

T-620-ENGX

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Foley

CopIt

- Course optimization program

LIKX-2

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14 March 2022

Cop: A abbreviation for "Course optimisation program"

It: A abbreviation for "Information technology"

Cop It

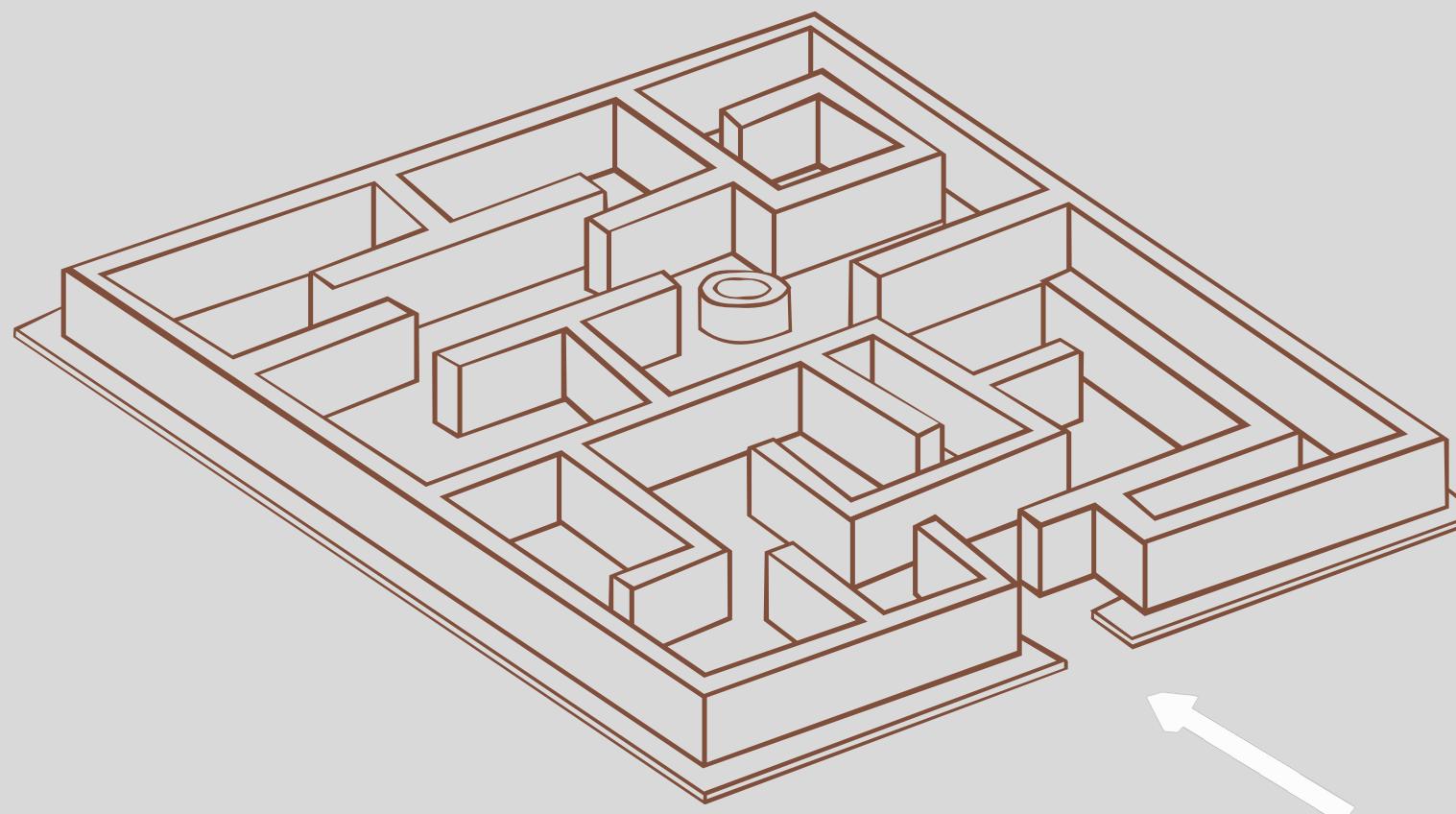
"Cop" is also a slang for wanting to get something.

Together "Cop it" means in this case choosing the courses you want to take

PROBLEM



School authorities & students have a hard time estimating if a course selection fulfills all demands to complete a university degree.
Example: General engineering





SOLUTION

Optimization program that takes in course info from school authorities & course choices from students. The program **gives a course plan for students** based on choices & recommends the best solution if course selection is not fulfilling a university degree.

