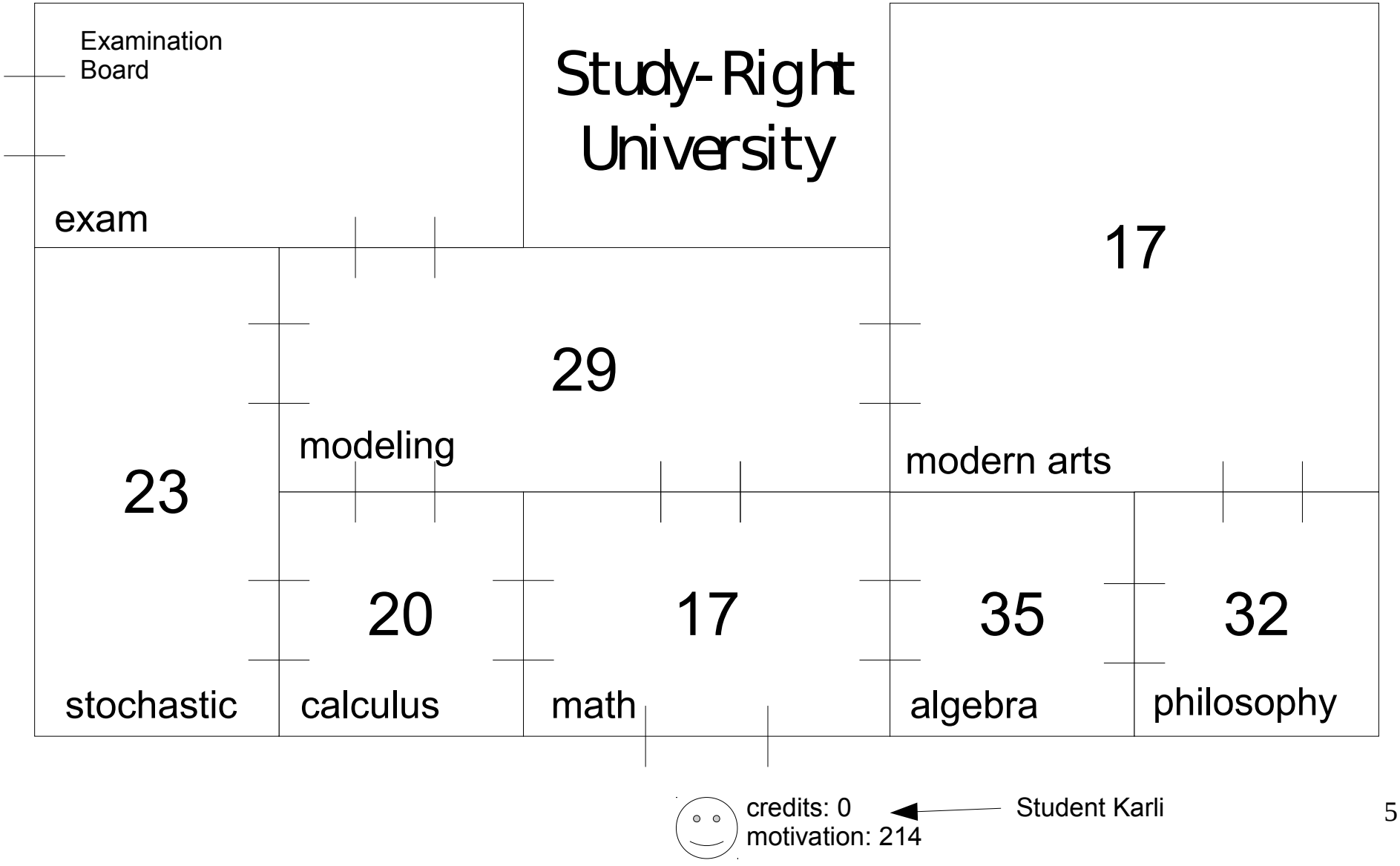
Examples that we believe are good:

The student Karli wants to achieve a degree at the Study-Right University. The initial situation is depicted in the attached figure. For a degree we need at the moment 214 credit points and Karli starts with 0 credit points and 214 motivation points. Karli is outside of the university and now enters the university into the math class. Karli attends the math lecture and automatically earns 17 credit points for it and loses at the same time 17 motivation points. Karli has now 17 credit points and 197 motivation points and can move on to the modeling class.

