FINAL REPORT

POLITECNICO DI TORINO

Human Computer Interaction
2023/2024

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Table of Contents

1 Project name, value proposition, team members' names, and group name.

1.1 Project name and value proposition

InVista

Transparent insights, enhanced performance.

1.2 Group name and team members' names

After All

Alfarano Alex

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2 Problem/Solution Overview

Our area of focus within the Education and Learning theme centres on an exercise platform, specifically designed to address failed and unsolved exercises.

Based on our conducted interviews, it became evident that possessing confidence in one's knowledge significantly influences the likelihood of succeeding in an interview.

In response, we developed a website tailored for recent STEM graduates aspiring to enhance their proficiency in technical interviews. This interactive platform provides users with diverse exercises and tests commonly encountered in such interviews, empowering them to approach interviews with heightened confidence in their technical expertise.

3 Needfinding

3.1 Interviews

3.1.1 Methodology and Procedure

Participants

The participants in this study were carefully selected to represent different user types within the job interview preparation domain. The table below provides information about each participant, including their name, gender, age, user type, why they were recruited, and how they were recruited:

Name	Gender	Age	User Type	Why Recruited	How Recruited
User 1	Male	28	Lead	100+ job interviews done	Friend of a friend
User 2	Male	31	Domain Expert	Job interviewer	Colleague of a friend
User 3	Female	23	Immediate	Freshly Graduated, few job interviews	Friend of a friend
User 4	Male	22	Immediate	Freshly Graduated, few job interviews	Friend of a friend
User 5	Male	22	Immediate	Still studying, few job interviews	Friend of a friend
-User 6	Male	26	Immediate	Works in IT with an economics background	Friend of a friend

Interview Questions

The following is a compilation of the questions asked during the interviews conducted. The questions are divided into two sections based on user type: Lead and Immediate Users, and Domain Experts.

Lead and Immediate Users:

0. Permission to participate in the interviews & user profile questions.
1. How did you prepare your personal presentation and resume for that specific interview?
2. Have you tried to learn more about the company or industry in which you were looking for a job? How did you acquire this knowledge?
3. Tell me about the 30 minutes before your interview.
    a. Possible followup: How do you handle nervousness or anxiety before an interview? Do you have strategies for dealing with stress?

4. What difficulties did you encounter during the process of preparing for job interviews? How did you deal with these challenges?
5. What resources or sources of information have you used to get advice on preparing for interviews?
6. What did you learn from these resources?
7. While preparing for the interview, did you try to get in touch with people who had previous experience interviewing in that role/company? If so, through what means were you able to contact them?
8. What was the most rewarding moment in your preparation for interviews? What made you most proud?
9. What digital tools or apps have you found useful for interview preparation?
10. What are your future learning goals in relation to interview preparation and success in the world of work?
11. How do you measure your progress in preparing for interviews? What indicators of success do you use?
12. Have you participated in interview practice sessions? If yes, how did they help you improve your skills?
13. Can you share your most recent job interview experience?
14. What company did you interview at and for what position?
15. What were your overall impressions of the experience?
16. What kinds of questions have you been asked during your previous IT/STEM job interviews?
17. Did you find any questions particularly challenging or difficult to tackle?
18. What were the main strengths you highlighted during your previous job interviews in the IT/STEM field?
19. Could you give me an example of an interview factor that you overestimated?
20. Could you give me an example of an interview factor you overlooked instead?
21. Did you have a chance to discuss your career aspirations and goals during your previous interviews in the IT/STEM field?
22. How did you communicate your ambitions to recruiters?
23. Have you ever faced questions regarding time management or the ability to manage complex projects during your previous interviews in the IT/STEM field?
24. How have you demonstrated your skills in these areas?
25. Can you share an experience where you received feedback on how to improve your interview performance?
26. How did you respond to this feedback?
27. How do you approach the discussion of economic terms? Like salary and job hours/euro?

Domain Experts/Extreme Users:

0. Permission to participate in the interviews & user profile questions.
1. How is the process of selecting a candidate through his or her resume before the interview?
2. What technical skills are most in demand currently in the STEM/IT/ICT field?

3. What aspects of an experienced candidate's preparation differ from those of a recent graduate in a job interview?
4. How do you handle the assessment of soft skills, such as problem-solving and collaboration skills, in interviews for technical roles?
5. What are the current trends in selection and assessment methods for STEM/IT/ICT candidates?
6. What challenges do you experience in trying to reduce gender disparity in STEM/IT/ICT recruitment?
7. How is candidates' practical experience or personal projects evaluated during an interview?
8. What interpersonal skills are most in demand in technical roles, such as communication and leadership?
9. What advice do you have for recent graduates looking to stand out during job interviews in the STEM/IT/ICT field?
10. What assessment tools or methodologies do you usually use to measure candidates' technical competence?
11. What emerging skills or technologies are becoming increasingly important in STEM/IT/ICT roles?
12. What skills or personal qualities do you think are often undervalued in STEM/IT/ICT job interviews?
13. How do you assess the ability to adapt to or solve a complex problem or situation?
14. What specific challenges do you encounter in the selection process for STEM/IT/ICT roles?
15. How do you assess adaptability and continuous learning in candidates?
16. How do you assess the balance between the need for experienced candidates and the ability to develop talent internally?
17. How do you fit the selection process for high-level versus entry-level roles in STEM/IT/ICT?
18. What advice do you have for experienced candidates looking to transition between different areas or technical specializations?

Interview Procedures

Interviews were primarily conducted via phone calls, ensuring flexibility for participants. A few face-to-face interviews were also conducted to capture a diverse range of perspectives.

A collaborative approach was adopted for the interviews. All team members participated in creating and selecting questions. The specific roles of each team member during the interviews were as follows:

Alex: Note-taking.

Fabrizio: Interviewer.

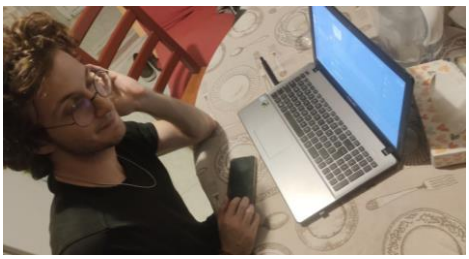
Marcello: Note-taking.

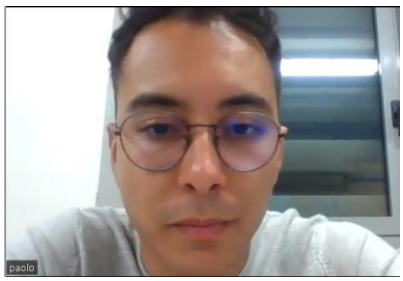
Mattia: Interviewer.

To ensure accuracy in capturing responses, interviews were recorded using various methods:
Zoom software recorder for remote interviews.
Phone recorder for face-to-face interviews.

3.1.2 Results

Here are just a few pictures taken during the interviews.



Key Quotes

"*How to approach the interview from a psychological perspective, not what to say and what not to say but how to approach the interview humanely*" – immediate user

"*If he (the candidate) comes prepared about the company, about the role, about the aspects the company wants to propose or give him, about what the company prospects, he gets a lot of points(...) at the interview you have to come prepared*" - extreme user

Some Summaries Interviews

Immediate User

Martino, a 26-year-old with a master's degree in general management, shared insights into his interview preparation. He emphasized following guidance from the Ergo service and training courses for resume preparation. Martino highlighted challenges in finding information about the company and stressed the importance of not needing to know everything about the company. His most rewarding moment was realizing he had chosen the right academic path. Digital tools such as Ergo and Canva were useful for his interview preparation.

Immediate User

This interviewee, currently working at Powertek Eng and Stellantis, described a meticulous approach to resume preparation, including practical aspects from university and creating a fillable CV. They underlined the importance of learning about the company through initial research. Nervousness varied depending on the type of interview, with technical interviews inducing more stress. The interviewee faced challenges in appearing genuinely interested in the company. They found resources through internet research and connections within their personal network.

Lead User

Davide, a 28-year-old with a considerable number of interviews, shared a transparent approach to resume and personal presentation. He used LinkedIn, company websites, and social networks to learn about the company. Initially experiencing anxiety before interviews, Davide now feels more relaxed, especially in his current job. Challenges included adapting to modern technologies, and he relied on platforms like LeetCode for technical preparation. Davide measures progress through mapping interviews and uses Excel for tracking.

3.2 Synthetis

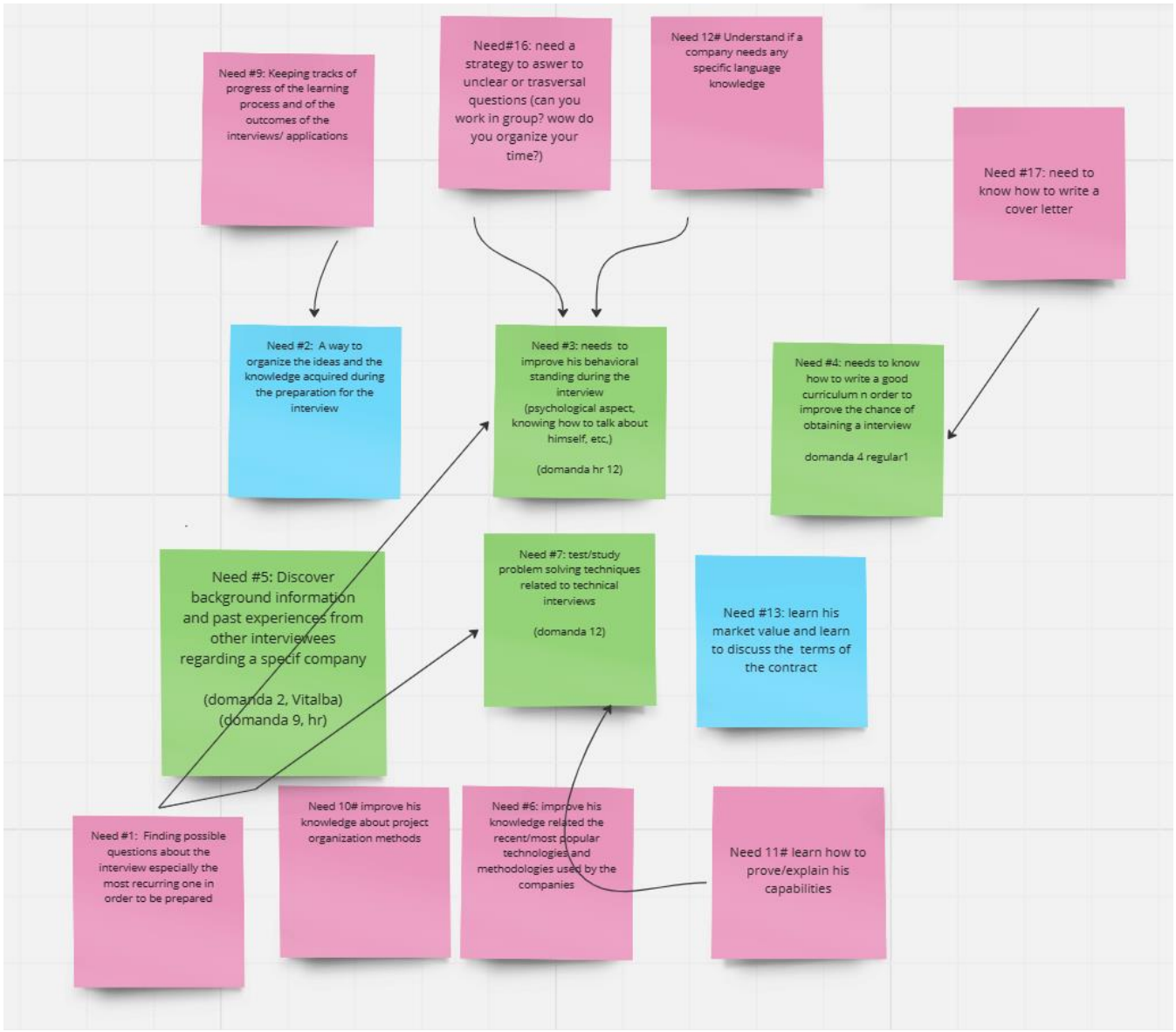
3.2.1 Brainstormed User Needs

The following is a list of the needs we extracted from the interviews:

1. Needs to arrive well prepared at the interview.
2. Needs to organize ideas and knowledge acquired during interview preparation.
3. Needs to improve behavioural standing during the interview.
4. Needs good interview documentation to improve the chance of obtaining an interview.
5. Needs a whisper network to discover tips and rumours regarding a specific company.
6. Needs to improve knowledge related to recent/most popular technologies and methodologies used by companies.
7. Needs to test/study problem-solving techniques related to technical interviews.
8. Needs to discover feedback and past experiences from other interviewees.
9. Needs to improve knowledge about project organization methods.
10. Needs to learn how to prove/explain capabilities.
11. Needs to understand if a company requires any specific language knowledge.
12. Needs to learn market value and discuss economic terms of the offer.
13. Needs an effective way to contact job offers/opportunities.
14. Needs a strategy to answer unclear or transversal questions.

15. Needs to understand contract bureaucracy.
16. Needs to know how to write a cover letter.

With the help of the website Miro we brainstormed and merged this list as showed in this picture:



3.2.2 Deep User Needs

Need #3: Improve behavioral standing during the interview.

Rationale: Addressing the psychological aspects and effective communication about oneself is critical. User #2, a domain expert, highlighted the importance of candidates having the right standing for an interview.

Need #4: Good interview documentation to improve the chance of obtaining an interview.

Rationale: The challenge of creating an impactful resume was emphasized by User #4, who struggled to receive responses. Effective documentation is key to highlighting strengths, as mentioned by User #6, contributing to the overall interview success.

Need #5: Whisper network to discover tips and rumours about a specific company.

Rationale: User #3's experience highlighted the significance of understanding a company's history, while the domain expert, User #2, emphasized that showing knowledge about the company's history is essential for standing out during interviews.

Need #7: Test/study problem-solving techniques related to technical interviews.

Rationale: User #1, a lead, emphasized the need to focus on basic technical skills during interviews. Testing and studying problem-solving techniques are crucial for success in technical interviews.

The primary rationale for choosing these deep user needs was the amalgamation of ideas, focusing on the most intriguing and possible ones. We aimed to address challenges not already tackled by other concepts, ensuring that our selected needs are both compelling and unexplored territory.

3.3 Solutions

3.3.1 Brainstormed Solutions

The following table reports the solutions for each deep user need.

DEEP USER NEEDS	SOLUTIONS
Need #3: Improve behavioral standing during the interview	• expert psychologist/private session • collection of frequent questions • practice sessions with experts • video interviews • guideline/ interviews etiquette • being able to talk to community that has done interviews • yoga session
Need #4: Good interview documentation to improve the chance of obtaining an interview.	• faq similar cv and miscellaneous documentation

	• interactive cv and miscellaneous documentation editor • feedback cv and miscellaneous documentation • cv and miscellaneous documentation search with similar training • company reviews of cvs and miscellaneous documentation received
Need #5: Whisper network to discover tips and rumours about a specific company.	• online community • video library • interactive collections of reviews • discover event • guided tours
Need #7: Properly test/study problem solving techniques related to technical interviews	• practice sessions with experts • collection of quizzes • feedback on answer question given during interviews • interactive platform/app for exercises • collection of useful notions

3.3.1 Top Solution

The top solution we picked is the **interactive platform/app for exercises.**

We opted for an interactive platform designed for recent graduates to practice a diverse set of exercises or tests required during technical interviews, addressing the deep user need #7. This platform serves as a space where users can not only practice but also share solutions and questions from their past job interviews. The idea is to create an environment where recent graduates can better prepare for upcoming interviews by engaging in interactive exercises.

The decision to select this solution was made through a voting process.

4 Tasks and Storyboard

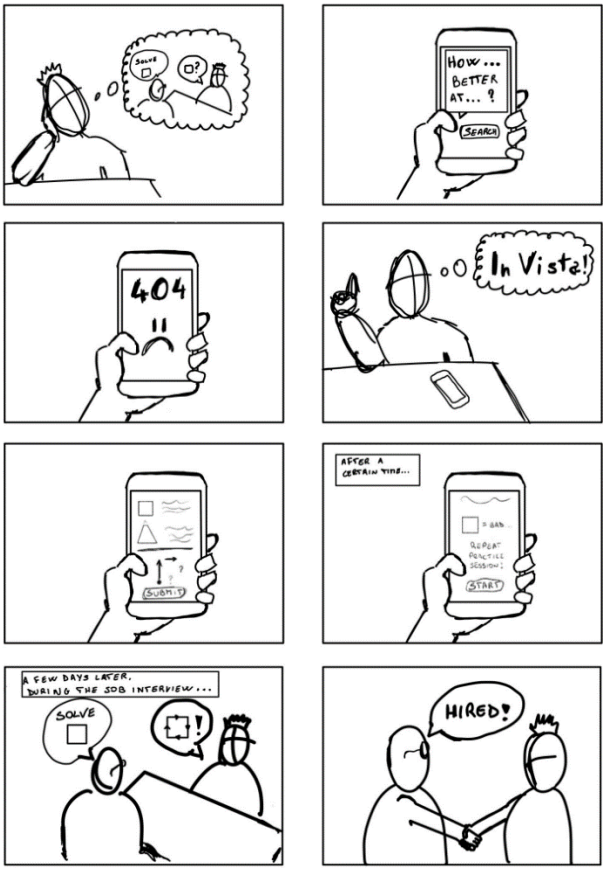
4.1 Simple, Moderate and Complex Tasks

The 3 defined tasks, core to the solution and the value proposition of the project, were:

- *Simple Task*: Start an interview practice session.
- *Moderate Task*: Repeating a practice session for a topic where one has been lacking in a previous session.
- *Complex Task*: Report an error to a proposed solution.

We selected them as we believe they are the most effective means to fulfil the user's needs through our solution.

4.2 Storyboard



4.2.1 Why?

We choose this kind of representation because it addresses well the typical situation in which the targeted need is generated, a generic user can take advantage of our solution he/she wants to improve his chances of success for his next interview.

4.2.2 Strengths and weaknesses

The storyboard effectively illustrates a standard interaction a user may have with our solution. It demonstrates the user's ability to easily practice one of our exercises and, if necessary, revisit more challenging topics. Unfortunately, the storyboard does not depict the option we provide for users to report issues with our solutions.

5 Low-fidelity

5.1 Modalities Exploration

Different ways to realize our solution were brainstormed:

- Virtual Reality
- **Mobile App**
- **Web Application**

Among all potential modalities, we have specifically focused on two options considering the interactive nature of our solution. We have chosen modalities that enable users to input their solutions quickly and comfortably, namely through a physical or digital keyboard. While virtual reality also offers options like speech-to-text or virtual keyboards, these modes are not well-suited for our solution in a learning context.