Related programs for comparison

In week 4 the group did some research into optimization models that already exist and were comparable to the groups project. The group found two models, that are both M.Sc. theses, written by students in RU.

Assigning teachers to classes



[Ing16]

Pilot recurrent training

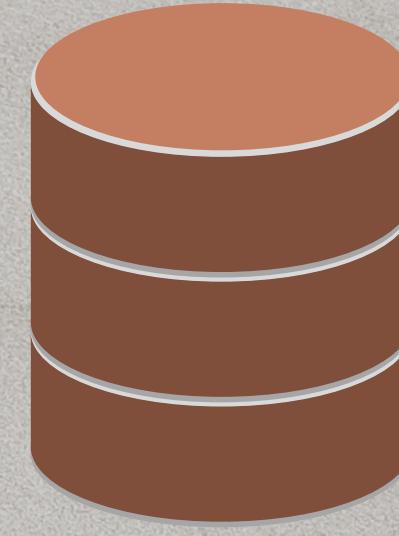


[Sil19]

Metrics



Run time [sec]



Database size [GB]



Constraints [count]



Variables [count]

Stakeholders



School authorities

&



Students

PRIMARY CUSTOMER NEEDS

+ Model is easy to use

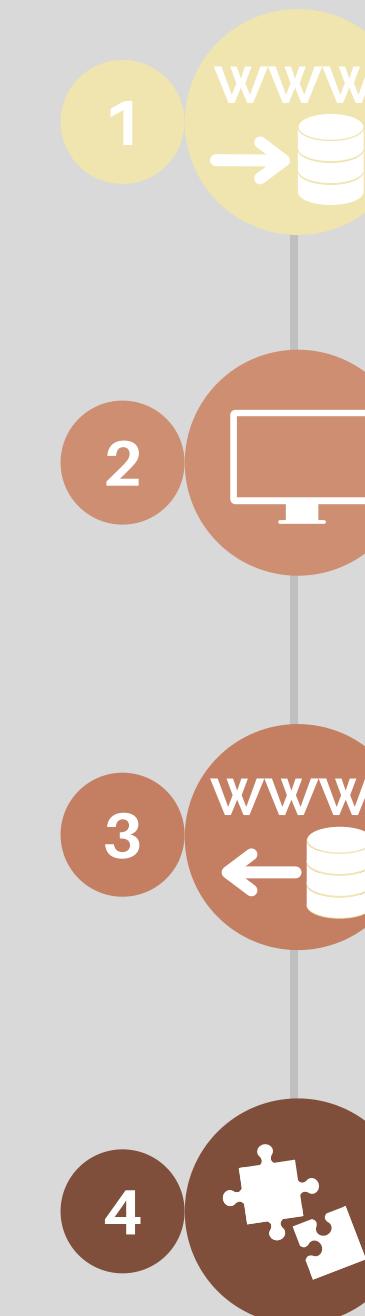
+ Model is reliable

+ Model gives appropriate feedback

+ Customer can adjust constraints to preference

+ Model enables students & staff to organize their study with ease

FOUR POSSIBLE CONCEPTS (ranked)



