oXya

FLASH CARD it

April 2024

oXya's participation to Google Gemini Hackathon

Project Introduction

Building Smart Learning Flashcard with Gemini

THE FLASHCARD'IT PROJECT

- oXya is thrilled to be participating in this hackathon, leveraging the power of Gemini technologies to revolutionize the way we learn! Our project focuses on building an innovative application that streamlines the creation of flashcards from educational PDFs.

- Imagine a world where certification documents, training manuals, and any learning resource can be transformed into interactive flashcards with just a few clicks. Our application tackles this challenge by utilizing Gemini's capabilities. Here's how it works:
  - **PDF Ingestion**: Users upload a PDF document containing valuable learning material.
  - **Intelligent Text Extraction**: Gemini's AI extracts key concepts, definitions, and factual points from the PDF, understanding the structure and context.
  - **Flashcard Generation**: The extracted information is then automatically converted into well-formatted flashcards, each represented as a JSON object. These flashcards can include text, images, or even audio snippets, depending on the content of the PDF.
  - **Testing and Learning**: Users can leverage these Gemini-powered flashcards to test their knowledge and solidify their understanding of the learning materials.

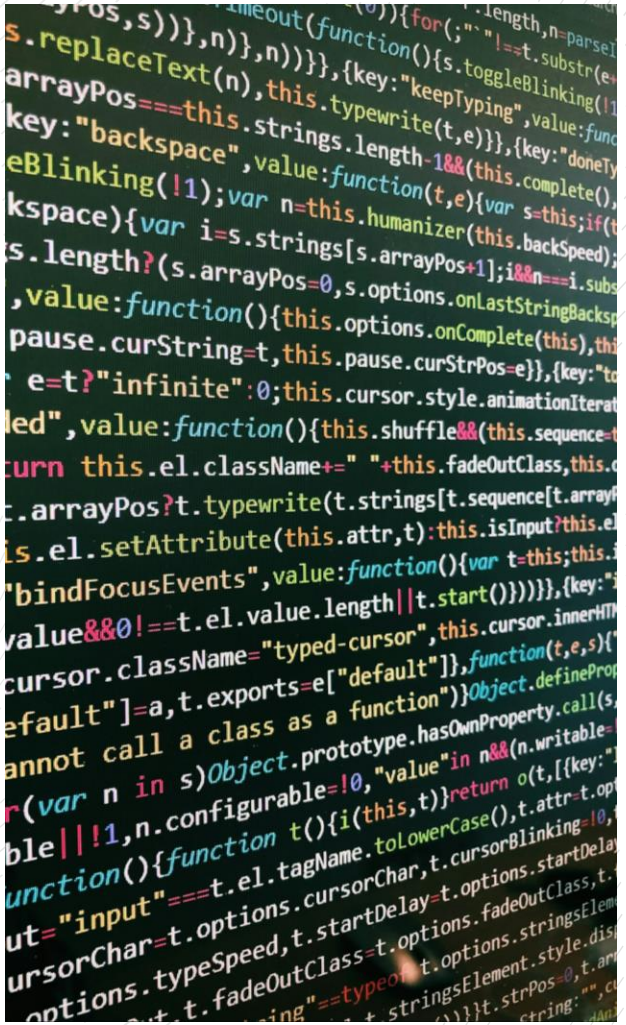
- Our project aims to empower learners by:
  - **Saving Time**: Eliminate the tedious task of manually creating flashcards.
  - **Enhanced Learning**: Improve knowledge retention through interactive flashcards.
  - **Accessibility**: Make learning materials more digestible and engaging.

- By harnessing the potential of Gemini, oXya's application aspires to make the learning process more efficient and enjoyable for everyone.

Gemini Hackathon

Why are we using Gemini for this Solution?

- We leverage Gemini's powerful **Large Language Model (LLM)** to create flashcards seamlessly, drawing information directly from its **vast knowledge base**.
- Uploading training materials in PDFs provides **additional context for Gemini**, enabling it to build even smarter and more accurate flashcards that are specifically tailored to the content. This significantly **reduces the likelihood of errors or irrelevant information** appearing in the generated flashcards (a phenomenon known as **hallucination**). This process is called **Retrieval-Augmented Generation** (RAG).
- While automation streamlines the process, **human oversight remains crucial**. Instructors can review the automatically generated flashcards and ensure their accuracy before using them.