Possible abstract title: Student passing one class

Possible concrete title: Karli entering and passing math class

Attached Figure



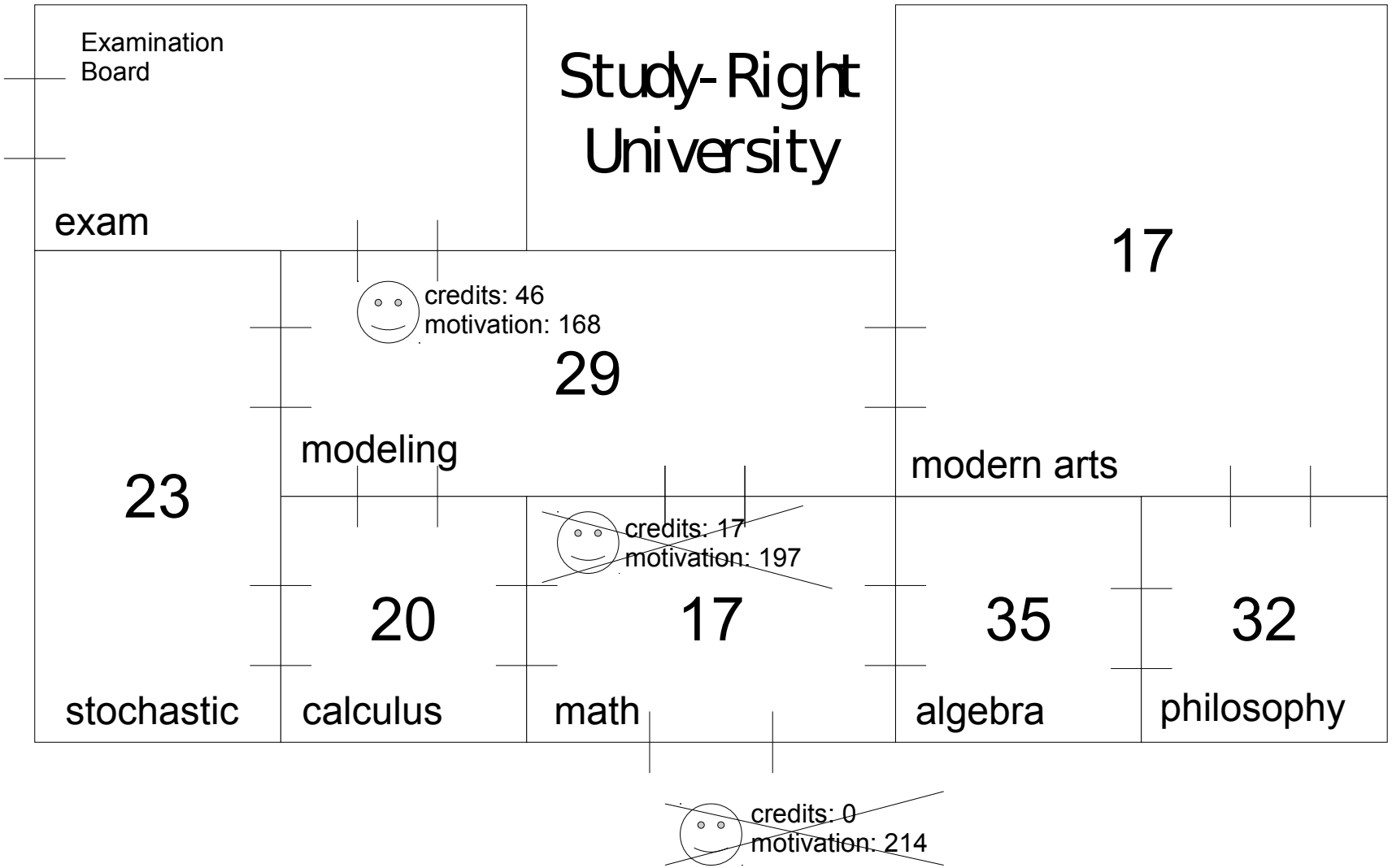
Another good example

Karli has studied math and modeling and therefore has now 46 credit points and 168 motivation points. Karli tries to enter the examination room. This situation is depicted in the attached figure. When entering, the examination board asks for the study book containing the number of gained credit points as well as the visited courses. As Karli's number of credit points is smaller than 214 the examination board does not allow graduation and Karli has to leave the university and start over.