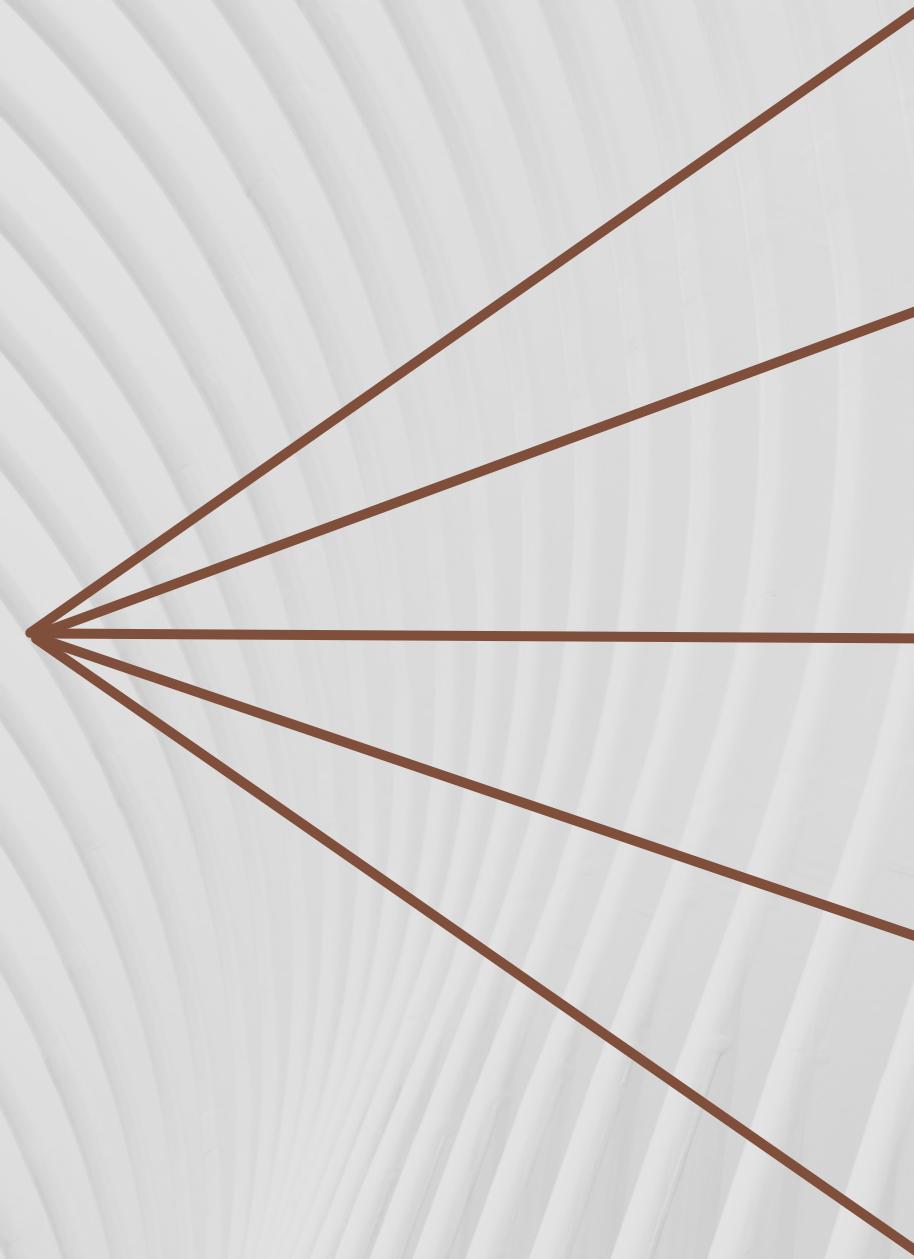
Website w. internal database

Offline desktop application

Website w. external database

Boarding game

Concept Testing



Functional Requirements

Get results from chosen study line & subject.

Get results and **course recommendations** from partially filled out course selection.