The Project Team

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Description of the Solution

Key definition

FLASHCARDS

- Flashcards are small study tools, typically cards, used to aid memorization. They are designed with information on one or both sides. One side with a question and the other side with the correct answer and some explanation.
- The flash cards are stored in the Firestore database in JSON format. It contains one question and a list of affirmation (e.g., true, false, or other character chains) associated with a boolean value revealing if the affirmation is valid or incorrect.
- There is always one only valid affirmation per flashcard that properly answers the question on the top of the flashcard.

TOPIC

- The training topic is the subject of the training, and a group of flashcards. The topic could be either related to a technical training, an employee on-boarding or the preparation of a specific certification (e.g., Google Cloud certified Professional Architect, Project Management Professional…) We associate tags to each topic to help the trainee find the proper topic (for e.g., aws, google, azure, pmp, certification, …)

RUN MODES

- Once the trainee connects to the platform and selects a topic, he or she has the possibility to select one of the 2 run modes available: learning mode or training mode.
- In the learning mode, the trainee will see first the question on the top of the card. Once he or she flips the card, only the right answer will show up with a a short explanation.
- In the training mode, the trainee will see first the question on the top of the card. Once he or she flips the card, several affirmation will show-up. The trainee will be invited to click on the affirmation he or she consider the valid answer. After clicking, the flashcard will reveal if the answer is correct or not.

Description of the Solution

Key definition

Instructor

- The instructor is a user role that has the ability to create the topic, tags, and upload the PDFs materials to create the flashcards on the "Flashcard'it" platform.

Trainee

- The trainee is a user role that has the ability to select a topic and display the flashcards in learning mode or training mode.

Description of the Solution

Application workflows

Instructor workflow to create the flashcards

1. Authentication to the website "Flashcard'it Platform"
2. Create a training and learning topic and associate topic tags
3. Upload a training and/or certification manual in PDF on the platform
4. The application, based on **Gemini**, extract the data, vectorize the document and generate flashcards

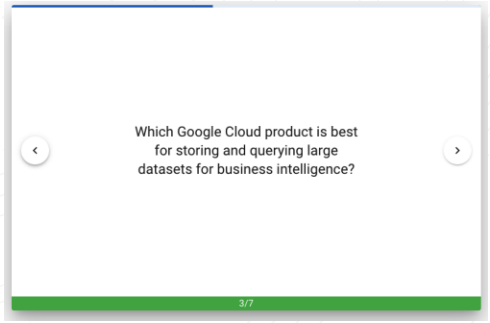
Trainee End-user workflow to learn and test his or her knowledge with the generated flashcards

1. Authentication to the website "Flashcard'it Platform"
2. Select a training and learning topic. Trainee can leverage the tags to search for a specific topic.
3. Trainee select a run mode: Learning mode or Training mode
4. Trainee can display the flashcard in the format corresponding to the run mode selected