5.2 Paper Prototypes

5.2.1 Paper Prototypes – Scans

Mobile App

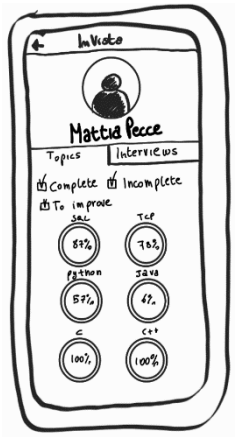


Figure 1: User Progress Page - Topics

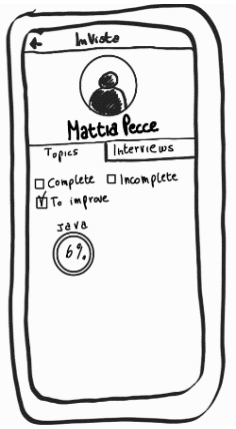


Figure 3: User Progress Page - Filter Action

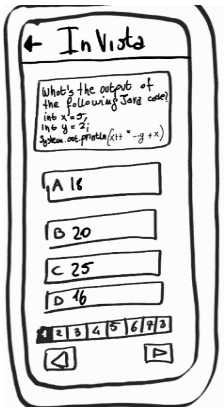


Figure 2: Interview Question Page - Multi Choice Type

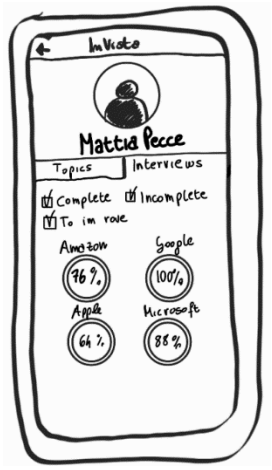


Figure 6: User Progress Page - Interviews

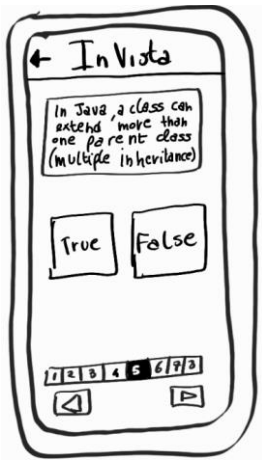


Figure 5: Interview Question Page - True/False Type

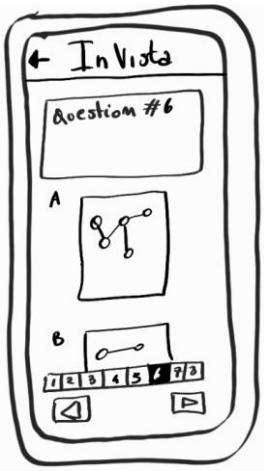


Figure 4: Interview Question Page - Image Answer Choice

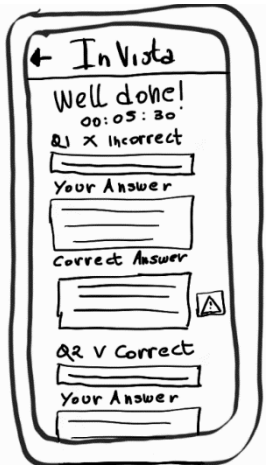


Figure 7: Results Page

Figure 8: Report Pop Up

Figure 9: Interview Question Page – Coding Type

Figure 10: Interview Question Page – Exit Pop Up

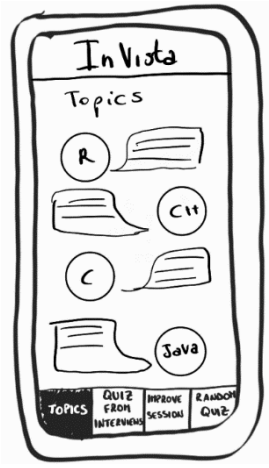


Figure 11: Main Interface – Topics Page

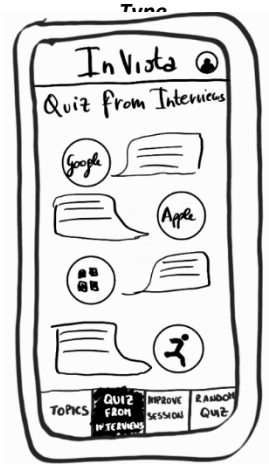


Figure 12: Main Interface – Quiz from Interviews Page

Figure 13: Main Interface – Improve Session Page

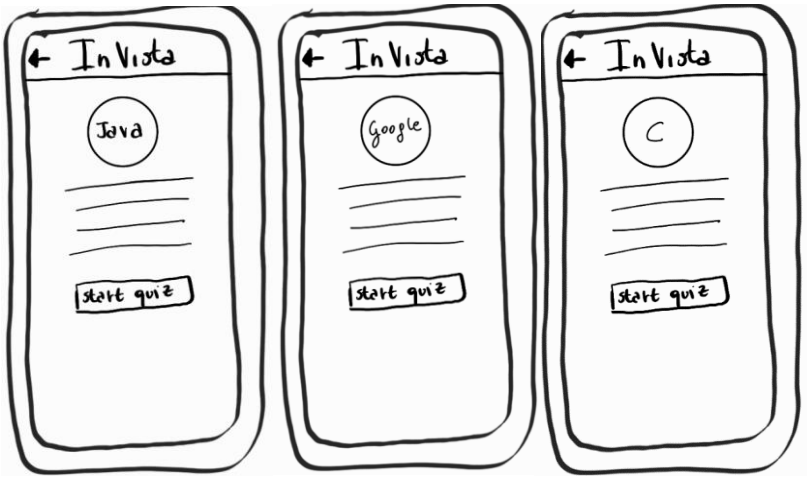


Figure 14: Quiz Description Page

Web Application

Figure 15: Login Page

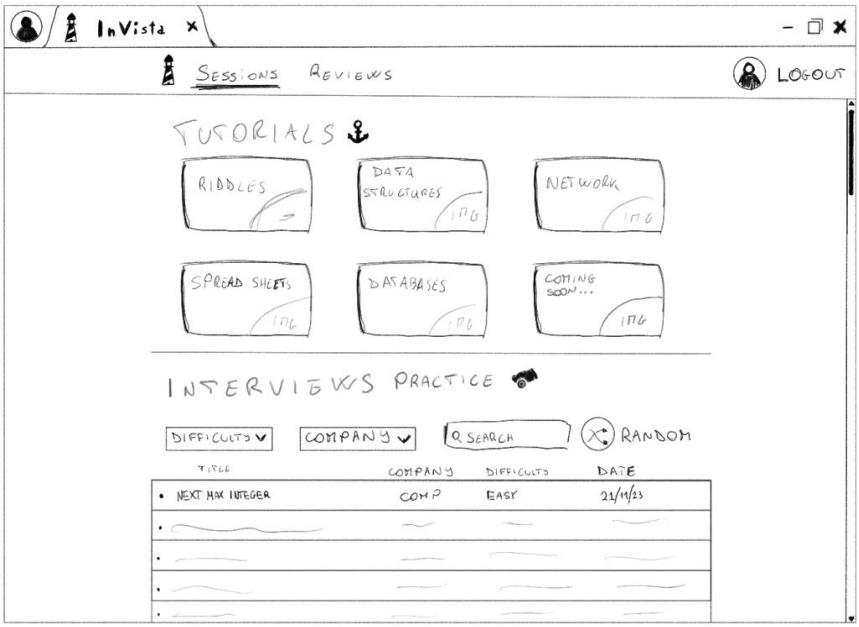


Figure 16: Session Page

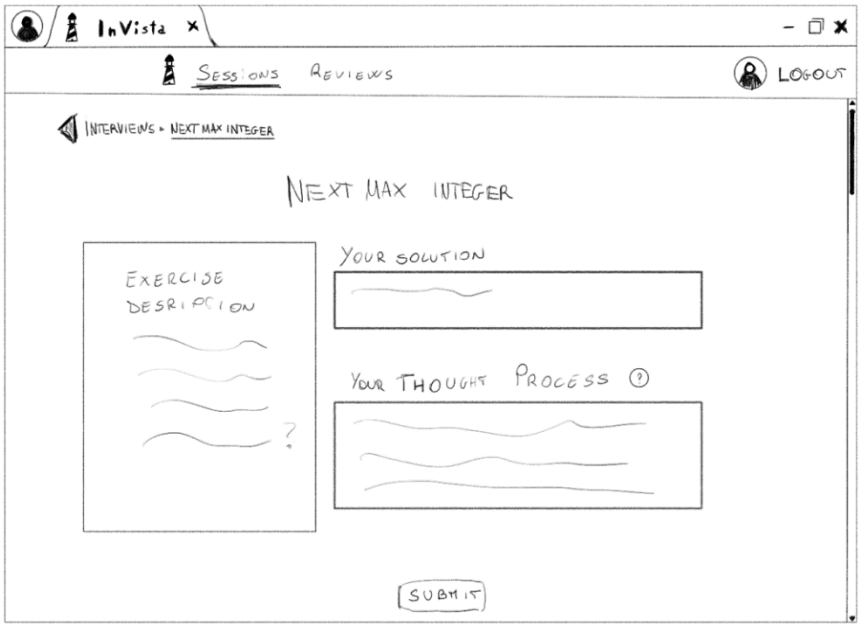


Figure 17: Interview Question Exercise Page

Figure 18: Report Page

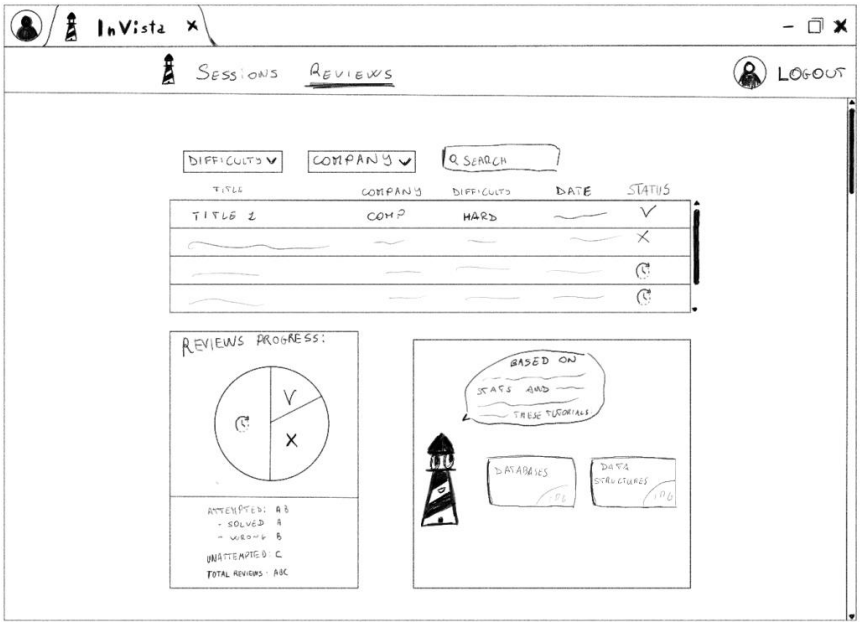


Figure 19: Reviews Page

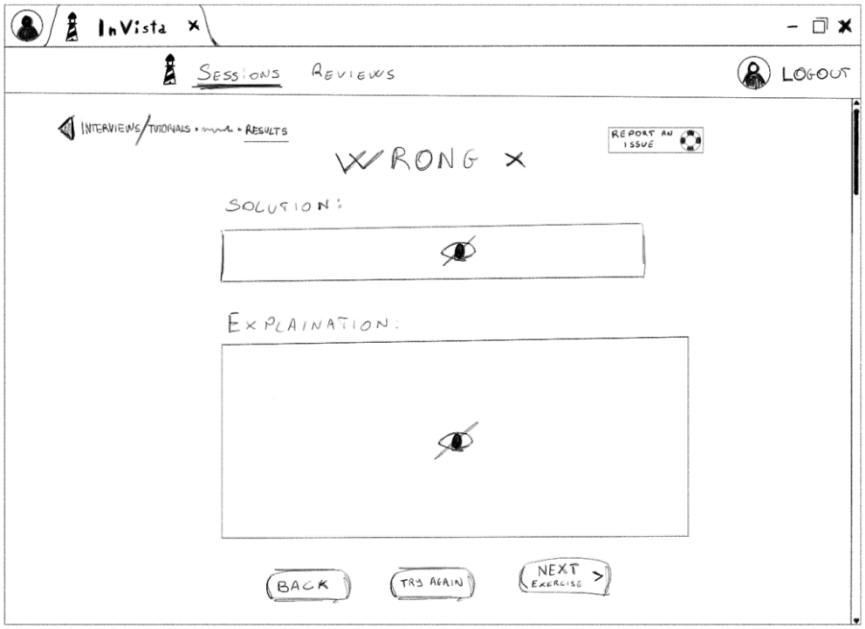


Figure 20: Results Page – Wrong

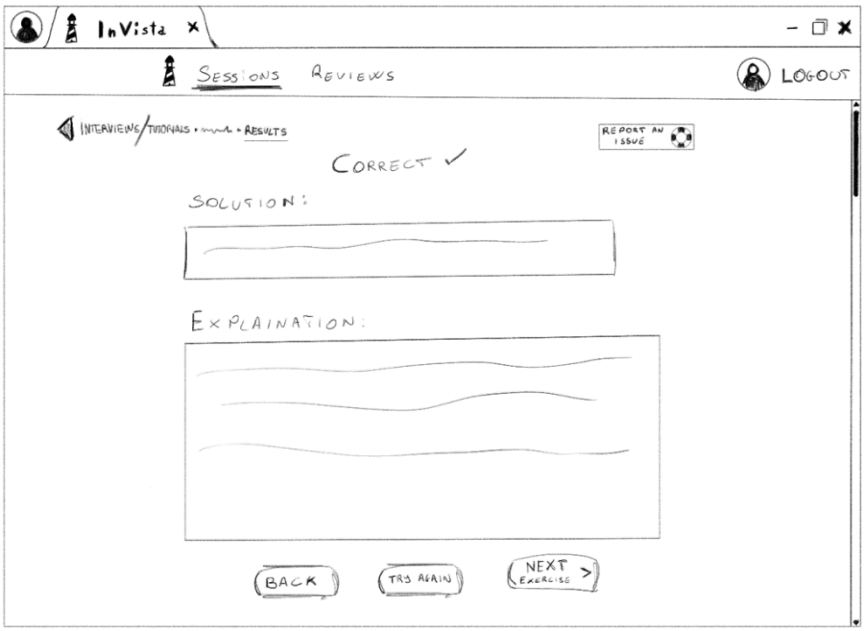


Figure 21: Results Page - Correct