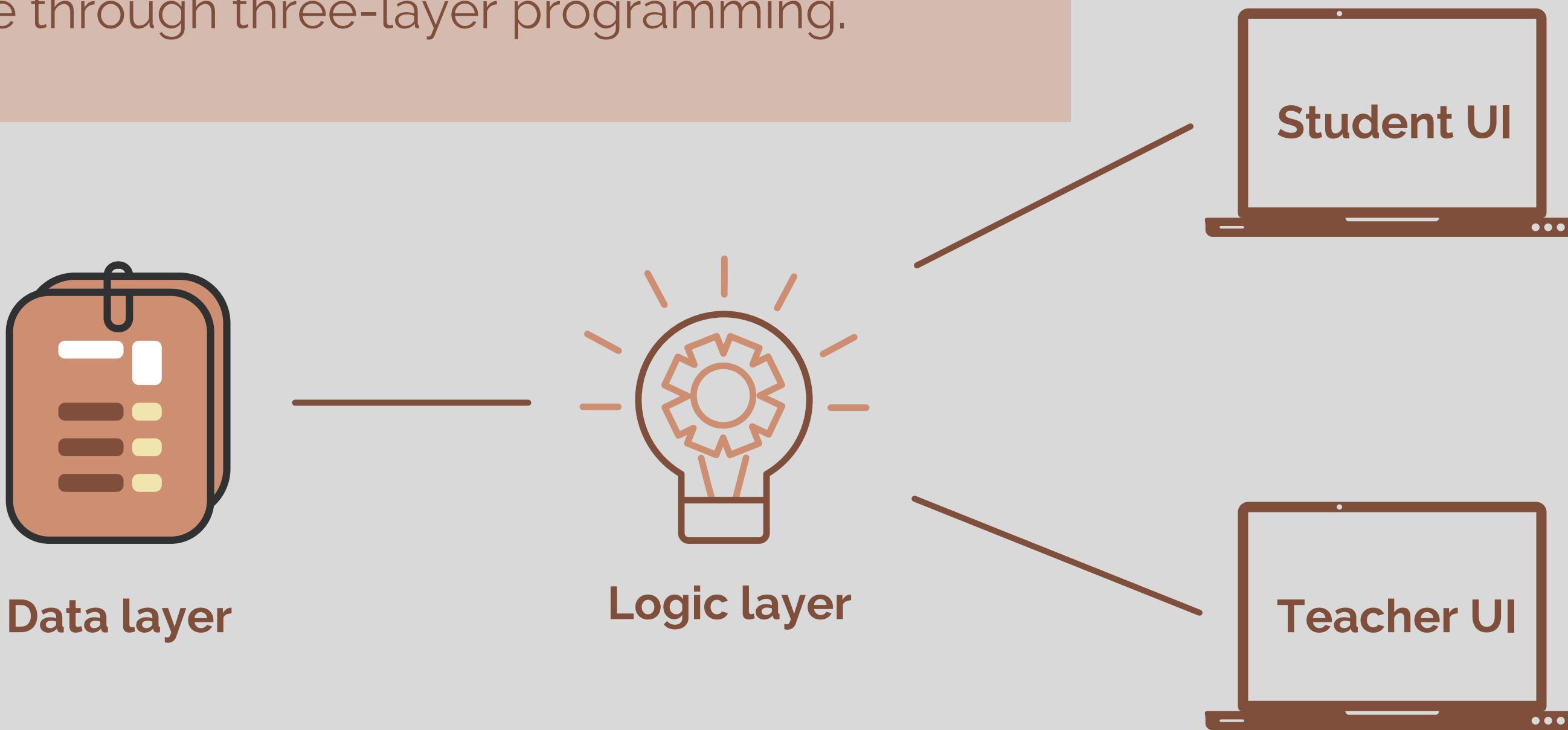
Detects if a course has **prerequisites**.

Exports output in **PDF form**.

Labels courses depending on characteristics.

Format

Two user interfaces that connect to the same database through three-layer programming.

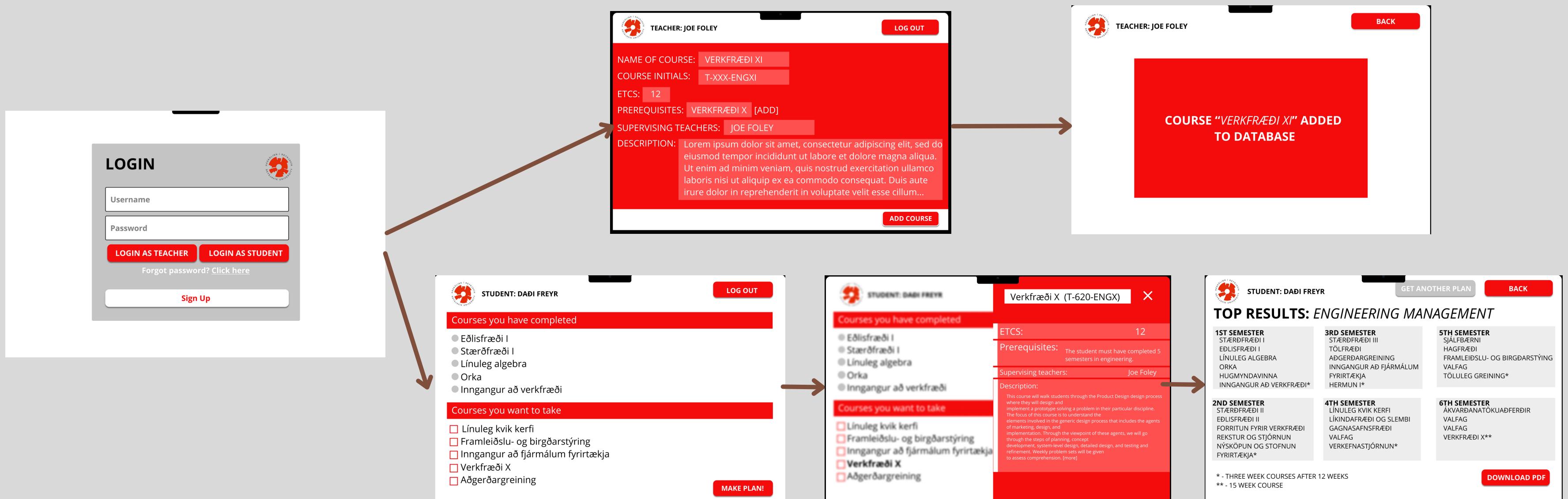


User Interfaces

We have made prototypes for two different user interfaces, using Figma.

