
LINGI2255

Software Development Project

Specifications & Requirements - Team 06

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1 Module's description

For the moment the questions are created manually by the professor. To increase the number of questions available for a given skill, we want to give the possibility for a professor to create/solve a large sample of questions based on typical problems. And for the students to efficiently train given skills by exercising on a large set of different problems.

It means that first the professor has to create a generic question, for example: $ax^2 + bx + c$ for an equation of the second degree. Then from this generic question we will provide an automatic creation of precise question with multiple values for a, b and c belonging to natural, integer or rational. We also want to provide some control the domain of the question and answer either integer, rational, complex ...

We also need to implement a solver for each type of questions. The solver should be able to give the students the solution and eventually the resolution step by step of the problem. So that the students knows if he provide the correct answer and can understand his mistake if he has done some. When he is training a given skills.

For some problems involving geometrical figures, we would like to implement visualization fonctionnalités for the student.

These fonctionnalités would take the randomized parameters and display the related figures on the student test.

For more advanced shapes or 3D shapes, the visualization fonctionnalités would provide multiple points of view of these shapes, enabling the best understanding of the shape by the student.

2 User stories

The number before each use story is the value coming from the planning poker session.

1. 5 :
As a teacher
I want to be able to set the domain of a problem
In order to let the question creation fonctionnalités use this domain for random parameters
2. 8 :
As a teacher
I want to have, for each assignement topic, a fonctionnalité to create a related problem based on random values
In order to not having to type specific values each time.
3. 5 :
As a teacher
I want a fonctionnalité to create multiple 2nd degree equations from random values to be solved by students
In order to not having to manually type the parameters
4. 3 :
As a teacher
I want to be allowed to specify rational, integer or natural answers and parameters for the 2nd degree equations problems
In order to allow the fonctionnalité to use random parameters of different domain types
5. 3 :
As a teacher
I want a fonctionnalité to create random triangle on which the student will have to compute the perimeter
In order to not having to manually create a triangle for the exercice

6. 3 :
As a teacher
I want to be able to choose how the student should resolve a question, if there are multiple ways to find the answer (e.g. find a triangle's perimeter)
In order to evaluate a specific skill
7. 3 :
As a teacher
I want a fonctionnality to create a random triangle on which the student will have to compute the area
In order to not having to manually create a set of triangles
8. 2 :
As a teacher
I want a fonctionnality to create a random circle on which the student will have to compute the area
In order to not having to manually create the circles
9. 2 :
As a teacher
I want a fonctionnality to create a random quadrilateral/rhombus/square/rectangle/parallelogram/trapezium on which the student will have to compute the perimeter
In order to not having to create them manually
10. 2 :
As a teacher
I want a fonctionnality to create a random quadrilateral/rhombus/square/rectangle/parallelogram/trapezium on which the student will have to compute the area
In order to not having to create them manually
11. 3 :
As a teacher
I want a fonctionnality to create a random regular polygon ($n=5$ to 10) on which the student will have to compute the perimeter
In order to not having to create the polygon manually
12. 3 :
As a teacher
I want a fonctionnality to create a random regular polygon ($n=5$ to 10) on which the student will have to compute the area
In order to not having to create the polygon manually
13. 2 :
As a teacher
I want a fonctionnality to create a random problem where the student will have to find the length of the side of a triangle (using Pythagoras theorem)
In order to not having to create multiple questions manually
14. 5 :
As a teacher
I want a fonctionnality to create a random statistical data on which the student will have to compute characteristic values (one characteristic value for one question)
In order to not having to create them manually

15. 2 :
As a teacher
I want a fonctionnality to create a random problem where the student will have to compute the simple interest
In order to not having to manually create that kind of problem
16. 3 :
As a teacher
I want a fonctionnality to create a question about compound interest from random values
In order to not having to manually type the parameters of each compound interest problem.
17. 13 :
As a teacher
I want to have a functionality to select a kind of object (cylinder, cone, prism, pyramid) and create that object from random values to be included in the assignement
In order to not having to specify values for that object, nor including pictures of that object in the test for the student
18. ? :
As a student
I want to have access to different representation, views, of the object of the assignement
In order to understand at first sight what kind of object it is and resolve the assignement without ambiguities