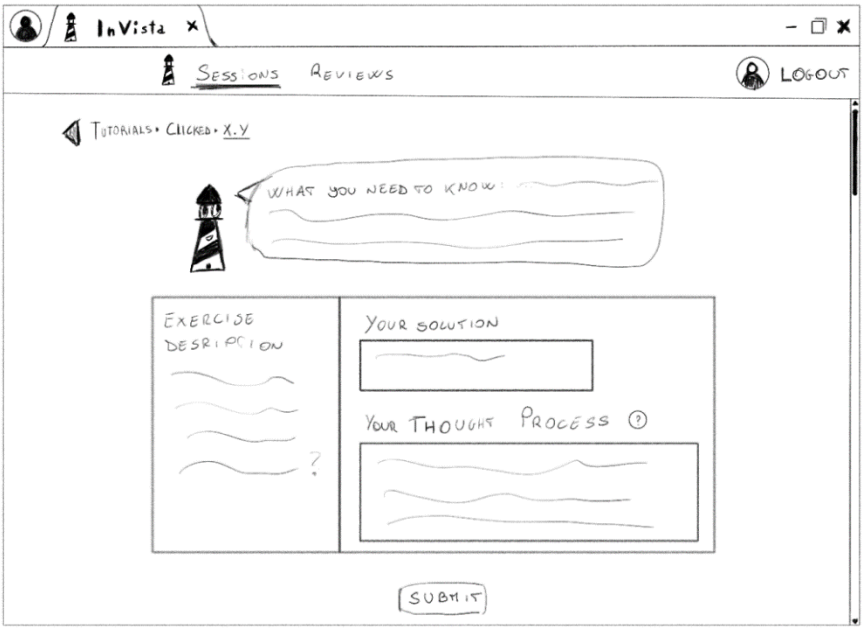


Figure 22: Tutorial Interview Exercise Page

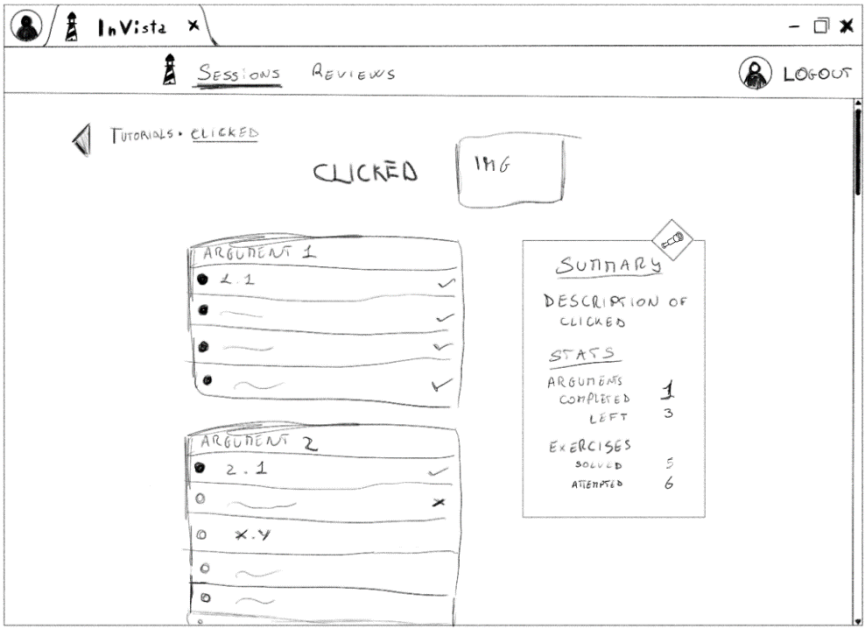


Figure 23: Clicked Tutorial Page

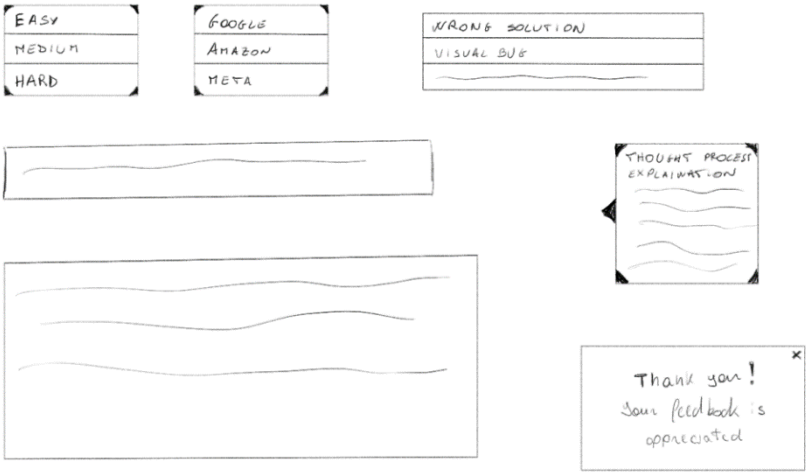


Figure 24: Utilities

5.2.2 Connection to the storyboard, the project goal and the three tasks

Mobile App

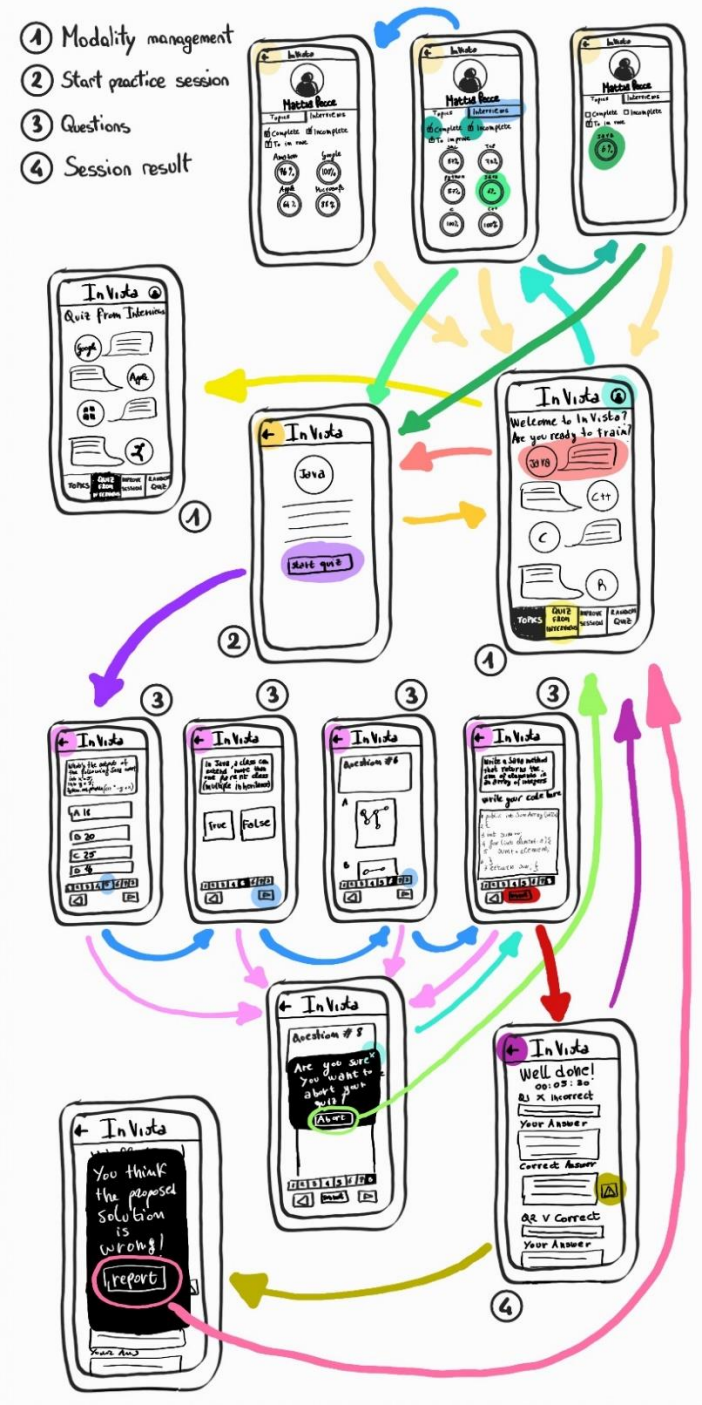
In the storyboard it is shown that after doing an exercise the user can pass an interview. In the prototype there are learning interfaces (tutorial exercises), both by subject and by company. Also, through the personal profile interface it is possible to keep track of one's progress and weaknesses. The user can start a session through the main page, where he can select whether the session will be on a particular topic or on a particular company. From his profile page he can select the various filters to see what topics or companies he is not prepared enough on. The user can also report an error in a solution by clicking on the report button on the solution page.

Web Application

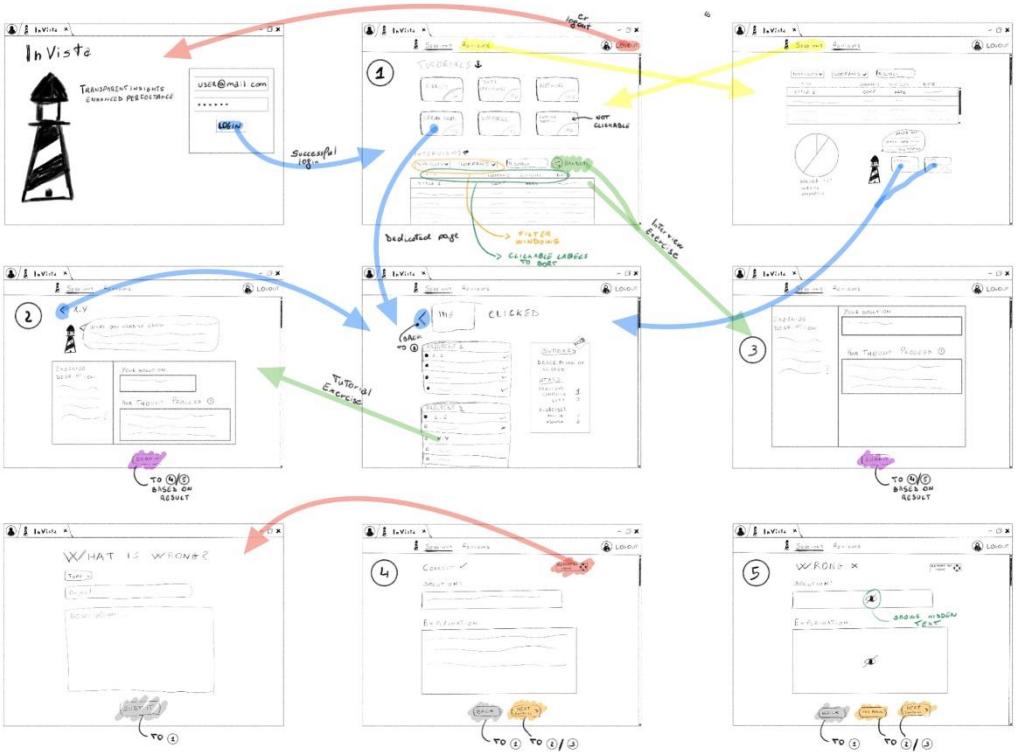
In the storyboard it is shown that after performing an exercise the user succeeds in passing an interview. In the prototype there are interfaces for learning (tutorial exercises) and for getting involved (interview problems). A user can start an interview practice session by clicking on one in the Session page or repeat a practice session for a topic in the Reviews page User can also report an error in a solution by clicking on the report button in the solution page.