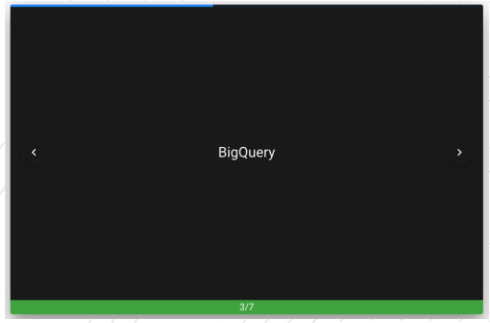
Description of the Solution

Example of a flashcard

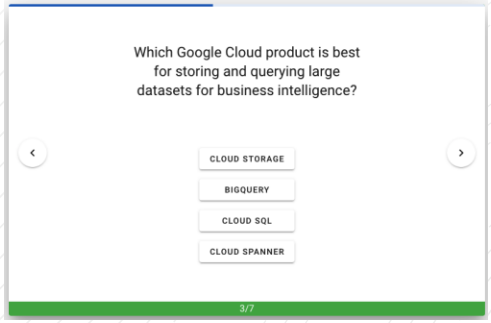
Front side of the flashcard



Flip side of the flashcard in learning mode

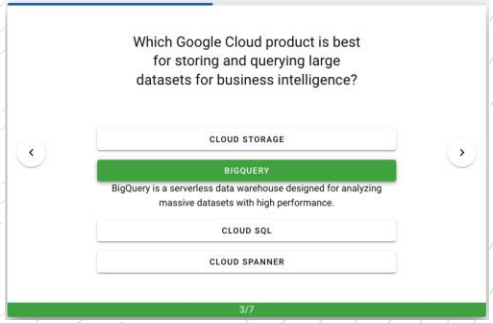


Flip side of the flashcard in training mode



Flip side of the flashcard in training mode

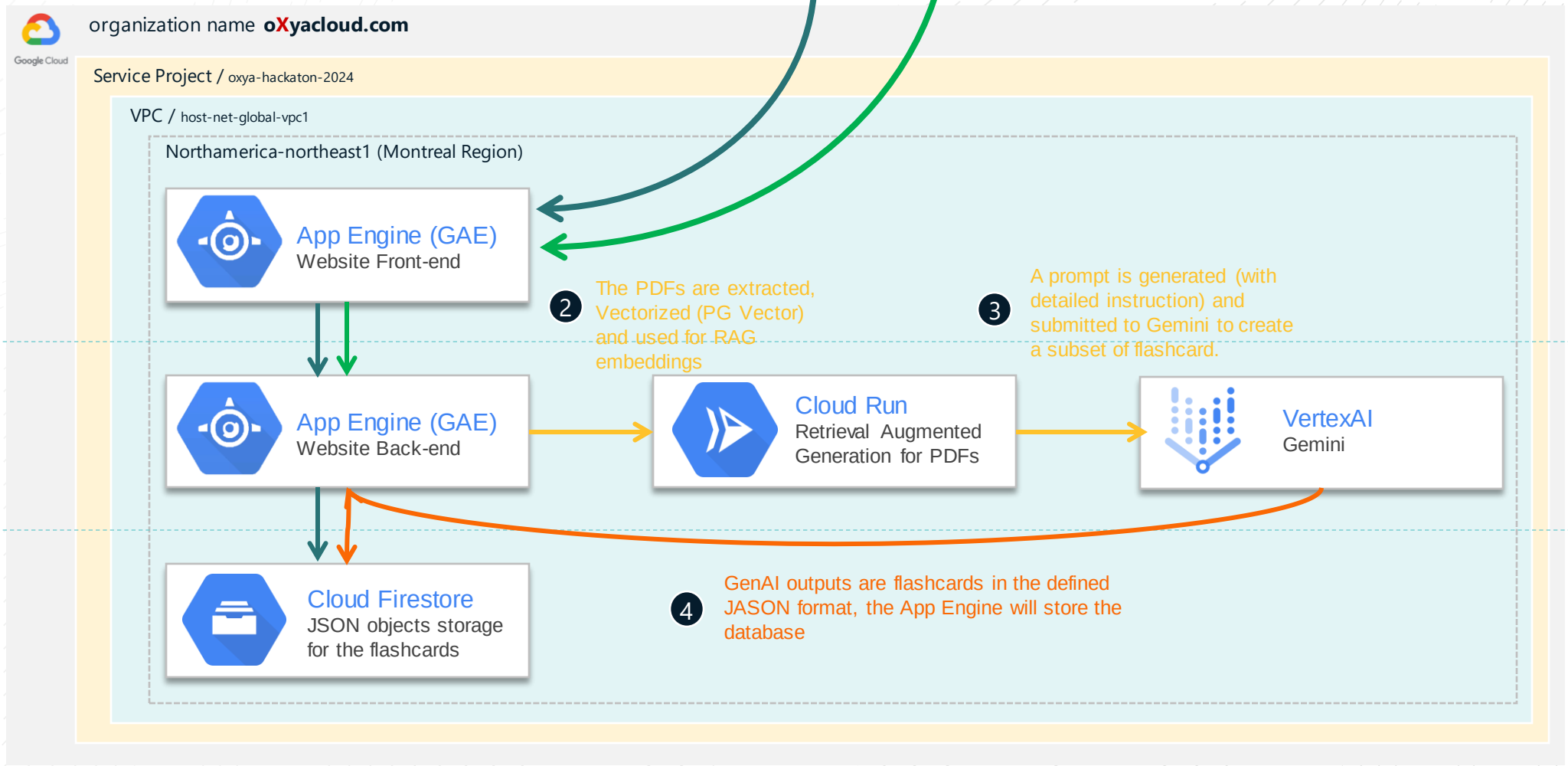
(After the trainee clicked on the affirmation, he or she consider the valid answer.)