Teachers interface

Student interface



Prototype for teacher interface

LOGIN



Username

Password

LOGIN AS TEACHER **LOGIN AS STUDENT**

Forgot password? [Click here](#)

Sign Up

(Credit: Baldur Logi 2022)



TEACHER: JOE FOLEY

LOG OUT

NAME OF COURSE: VERKFRÆÐI XI

COURSE INITIALS: T-XXX-ENGXI

ETCS: 12

PREREQUISITES: VERKFRÆÐI X [ADD]

SUPERVISING TEACHERS: JOE FOLEY

DESCRIPTION: Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum...

ADD COURSE

(Credit: Baldur Logi 2022)



TEACHER: JOE FOLEY

BACK

**COURSE "VERKFRÆÐI XI" ADDED
TO DATABASE**

(Credit: Baldur Logi 2022)

Prototype for student interface

LOGIN



Username

Password

LOGIN AS TEACHER **LOGIN AS STUDENT**

Forgot password? [Click here](#)

Sign Up

(Credit: Baldur Logi 2022)



STUDENT: DAÐI FREYR

LOG OUT

Courses you have completed

- Eðlisfræði I
- Stærðfræði I
- Línuleg algebra
- Orka
- Inngangur að verkfræði

Courses you want to take

- Línuleg kvík kerfi
- Framleiðslu- og birgðarstýring
- Inngangur að fjármálum fyrirtækja
- Verkfræði X
- Aðgerðargreining

MAKE PLAN!



STUDENT: DAVID FREYR

Courses you have completed

- Eðlisfræði I
- Staerðfræði I
- Línuleg algebra
- Orka
- Inngangur að verkfræði

Courses you want to take

- Línuleg kvík kerfi
- Framleiðslu- og birgðarstýring
- Inngangur að fjármálum fyrirtækja
- Verkfræði X
- Aðgerðargreining

Verkfræði X (T-620-ENGX)



ETCS:

12

Prerequisites:

The student must have completed 5 semesters in engineering.

Supervising teachers:

Joe Foley

Description:

This course will walk students through the Product Design design process where they will design and implement a prototype solving a problem in their particular discipline. The focus of this course is to understand the elements involved in the generic design process that includes the agents of marketing, design, and implementation. Through the viewpoint of these agents, we will go through the steps of planning, concept development, system-level design, detailed design, and testing and refinement. Weekly problem sets will be given to assess comprehension. [more]

(Credit: Baldur Logi 2022)



STUDENT: DAÐI FREYR

LOG OUT

Courses you have completed

- Eðlisfræði I
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Courses you want to take

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- Verkfræði X
- Aðgerðargreining

MAKE PLAN!