5.2.3 High-Level Flow

Mobile App



Web Application



5.3 Heuristic Evaluations

5.3.1 Comments on the received Heuristic Evaluations

The heuristic evaluation we received addresses many aspects, from visual problems to missing properties that need to be considered. We didn't agree with all violations, but some of them inspired us to think about good fixes to some of our applications' flaws. The evaluation result can be found at the following links:

- Heuristic Evaluation 1
- Heuristic Evaluation 2
- Heuristic Evaluation 3

5.3.2 List of the Violations

Mobile App

1. **H1: Visibility of system status**

   Where: Quiz question pages

   What: No timer showing quiz progress.

Why: It is important to keep a user informed about the progress of the quiz, showing a timer is a way to provide feedback about system status.

Severity: 3

2. **H1: Visibility of system status**

Where: Overview of tests

What: There is no scrollbar or anything indicating that the menu with different tests is scrollable.

Why: Makes it look like a static component, and that users will believe there are less tests available than there really are.

Severity: 4

3. **H1: Visibility of system status**

Where: Best score from previous test

What: For each test, a bar shows your best score. It looks more like a progress bar than a score.

Why: Creates confusion for users, who might think they only finished 80% of the test when they got an 80% score.

Severity: 4

4. **H1: Visibility of system status**

Where: Improve session

What: Makes the user think they can pick up on those answers they got wrong, instead of just taking the whole test over again.

Why: Phrasing is ambiguous and does not correctly define the users' options.

Severity: 2

5. **H1: Visibility of system status**

Where: Summary of taken test

What: The page does not show how you performed compared to your previous scores.

Why: It is useful for the user to see whether they improved from previous attempts.

Severity: 3

6. **H1: Visibility of system status**

Where: Quiz questions page.

What: The square boxes with the numeration questions don't have black and white colour contrast for answered and non-answered questions.

Where: It is important to show the system status if the answer is recorded or not.

Severity: 3

7. H1: Visibility of system status

Where: Report page.

What: After submitting the report, there is no confirmation if it's submitted successfully.

Why: It is not clear to a user if they submitted a report or not, the system status is unknown. So, it's important to show a confirmation message that a report has been submitted.

Severity: 4

8. H2: Match between system and the real world

Where: Welcome page (Topics section).

What: Misleading percentage notation for quiz grades instead of practice progress. The app shows the percentage above each section: Java, C++, C, R, and it would seem like the progress in those sections (6% out of 100% are practised) but it turned out that they were the last grades for the quizzes from those sections.

Why: Violates real-world conventions, causing user confusion, making us falsely assume that it was the progress of practising a section.

Severity: 2

9. H2: Match between system and the real world

Where: Filtering your test scores

What: How you differentiate between tests "to improve", "complete" and "incomplete".

Why: User does not understand the criteria upon which the filtering is based, making the filters redundant.

Severity: 3

10. H2: Match between system and real world

Where: Abort quiz page

What: The app uses the word 'Abort'

Why: The system should speak the users' language. 'Quit' or 'Exit 'would be more user-friendly.

Severity: 3

11. H2: Match between system and the real world

Where: Filtering tests

What: Having a single checkbox-group for each filter makes it possible to create illogical and contradicting filtering. Should be converted to radio-buttons. Ex: Selecting both complete and incomplete tests, as well as all tests.

Why: Makes filtering of the tests unclear for the user.

Severity: 4

12. H3: User control and freedom

Where: After starting the quiz, quiz question page.

What: No explicit exit button after starting a quiz. There is an arrow at the top left.

Why: If a user starts a quiz by mistake or doesn't want to finish, there should be an easily recognizable exit (e.g. cross icon) to provide user control and freedom. The top left arrow can be replaced by a cross.

Severity: 3

13. H3: User control and freedom

Where: Quiz results page.

What: There is no "Finish review" button.

Why: After completing a quiz, and reviewing all correct and incorrect answers, it is not clear what to click to exit the review page, so user control is limited.

Severity: 3

14. H4: Consistency and standards

Where: Previous test score

What: When completing a test, time taken is shown. However, this is not shown on previous test results.

Why: If time taken is shown when finishing a test, it should be stored. Otherwise, it becomes excess information.

Severity: 3

15. H4: Consistency and standards

Where: The results page after submitting the quiz.

What: Time spent is shown on the results page, whereas there was no timer when answering questions.

Why: It is not consistent that a timer was absent first, and then time appeared at the end. It confuses a user because they don't know at the beginning that time is tracked. It's important to consistently show time throughout the quiz or provide a clear and consistent explanation of when and how time is tracked.

Severity: 3

16. H4: Consistency and standards

Where: Improving previous tests

What: Using different terminology for the same thing: “Sessions” and “Topics”.

Why: Gives the idea that they are two different things, which they to my understanding are not.

Severity: 2

17. H4: Consistency and standards

Where: Use of “topics”, “quizzes” and “sessions”.

What: There seems to be one quiz per topic, and a session is an instance of a certain topic. For example, you filter topics as well as quizzes from interviews. But when pressing random quiz, that results in either a “quiz” or a “topic”.

Why: Using different phrases for what means the same creates confusion and should therefore be changed to using just one or clarifying the difference.

Severity: 4

18. H4: Consistency and standards

Where: Report pages.

What: Below the question “Do you think the proposed solution is wrong?”, there is a button ‘Report’, and later, below the text“Write here where you think there is an error”, there is a button ‘report’. It is inconsistent writing of the word ‘Report’ which starts with an uppercase letter, then starts with lowercase.

Why: it’s important to have a consistent design to make an app seem credible and not confuse a user.

Severity: 2

19. H5: Error prevention

Where: Last quiz question page.

What: No confirmation option after clicking the Submit button.

Why: There should be a confirmation question “Are you sure to submit your quiz?” before recording the results, to prevent unintended submissions.

Severity: 3

20. H6: Recognition rather than recall

Where: Quiz questions page.

What: The square boxes with the numeration questions don't have black and white colour contrast for answered and non-answered questions.

Where: A user can't easily navigate through questions and has to memorize which questions are answered and which are not. It would be better if a user didn't have to use its memory load and could know which questions are not answered (white ones) to quickly return to those questions instead of checking all questions. **Severity:** 3

21. H10: Help and documentation

Where: Description of tests

What: Unclear what the description of each test is meant to provide.

Why: Could either be really helpful to understand the context of the test but could also be excess text providing little to nothing.

Severity: 2

22. H10: Help and documentation

Where: Quiz from interviews

What: Could use a description of what quizzes from interviews are, and how and when they have gathered the questions. **Why:** Makes it easier for the user to understand the background of the quizzes.

Severity: 3

23. H10: Help and documentation

Where: Start quiz page.

What: Quiz instructions are missing. The representative of the group confirmed that the description is about Java/C++/C/R, not about the quiz itself.

Why: The help or documentation is needed because a user has to know what quiz they are starting: the rules, how many questions, etc. **Severity:** 4

24. NH: Non-heuristic issue

Where: Enter code quiz question page. **What:** Code entering box has to be white without the code entered, or maybe with just the starter code. **Why:** The whole implementation shouldn't be entered because a user enters the code. Likely a design mistake rather than a heuristic violation. **Severity:** 1

Web Application

1. H4: Consistency and Standards

Where: Exercise page and Interview page after submitting an answer

What: The "Back" and "Try again" button do the same thing

Why: After submitting an answer, the user can understand that the “Try again” lets him try again if he was wrong, but it does the same thing of the “Back” button.

Severity: 3

Changes: Merged the first 2 violations that were the same but in different pages, for some reason were numerated by the evaluator `1.2` and `1.2`, presumably a typo.

2. H4: Consistency and Standards

Where: Exercise page

What: The title of the exercise is missing

Why: After clicking to a specific Interview, the user can see at the top the name of that so that he knows what he is doing. This doesn’t happen for the exercise.

Severity: 1

3. H2: Match Between System and the Real World

Where: Tutorials section

What: The word tutorial is used imprecisely

Why: For tutorial we usually think about something we use to start learning how thing work, like the Cambridge dictionary says, “a document or website on a computer that shows you how to use a product in a series of easy stages”, but here is used more like a section where you can learn more about specific topics that are used in the interviews. The user can understand that because we have cards with topics below, but with that said maybe someone can still be confused by this.

Severity: 1

4. H6: Recognition Rather than Recall

Where: Reviews page

What: There is not the date of submission of an answer

Why: After the user submitted an answer, the user will want to know when he did that interview instead of having to remember that date.

Severity: 1

5. H6: Recognition Rather than Recall

Where: Exercise result page and Interview result page

What: The user cannot see his answer in the result page

Why: After submitting an answer, the user will want to see his answer, even if it is wrong, instead of seeing only the proposed solution (which he can decide if he wants to show, which is a good thing).

Severity: 2

6. H3: User Control and Freedom

Where: Interview page and Exercise page

What: There is no back button to return to the previous page

Why: There is at the top left the navigation path that the user can use to return to the previous pages, but adding a simple cancel button I think that can improve the users experience using the application.

Severity: 2

Changes: Merged previous violations 6.1 and 6.2 into 6, same violation but in different pages.

7. H1: Visibility of System Status

Where: After opening an interview or a tutorial from the Reviews page

What: The navigation map at the top will redirect us to the Sessions page instead of the Reviews

Why: We have two different tabs that share the same elements (Interviews and Tutorials). When a user wants to do an action on a specific element from a specific tab he wants to be also redirected to that tab instead of the Sessions one.

Severity: 3

8. H5: Error Prevention

Where: Exercise page and Interview page

What: The page should not allow empty submits

Why: The user should not be allowed to insert an empty response to an exercise.

Severity: 3

Changes: Merged previous violations 8.1 and 8.2 into 8, same violation but in different pages.

9. H7: Flexibility and Efficiency of Use

Where: Exercise page and Interview page

What: The user can see the right answer only after submitting

Why: To see the right answers, the user must do a submit, but maybe a user simply wants to see the right one without having to go through all the submit process.