Abstract title: Student failing univerisity due to low credit points

Concrete title: Karli failing university due to having only 168 points

Example 2 Figure



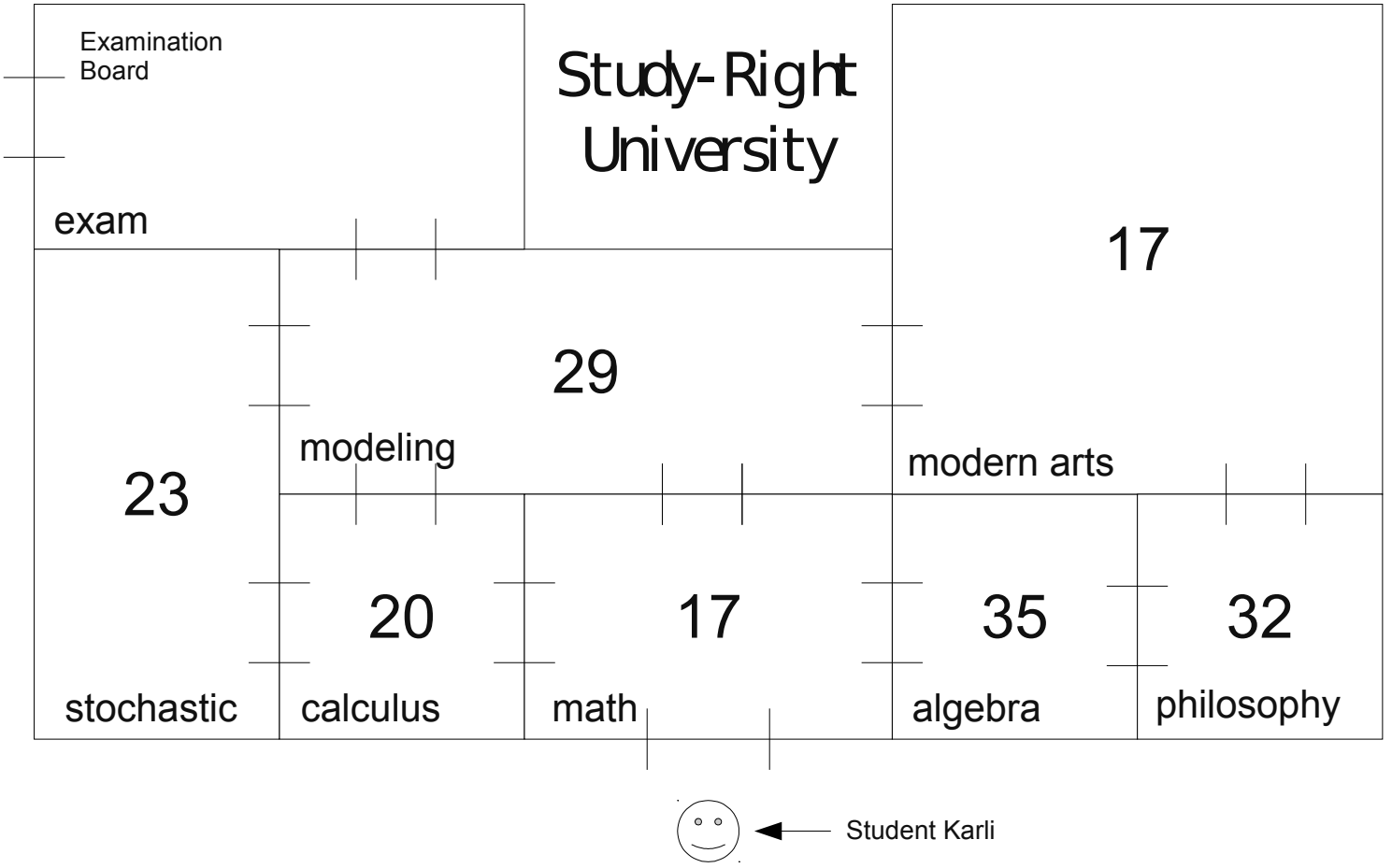
Objects

- SDM uses **Objects** First design
- **Objects** are in **Object** Orientation
- What are **Objects**?