STUDENT: DAÐI FREYR

GET ANOTHER PLAN

BACK

TOP RESULTS: ENGINEERING MANAGEMENT

1ST SEMESTER

STÆRÐFRÆÐI I
EÐLISFRÆÐI I
LÍNULEG ALGEBRA
ORKA
HUGMYNDAVINNA
INNGANGUR AÐ VERKFRÆÐI*

2ND SEMESTER

STÆRÐFRÆÐI II
EÐLISFRÆÐI II
FORRITUN FYRIR VERKFRÆÐI
REKSTUR OG STJÓRNUN
NÝSKÖPUN OG STOFNUN
FYRIRTÆKJA*

3RD SEMESTER

STÆRÐFRÆÐI III
TÖLFRÆÐI
AÐGERÐARGREINING
INNGANGUR AÐ FJÁRMÁLUM
FYRIRTÆKJA
HERMUN I*

4TH SEMESTER

LÍNULEG KVIK KERFI
LÍKINDAFRÆÐI OG SLEMBI
GAGNASAFNSFRÆÐI
VALFAG
VERKEFNASTJÓRNUN*

5TH SEMESTER

SJÁLFBÆRNÍ
HAGFRÆÐI
FRAMLEIÐSLU- OG BIRGÐARSTÝING
VALFAG
TÖLULEG GREINING*

6TH SEMESTER

ÁKVARÐANATÖKUAÐFERÐIR
VALFAG
VALFAG
VERKFRÆÐI X**

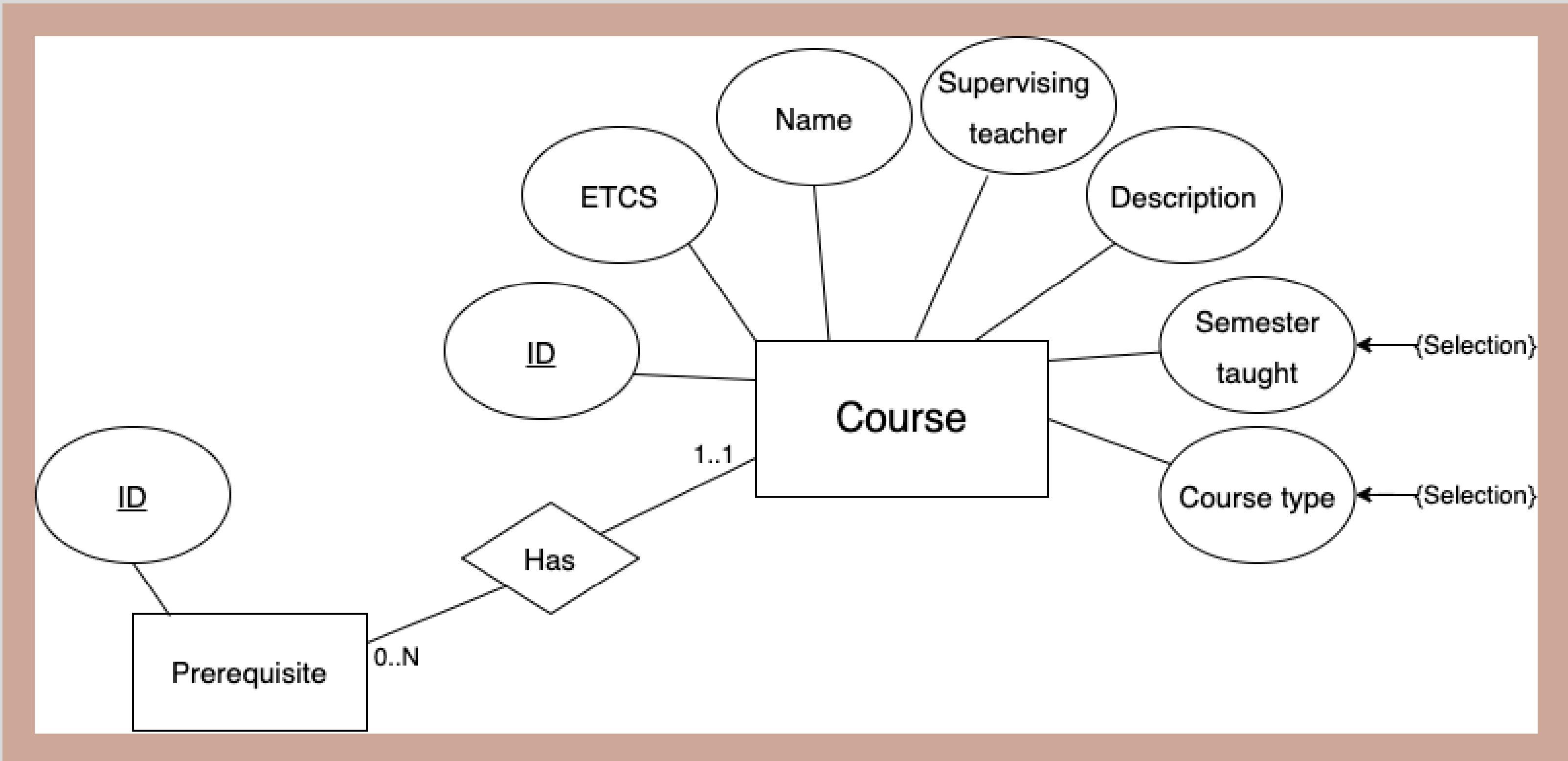
* - THREE WEEK COURSES AFTER 12 WEEKS

** - 15 WEEK COURSE

DOWNLOAD PDF

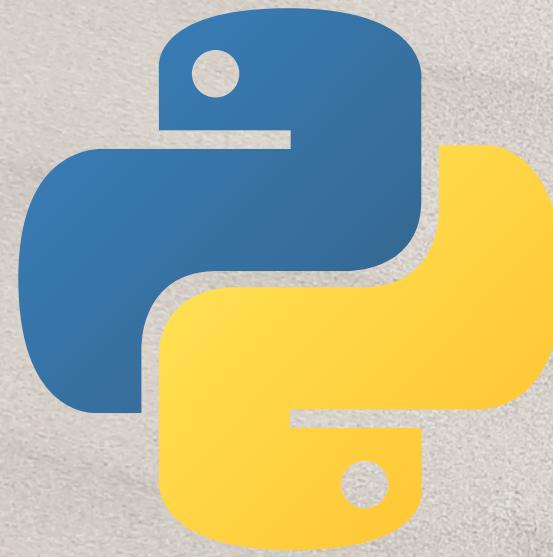
(Credit: Baldur Logi 2022)

Database ER-diagram

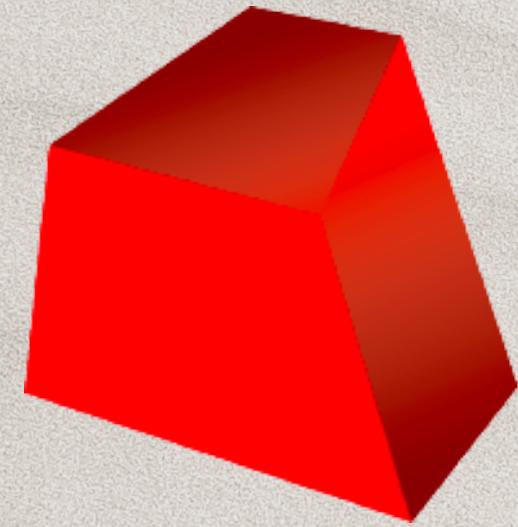


(Credit: Áslaug Sól 2022)

Project resources



Python



GurobiPy



Database
management
system



Data from RU



Computers

Bill of Materials