Severity: 2

Changes: Merged previous violations 9.1 and 9.2 into 9, same violation but in different pages.

10. H1: Visibility of System Status

Where: Exercise page and Interview page

What: There is no feedback after submitting telling the user that everything went fine

Why: After submitting every exercise, the user should receive some sort of feedback, to know that his submission was saved in the system.

Severity: 2

Changes: Merged previous violations `10.1` and `10.2` into `10`, same violation but in different pages.

11. H6: Recognition Rather than Recall

Where: Reviewing an interview

What: When opening a review, the user cannot see what his previous answer was

Why: The user should be able to see what his previous answer was so that he does not have to remember all this information by himself.

Severity: 3

12. H5: Error Prevention

Where: Interview chosen from the Reviews page

What: There is no warning for submitting a new answer for an already correct interview

Why: The user should be allowed to insert a new answer if he wants, but the system should warn him that he is going to change his final response and that he got it right last time.

Severity: 3

13. H5: Error Prevention

Where: Interview page and Exercise page

What: The page does not have a window to confirm the submit

Why: The user might click submit by mistake, so he needs a way cancel the submit process.

Severity: 3

Changes: Merged previous violations `13.1` and `13.2` into `13`, same violation but in different pages.

14. H5: Error Prevention

Where: Interview Result page and Exercise Result page

What: The page does not have a window to confirm the try again click

Why: The user might click “Try again” by mistake, so he needs a way cancel this process.

Severity: 3

Changes: Merged previous violations 14.1 and 14.2 into 14, same violation but in different pages.

5.4 Selection

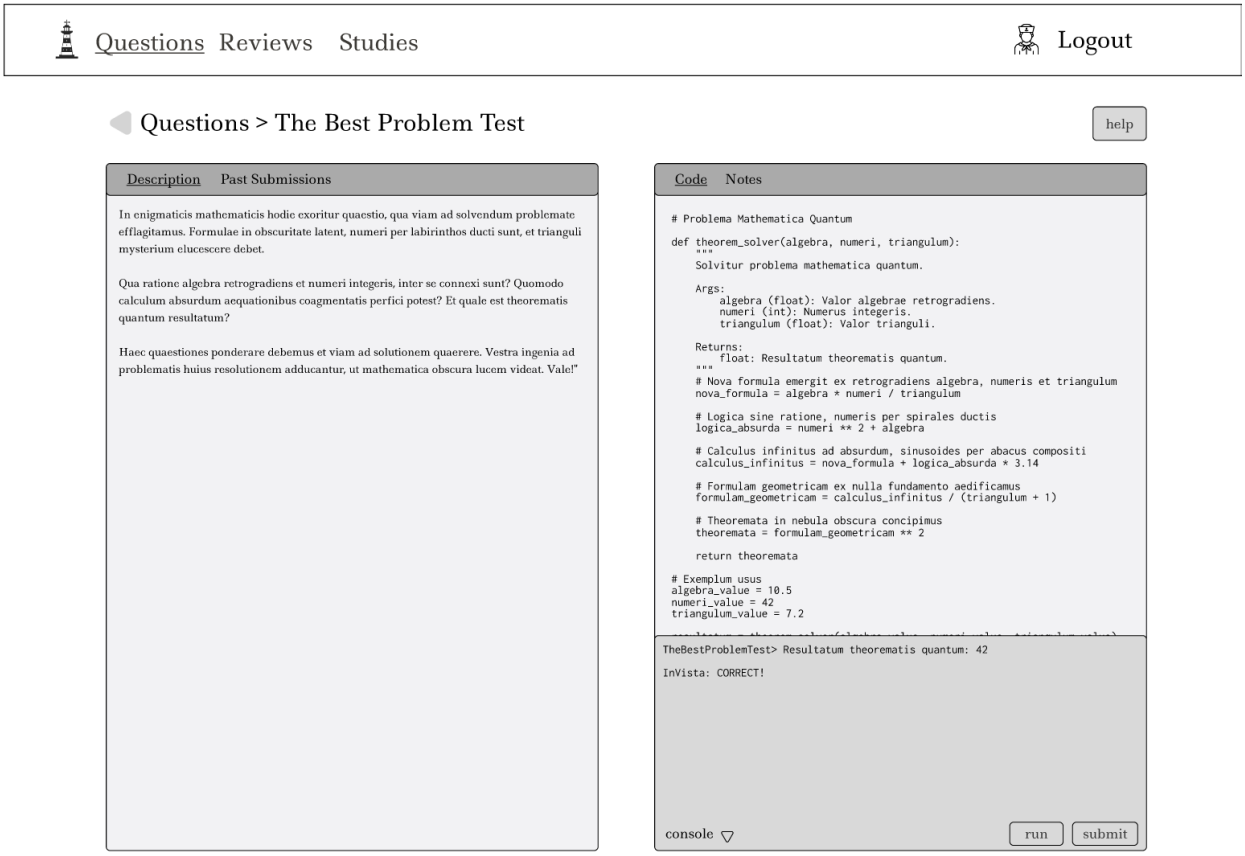
Between the two prototypes Mobile App and Web Application we opted for the second one because of 2 main reasons:

- From a practical point of view, our application involves a lot of writing, often coding related material, the web application interface suits best the kind of usage that we expect the users to perform.
- Most likely related to reason 1, the prototype for the web application felt more natural while developing it, this led to a smaller number of violations emerged, that were also easier to address.

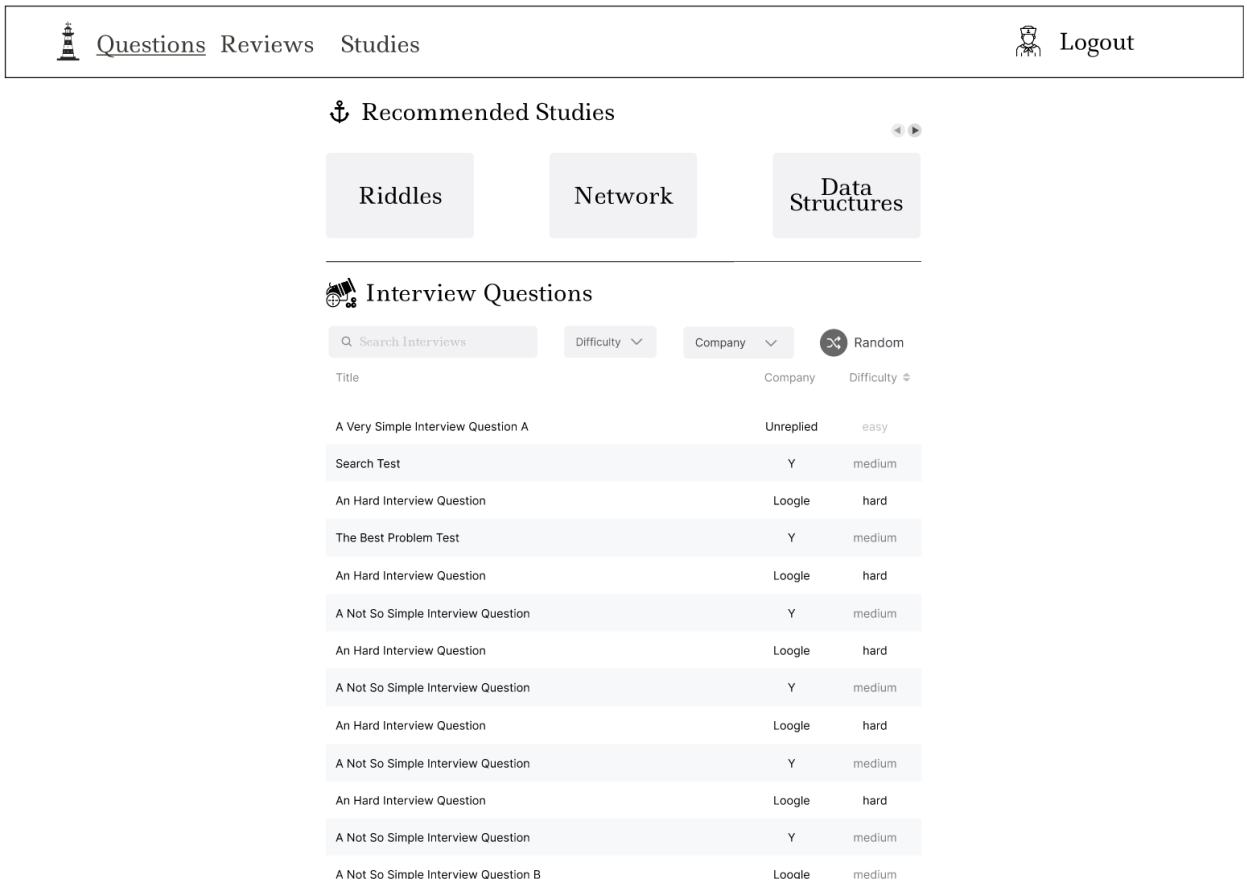
6 Medium to High-Fidelity Prototype

6.1 The tool and most significant screens

Utilizing the design platform Figma (a collaborative interface design tool), we crafted what we consider to be the crucial pages of our website. This includes the main page, as it is likely the most frequently visited, and the exercise page, which is pivotal for fulfilling the user's needs.



Mid-Fidelity Prototype Screen 1 – Single Question Page



Mid-Fidelity Prototype Screen 2 – Questions Page

6.2 Link to the Medium-Fidelity Prototype screens

https://www.figma.com/file/UJCfvMZjXLDu9NzT62F74c/Untitled?type=design&node-id=0%3A1&mode=design&t=Afo905ViDc7D0Mcx-1

6.3 Addressing Low-Fidelity Prototype Issues in High-Fidelity Design

6.3.1 Plan for Major Violations

Violation #1

H4: the behaviour of the pop-up buttons will be modified to let the user perform 3 actions:

- Close the popup with an “X” button to continue the current exercise
- Try again button to start the exercise from fresh
- Going back to the related main page with a “Back to Problems” or “Back to Reviews”, depending on how the user arrived to the question page.

Violation #3

H2: we disagree with the severity given by the evaluator, 1, during the evaluation process it seemed very stuck, trying to start a general tutorial exercise instead of a actual interview practice which was the main task, for this reason we decided to consider this as an high priority violation that will be addressed like we did in the mid-fi prototype:

- Changed the label from Tutorials to Recommended Studies
- Decreased the number of tiles of the Studies on the home page to make space for real interview question
- Changed the label from Interviews Practice to Interview Questions for real interview exercises
- Created a new Studies tab that redirects to a page containing all the previous called Tutorials

Violation #8

H5: the violation will be addresses to allow the user to submit a solution only if it actually write something in either the solution box or thought process box.

Violation #11

H6: the violation will be addressed like we did in the mid-fi prototype, inside an exercise/question, either accessed from questions page or reviews, will contain a tab to switch view from the description of the problem to previous submissions, if they exist, so that it will be able to view past solutions and past thought process notes.