Object

- thing, entity
- concrete
- instance of class
- memory location
- data structure, has sub-elements
- has methods
- struct + methods

Lecture Example: Study Right University



Task:

- Path finding

Handicaps:

- Motivation points
- Per credit one motivation
- 214 credits
- Compulsory courses
- Dependencies from module
- . . .

User-stories to objects

- **Title:** Karli enters the SRU
- **1. Pre:** Karli has 214 motivation points and 0 credit points, Karli is outside of the SRU. To the outside of the SRU the math lecture hall is connected. Math has a work load of 17. Karli has an empty notebook to note down his courses.
- **Action:**
  - 2. Karli enters the math lecture hall.
  - 3. After entering, he studies and 17 credit points are credited.
  - 4. Due to the heavy work he loses 17 motivation points.
  - 5. He writes in his notebook in the first line “first try” and “1. math, 17” in the second line.
- **6. Post:** Karli is in the math lecture hall. He has 17 credit points and 197 motivation points. His notebook contains the lines: “first try” and “1. math, 17”.

Identify objects?

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- **1. Pre:** Karli has 214 motivation points and 0 credit points, Karli is outside of the SRU. To the outside of the SRU the math lecture hall is connected. Math has a work load of 17. Karli has an empty notebook to note down his courses.
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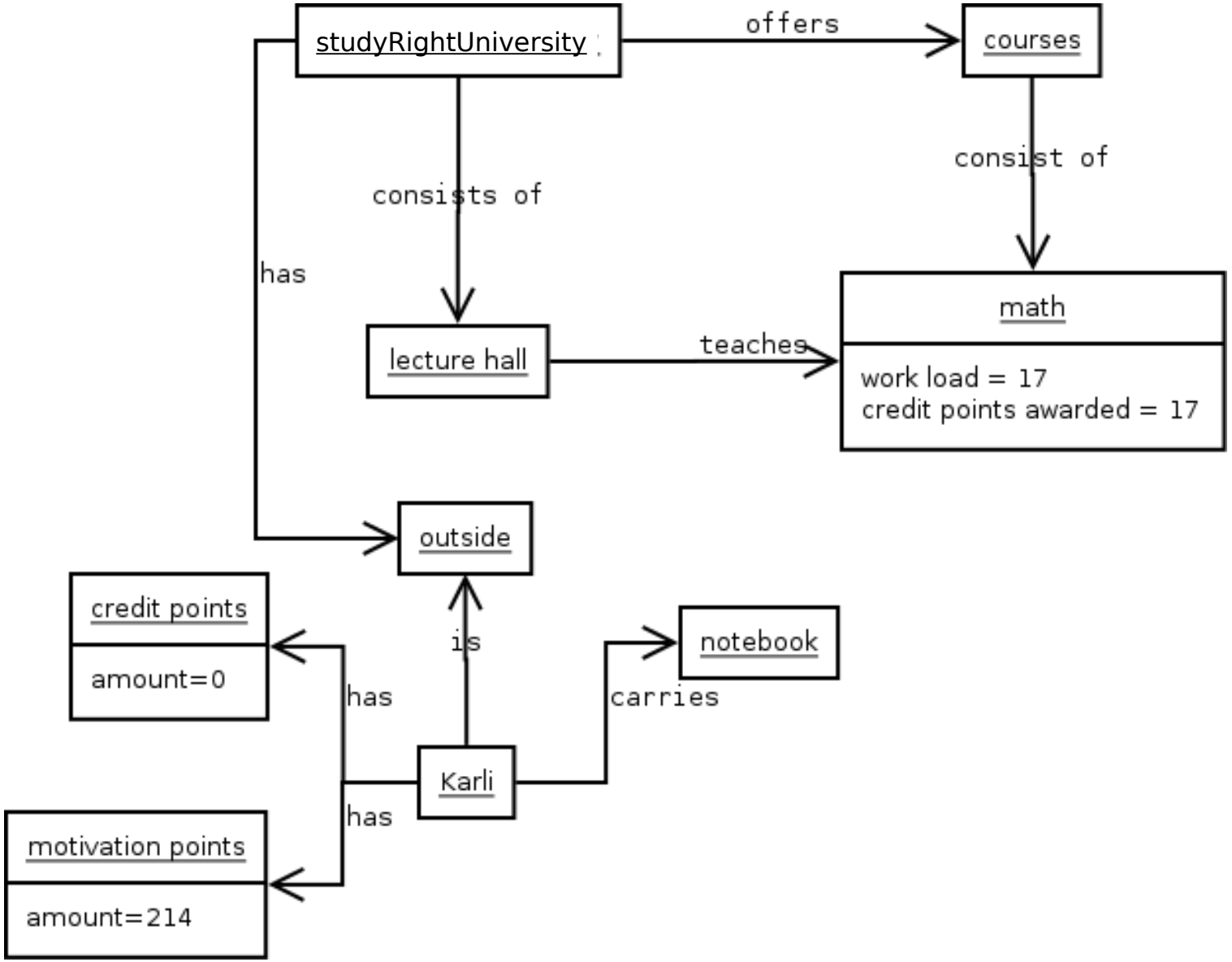
Identified objects