Components	Description	Cost
Python	For coding	0 ISK
GurobiPy	For the optimization part	0 ISK
Computer	To work on software	349.995 ISK
Server	For hosting the database	1200-2400 ISK/month

[AWS]

[Mac22]

Estimations for cost of product

Time for development: 800 working hours total

Cost of hourly rate: 3.000 ISK/hour

Occurrence of software maintenance: 80 hours/week (2 persons working full time)

Cost of storing data: 20.000 ISK/month

Computers fo running program and storing software: 4 computers (Used for developing software), costumer has access from own computer.

Cost of initial development: 800 hours x 3.000 ISK/hour
= **2.400.000 ISK**

Yearly cost of maintenance: 80 hours/week x 52 weeks/year x 3.000 ISK/hour
= **12.480.000 ISK**

Yearly cost of data storing: 20.000 ISK/month x 12 months/year
= **240.000 ISK**

What is ready?

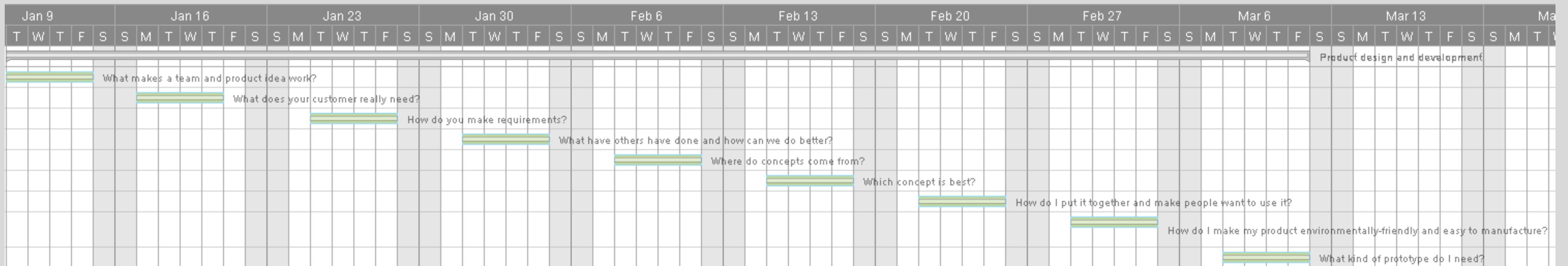
Product development
Phase 1

User interface
prototype (design)

Database ER-diagram



Product development - phase 1



(Credit: Kári Steinn 2022)

What is left?