3 Scenarios

3.1 Assessment for geometry skills

1. Professor Layton wants to assess his students about basic geometric skills.
2. Layton decides to test his students with perimeter and area calculus of triangles (non right-angled).
3. Layton logs in, reach his class management page and access the assessment creation page.
4. Layton select the skills for area and perimeter calculus of non right-angled triangles.
5. Layton creates the assessment.
6. Questions have been generated with random values (not leading to extreme shapes of triangle).
7. Layton chose to regenerate some of the questions that not fit its tastes.
8. Layton finalize the test creation, his students can now do it online.

3.2 Roots of polynomial assessment

1. Professor Oak decides that the time has come to test his students on determining the roots of a polynomial.
2. Oak logs in, reach his class management page and access the assessment creation page.
3. Oak select the said skill in the selection option.
4. Oak creates the assessment.
5. Oak is now on the assessment modification page.
6. Oak chose the type of parameters and answer for the questions related to root calculus.
7. Oak generate a polynomial and an expected answer with those parameters
8. Oak validates the test, students can do the assessment online.

3.3 Assessment for students

1. Student Sasha has to do the assessment given by teacher Oak.
2. Sasha logs in, reach Assessment section.
3. Sasha arrives in a Assessment page.
4. Sasha answers at all the exercices given
5. Sasha has finished and leave the assessement.

3.4 Training for students

1. Student Sasha wants to train her skills in a given subject.
2. Sasha logs in, reach the training section
3. Sasha choose one skills amongst those given by her teacher.
4. Sacha arrives in a Training page.
5. Sasha try to answer the question, after 3 tries the correction is given.
6. Sasha decide she is done training and leave the page.

4 Wireframes

4.1 Question Configuration

The professor can choose subject and assessment type or skills. The right side is the assessment type where he can set the domain radius and parameter.

A Web Page

Navigation icons: back, forward, close, home

Address bar: http://

Form fields:

- Subject:
- Assessment type:
- Skills:
- Shape: (with a circle icon)
- Domain Radius:
- Parameter: ☐ Integer
☐ Fraction
☐ Decimal

Submit button

4.2 Generated Questions Choice

The professor can choose questions in the list of generated questions. There is the possibility to generate 5 new question if some are not suitable.

A screenshot of a web browser window titled "A Web Page". The address bar shows "http://". The page content includes two questions, each with a checkbox for selection. Question 1 and Question 2 both contain the text "Radius Value" and "Result Value". At the bottom of the page, there are three buttons: "Back", "Generete 5 More Questions", and "Create Assessment".

4.3 Student Answer

The student has the problem with an illustration and can answer in the input.