- Karli
- Study-Right-University (SRU)
- motivation points
- credit points
- math
- lecture hall
- notebook
- courses
- (first, second) line
- work load

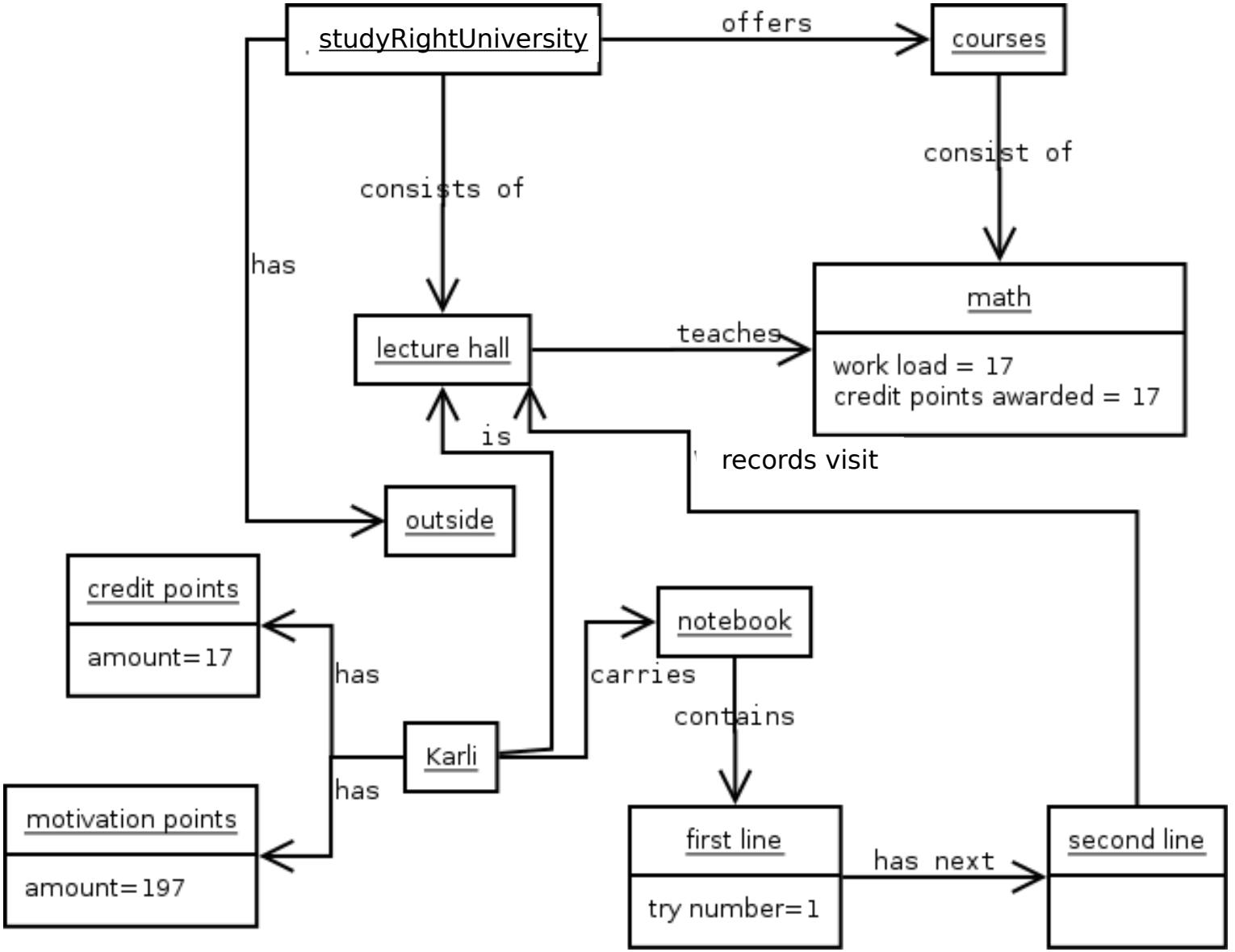
Exercise object diagrams Karli enters Study-Right-Univ.