Functional requirements

Teacher UI

Student UI

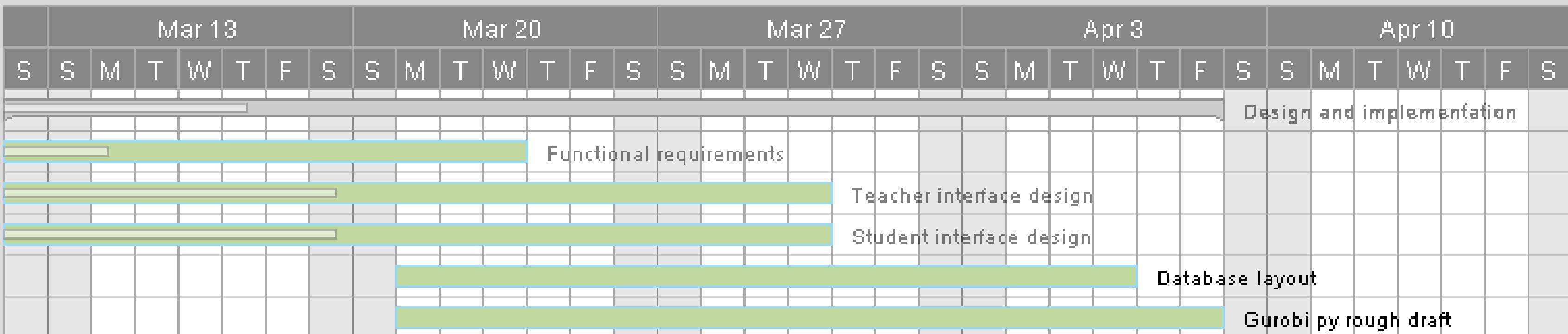
Database layout

Gurobi Py setup

Programming/production
ramp-up

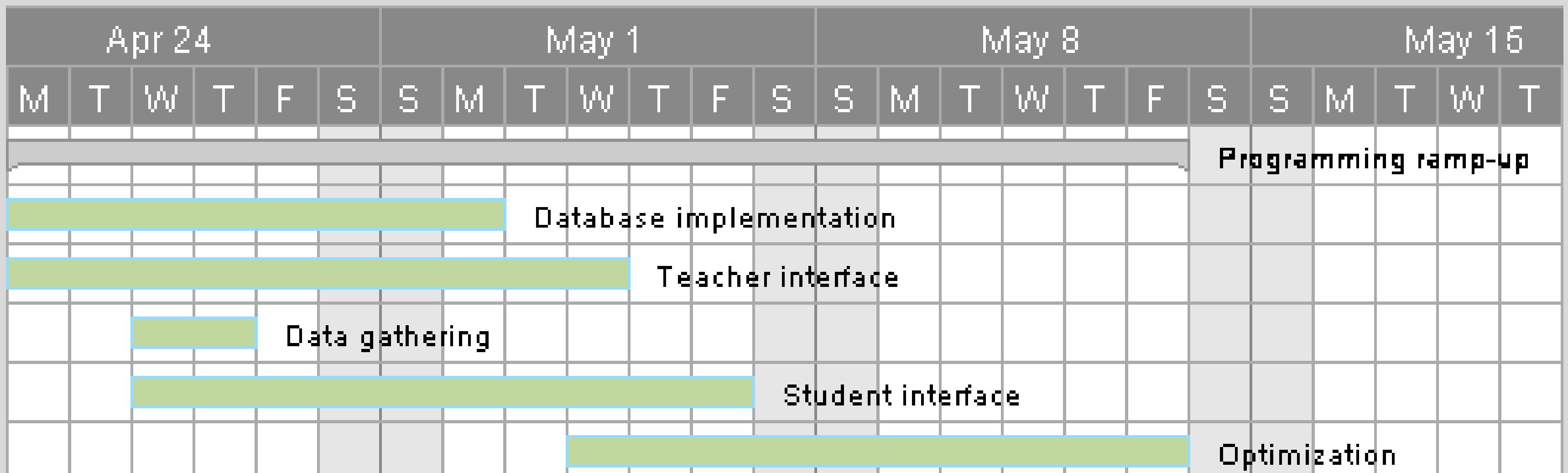


Design and implementation - phase 2



(Credit: Kári Steinn 2022)

Programming ramp-up - phase 3



(Credit: Kári Stein 2022)

Next steps?

Get data from RU



Decide database
management system

Start programming for
logic layer

References

- [Ing16] Inga Lilja Eiríksdóttir. "Optization Model for Assigning Teachers to Classes". Master's Thesis. Reykjavík University, June 2016.
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Thank you for
your attention!