Violation #13 and #14

H5: the violations will be addressed by simply adding a request confirmation pop-up for both the try again button (#13) and the submit button (#14)

6.3.2 Discarded Violations

Violation #6

H3:

- Where: Interview page and Exercise page
- What: There is no back button to return to the previous page
- Why: There is at the top left the navigation path that the user can use to return to the previous pages, but adding a simple cancel button I think that can improve the users experience using the application.

We decided to discard this violation, we think that the evaluation itself is contradictory, “There is no back button…” but “There is at the top left the navigation”, moreover, the evaluator indeed pointed out a possible suggestion in the Why section, rather than an actual violation.

Violation #7

H1:

- What: The navigation map at the top will redirect us to the Sessions page instead of the Reviews The violation was a problem related to the paper panel we used in the evaluation rather than a flaw in the design, the prototype was meant to return to the leaf of the navigation map, based on the path took by the user to reach the page.

Violation #12

H15:

- What: There is no warning for submitting a new answer for an already correct interview The application is designed to make exercises repeatable, maintain an history of past submissions

7 High-Fidelity Prototype

7.1 Description

The prototype utilizes ReactJS as the client-side framework. ReactJS was chosen because it allows users to access the service without installing any application and ensures they always have access to the latest versions. Its use of React technology enables fast navigation and seamless compatibility across various devices and operating systems.

On the server side, NodeJS is employed as it seamlessly integrates with the ReactJS client. NodeJS enables easy and efficient development of the required APIs for data provision to the client. It also facilitates the use of an SQLite database to store all the necessary information.

The main libraries used in the prototype include MUI, which enhances aesthetics and ensures portability across different screen sizes. MUI also provides a comprehensive range of widgets to enhance the overall application's appearance.

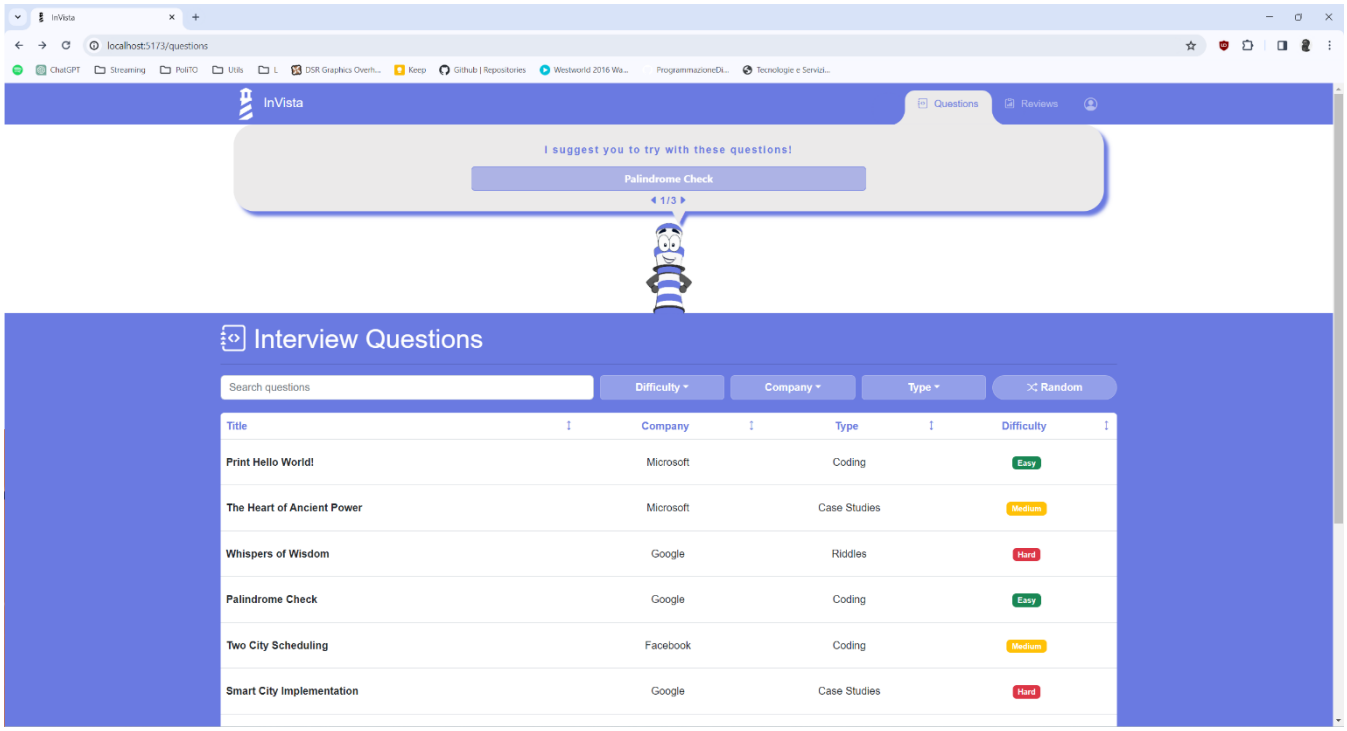
For security measures, the prototype incorporates appropriate methods for secure password storage within the database. Additionally, the server-side implementation includes the Express, Morgan, Cors, and Passport libraries, providing features such as authorization, access control, and other safety measures for both users and the server itself.

7.2 Link

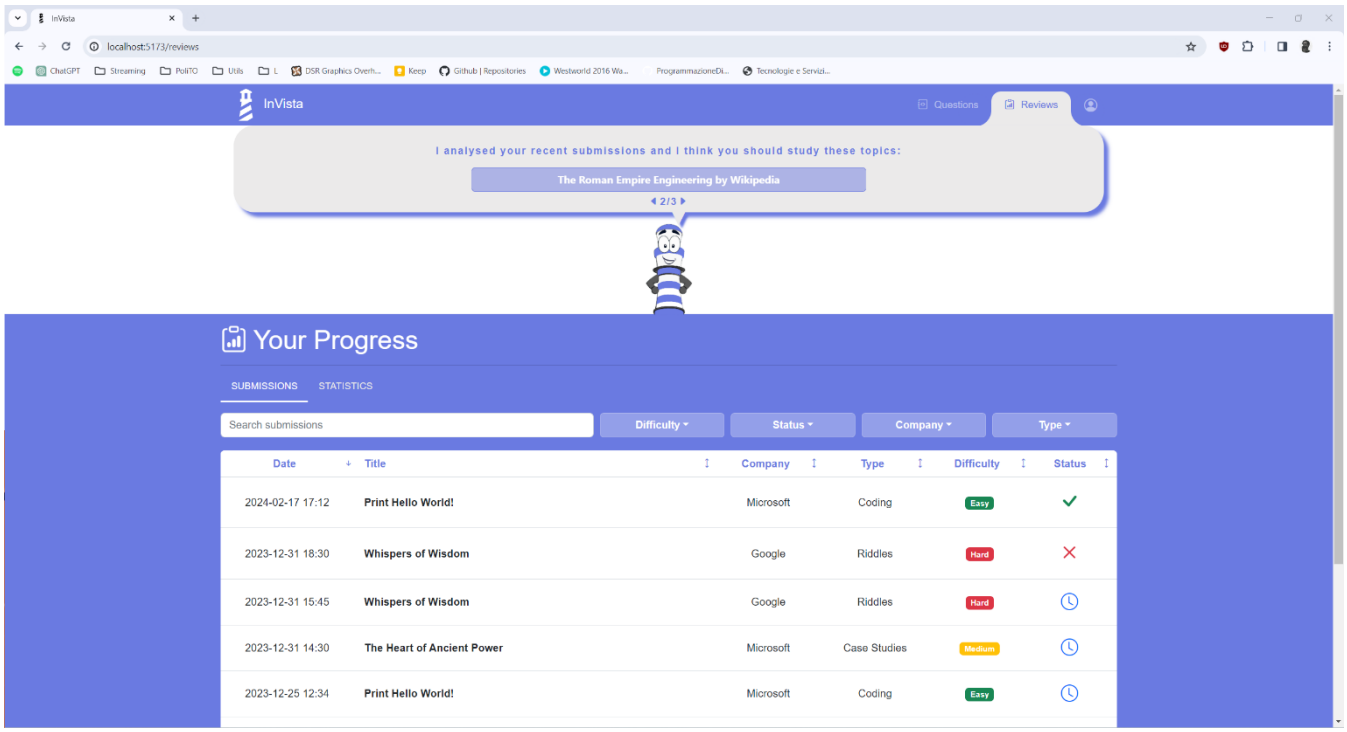
https://github.com/polito-hci-2023/InVista

7.3 Significant Screens

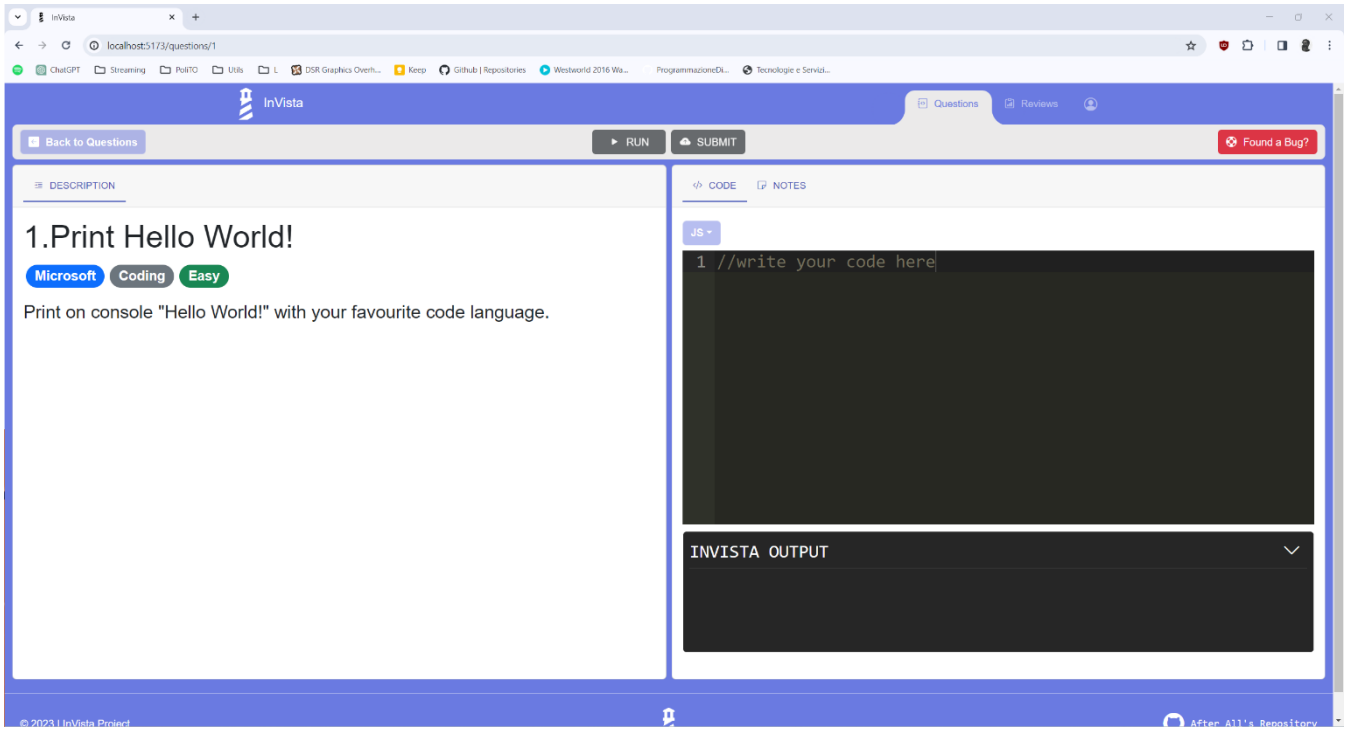
The following are the descriptions of the most significant “screens” in the application.