- Work in teams / alternate groups (Pre, Post)
- Pre creates object diagram for pre condition in on paper (5 min)
- Post creates object diagram for post condition in on paper (5 min)
- Take picture and post solution to slack #in-class-karli-enters
- Mix and compare, what type of operations (on object level) are needed (5min)
- Think about possible groups of objects and ideas how to move on to classes

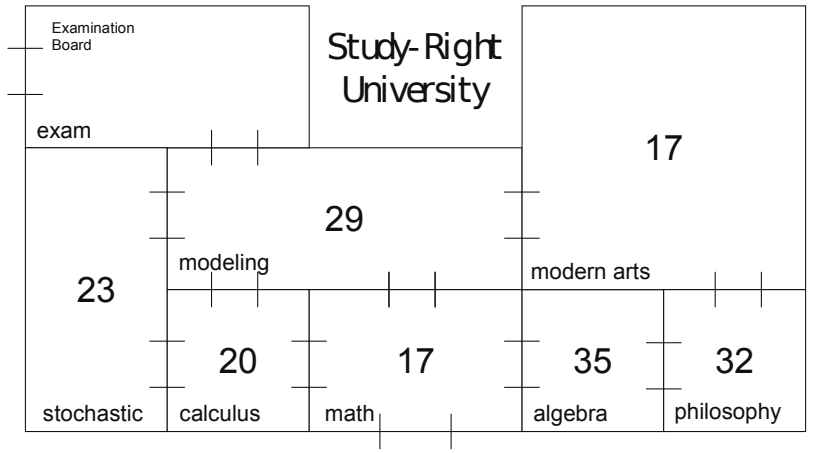
Pre condition



Post condition



To Classes



r4
topic = "exam"

r5
topic = "modeling"
credits = 29

r6
topic = "modern arts"
credits = 17

r3
topic = "stochastic"
credits = 23

r2
topic = "calculus"
credits = 20

r1
topic = "math"
credits = 17

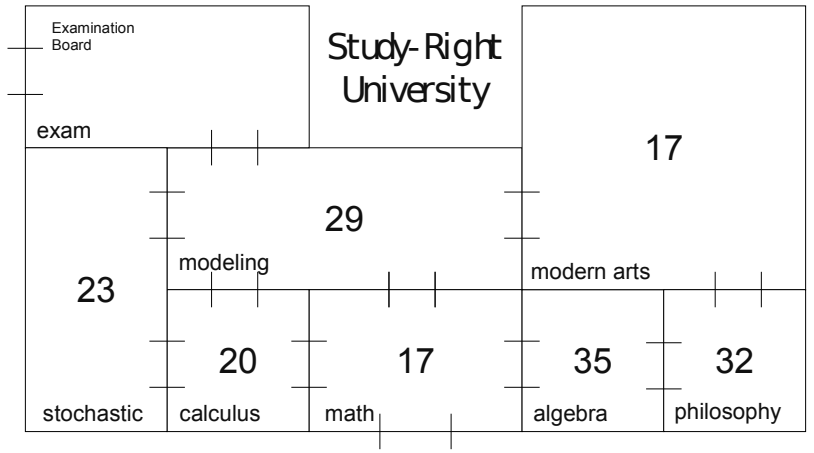
r8
topic = "algebra"
credits = 35

r7
topic = "philosophy"
credits = 32

rw

karli
motivation = 197
credits = 17

To Classes



r4: ExamRoom
topic = "exam"

r5: Room
topic = "modeling"
credits = 29

r6: Room
topic = "modern arts"
credits = 17

r3: Room
topic = "stochastic"
credits = 23

r2: Room
topic = "calculus"
credits = 20

r1: Room
topic = "math"
credits = 17

r8: Room
topic = "algebra"
credits = 35

r7: Room
topic = "philosophy"
credits = 32

rw: Outside

karli: Student
motivation = 197
credits = 17

Simple Class Diagram