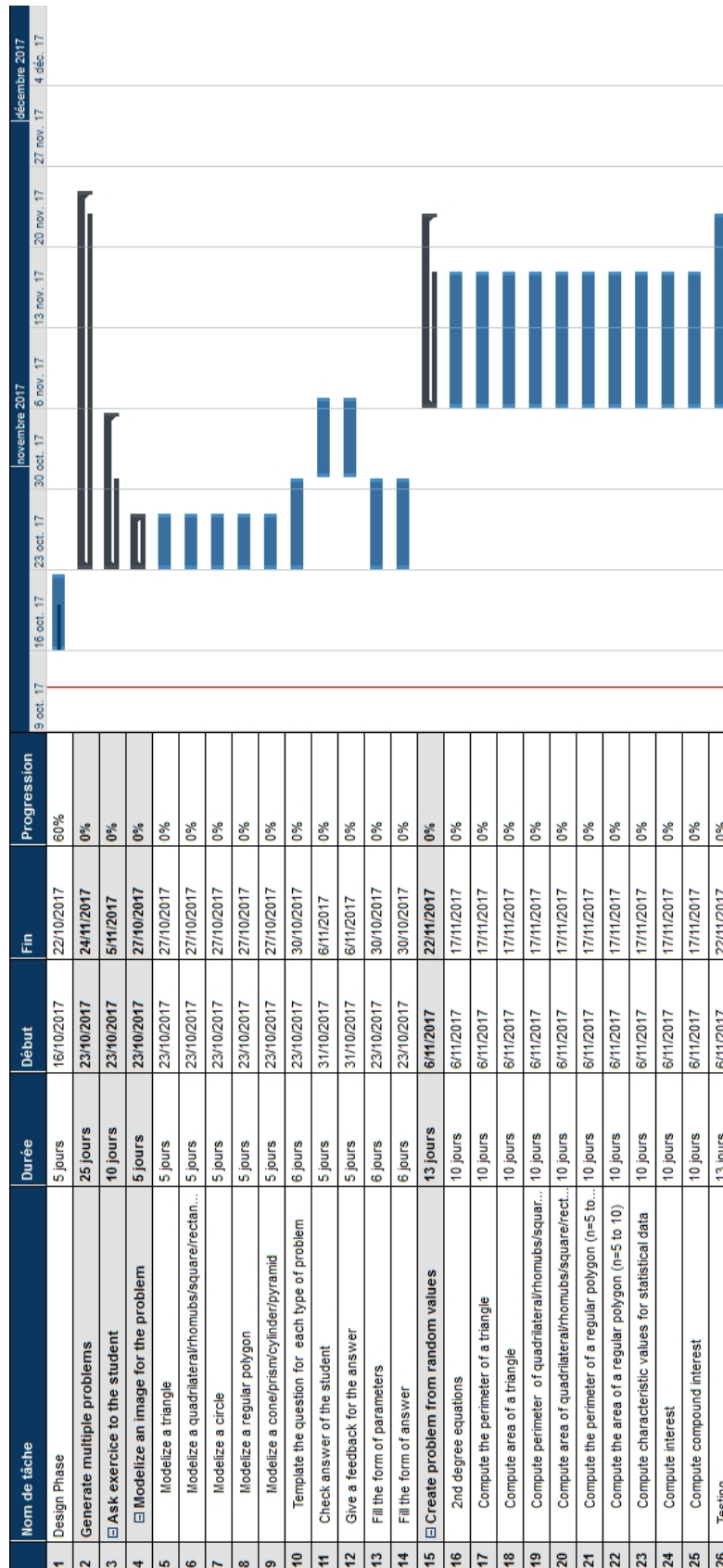
A screenshot of a web browser window titled "A Web Page". The address bar shows "http://". The page content displays a "Problem :" section with a diagram of a circle and the text "Radius : Value". Below the problem, there is a "Your Answer :" section with a text input field. At the bottom right, there are two buttons: "Exit" and "Submit".

5 Activity diagram

SPLIT IN TWO PARTS AND FIX SEMANTICS Red bubbles in the Activity Diagram highlight the main activities we will be working on.



6 Planning



7 Development methodology

We will be using SCRUM as the Agile methodology.

SCRUM suits the best our needs for this project for these reasons :

- The official planning of the course allows us to organize ourselves in multiple sprints, with personal sub-goals to reach the official deadline.<https://www.sharelatex.com/project/59d4d6b5b9df5f5836f753c0>
- Managing a team of eight people might be really difficult using Waterfall. With SCRUM, everybody is responsible of his own piece of work but also of all the other part of the project.
Nobody's never done with his work and everybody's working towards the same goal, which leads to a stronger "team-spirit".
- Frequent stand-up meetings are a good source of motivation, a useful way to keep everybody's knowledge of the project up-to-date.
- The team-leader we elected has already responsibilities about communications with the clients and team organization, him being the SCRUM-Master won't be an overload of work and will perfectly suits the whole organization.

8 Organisation and distribution of work in the team

- **Rémy Voet** : Team-Leader, SCRUM Master
- **Sophie Madessis** : Database Engineer
- **Nicola Romano** : Developer, Test Assistant
- **Youri Mouton** : Lead Developer, Git Master
- **Tristan Moers** : Developer, Team-Leader Assistant
- **Ilias Boutchichi** : Front-End Developer
- **Antoine Rime** : Developer
- **Samuel Monroe** : Behaviour Driven Development, Testing, Front-End Developer