High-Fidelity Figure: 1 – Questions Page



High-Fidelity Figure: 2 – Reviews Page



High-Fidelity Figure: 3 – Single Question Interface

7.4 Comments and Limitations

The application is designed with a client-server architecture, where crucial data for its operation is stored in a database. However, the available data proved less extensive than desired, leading to limitations in scenarios where specific filters or tags might result in empty outcomes.

In addition, although the backend setup includes features like Express, Morgan, Cors, and Node, there's an observation that the application currently employs auto-login functionality rather than presenting a traditional login page. This means users are seamlessly directed to the website without explicitly logging in, leveraging the backend components mentioned earlier.

Another notable limitation involves the integration of Artificial Intelligence (AI) for analysing user inputs during exercises. Implementing such AI features would have demanded considerable effort and resources. As a workaround, certain behaviours have been hardcoded to generate standardized results, simulating the expected behaviour that the AI would have exhibited.

8 Usability Testing

8.1 Preparation and Run

8.1.1 Description

Regarding participants, our target population primarily consists of recent graduates who own a computer, are familiar with its basic functions, and are in the process of preparing for job interviews or are about to undergo them.

Therefore, individuals we are seeking should fulfil the following criteria to align with our desired profile:

- Age: 21-30 years old
- Education: Bachelor's/master's degree in a STEM field or in the process of obtaining it
- Gender: Irrelevant
- Basic Computer usage
- Experience with Technical Interviews

The evaluations were conducted mostly in person, and the team members had the following roles:

Team Member	Role(s)
Marcello Vitaggio	Observer
Alex Alfarano	Facilitator and observer
Mattia Pecce	Facilitator and observer
Fabrizio M. L. Vitale	Facilitator and observer

The refined set of tasks is reported in the table below.

#	Scenario	Task	Success criteria	Methodology

T1	You would like to work for Microsoft, and you want to start with something easy.	**Start an interview practice session for this company and complete it.**	After selecting a question by Microsoft, the user answers to it, run the attempt and submits the solution.	Cooperative Evaluation
T2	You would like to review the questions you got wrong.	**View ONLY the list of the questions you have answered incorrectly.**	Go to “Review” tab and filter by Failed status.	Cooperative Evaluation
T3	After getting a wrong answer to a question, you studied to improve.	**Check your improvements by attempting to answer the question correctly.**	Repeat a failed submission by selecting it from “Reviews” tab	Cooperative Evaluation
T4	You remember starting to work on a difficult question last months, but you did not had time to complete it. Now you are free.	**Go back to that question and finish it.**	Select a difficult question from “Reviews” tab, which status is “Uncompleted”.	Cooperative Evaluation
T5	During practice on the “Palindrome check” question, you notice that the description contains a visual bug.	**Report the presence of errors in that question.**	The user should click on the button “Found a bug”, select the category “Visual Bug” and optionally describe the error.	Cooperative Evaluation
T6	You want to check your progress to improve your skills.	**Identify what types of questions you are lacking in, and you need to focus more on.**	User goes to “Reviews” tab and visualizes the Statistics.	Cooperative Evaluation

Talking about metrics, the combination of quantitative and qualitative data was compiled and analysed and then used to develop conclusions.

Quantitative metrics were:

- Time to complete the tasks
- Post-test questionnaires (SUS)
- Successful Task Completion
- Number of Critical errors

while qualitative metrics included:

- User's comments and questions
- Post-task questionnaires
- User's body language and facial expressions

About equipment, to conduct the usability tests the following tools were used:

- Computer with external mouse
- Internet connection
- Browser
- Smartphones' camera and microphone

The usability tests requirements were:

- Setup the high-fidelity prototype on a computer
- Setup of a "fake" account already filled with data

and the artifacts were:

- Informed consent form
- Post-task questionnaire
- Post-test questionnaire (SUS)
- Usability Testing's script

8.1.2 Links

This is the link to the PDF document that represents the usability testing protocol: Usability test protocol.

Participant	Informed consent form	Questionnaires
1	Informed consent form – Participant 1	Questionnaires – Participant 1
2	Informed consent form – Participant 2	Questionnaires – Participant 2
3	Informed consent form – Participant 3	Questionnaires – Participant 3
4	Informed consent form – Participant 4	Questionnaires – Participant 4

8.2 Results

8.2.1 Summary

The study's results and findings were derived by analysing both quantitative and qualitative metrics. Quantitative metrics encompassed diverse factors such as task completion time, number of critical errors, and post-test questionnaires (SUS). The tables below illustrate the data related to the initial two metrics.

Participant	Time to Complete the Tasks (seconds)					
	T1	T2	T3	T4	T5	T6
1	~ 40	~ 25	~ 30	~ 30	~ 35	~ 20
2	~ 20	~ 15	~ 20	~ 20	~ 25	~ 15
3	~ 20	~ 15	~ 15	~ 20	~ 20	~ 15
4	~ 15	~ 15	~ 15	~ 25	~ 15	~ 15

***** Highlighted meaning explained in 8.2.2

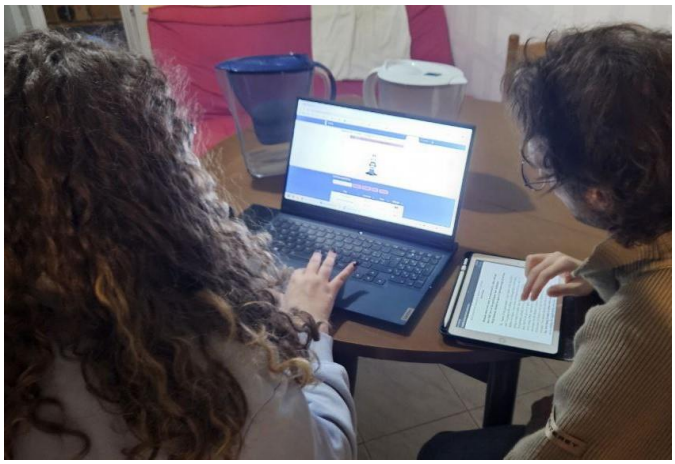
Participant	Number of critical errors in tasks					
	T1	T2	T3	T4	T5	T6
1	1	0	0	0	0	0
2	1	0	1	1	0	0
3	1	0	0	0	0	0
4	0	0	0	0	0	0

Below is the table reporting the SUS (System Usability Scale) scores for the post-test questionnaire. Scores equal to or greater than 68 indicate a favourable usability evaluation, while scores below 68 suggest areas that may require improvement.

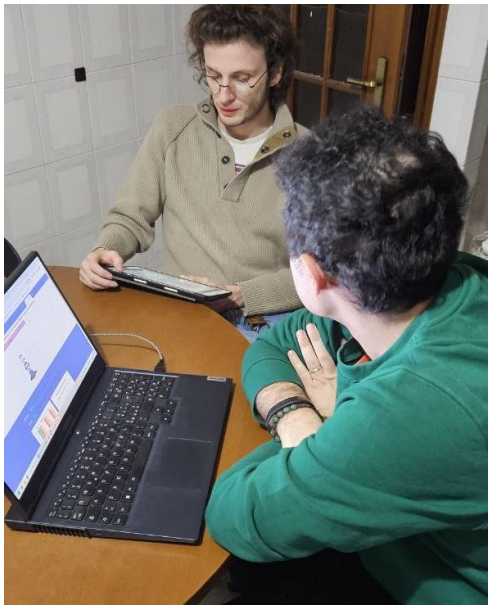
Participant	Score
1	70
2	100
3	90
4	100

And here are some of the photos we took with captions:

Usability Test - Participant: 4



Usability Test - Participant: 4



Usability Test - Participant: 4

Usability Test - Participant: 4

8.2.2 Discoveries and learnings

Regarding task times, unexpected system behaviours, along with issues in the recording software, emerged during the first two usability tests (specifically in tasks 1, 2, 3, 4). These issues were promptly addressed in time for the subsequent tests. It is worth noting that, particularly in the first two tests during task 1, completion times were longer not due to difficulties using the prototype but because participants struggled with the exercise itself. In the third test, an anomaly with the browser occurred, affecting the successful completion of the task.

Throughout the tests, we observed that some candidates used the browser navigation instead of the prototype, indicating that the designated navigation elements were not prominent enough.

Additionally, it was observed that some candidates expected the prototype to prompt for submission after running the code without explicitly submitting progress upon exiting the question.

Some participants confused the list of submissions with the list of questions, suggesting that, perhaps, in addition to the navigation bar, a more effective method is needed to distinguish between the two screens.

It also emerged during the tests that some participants did not use filters to locate questions because they were easy to identify, given their limited number.

Despite these observations, the overall feedback from participants indicates that the prototype is generally intuitive and easy to use.

8.2.3 Potential Changes

Based on the results of the experiments and the feedback from participants, we compiled a substantial list of changes that we aim to implement and that we already implemented to address the primary issues identified during the usability test. Each modification, along with the corresponding feedback that prompted it, is detailed in the following table.

Change	Source
Single Question Page: working language filter bug	P1 test
Single Question Page: back navigation button graphic design	P1 test
Questions and Review Page: UI design	P3 test

9 Conclusions

9.1 What we learned

Our primary takeaways regarding the overall course process encompassed concepts of the human-centred design process, user experience, and usability. Additionally, we acquired new skills, such as evaluating interactive systems with users, listening to user needs, and interacting with applications, devices, and environments.

Within the scope of our lab theme (Education and Learning) and our project, we discovered the vital importance for users to always have access to a variety of teaching resources, seeking stimuli that go beyond the usual and offer a more diverse learning experience.

9.2 Group Feedback

We collaborated on assignments 1, 2, and 4, while assignment 3 was an individual task. For assignment 5, involving the implementation of the high-fidelity prototype, we distributed our tasks as follows:

- Fabrizio: Server Management, API's, navigation and report features
- Alex: Question Page and usability test protocol
- Mattia: Review Page and usability test protocol
- Marcello: Single Question Page and final report

Our experience of collectively working on a project as a group of engineers brought about both positive and negative aspects. The collaborative nature of our work encouraged innovative thinking, honed our skills, and resulted in a more comprehensive project outcome. However, at times, we faced occasional challenges in effective project management. By addressing these issues, we successfully navigated the complexities of teamwork and ultimately produced a successful project.