Description of the Solution

Architecture on Google Cloud

- **Project Number**: 260594083857
- **Project ID**: oxya-hackaton-2024



Front-End Tier

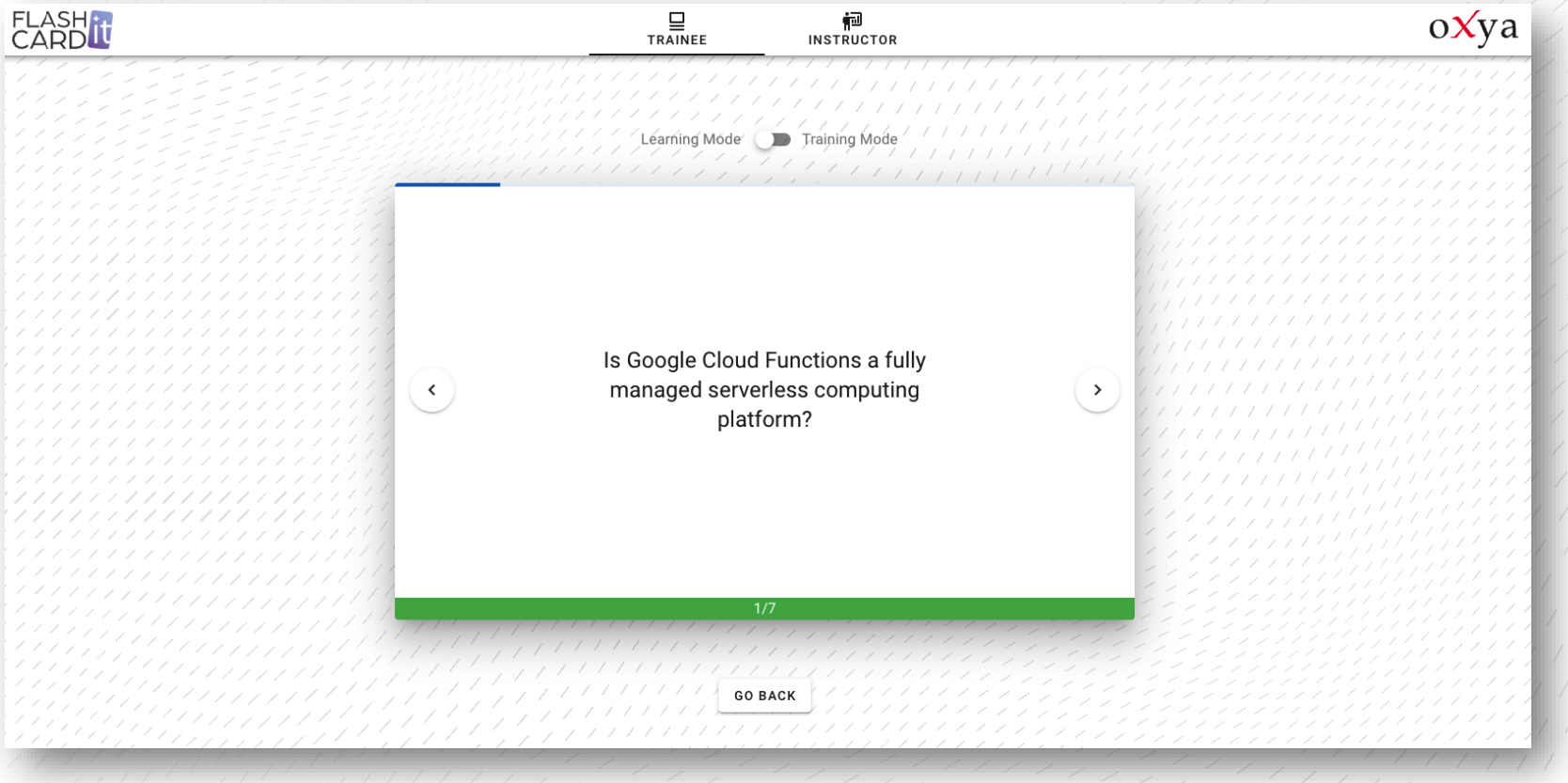
Back-end Tier

Database Tier

Description of the Solution

Sneak peak of the Interface

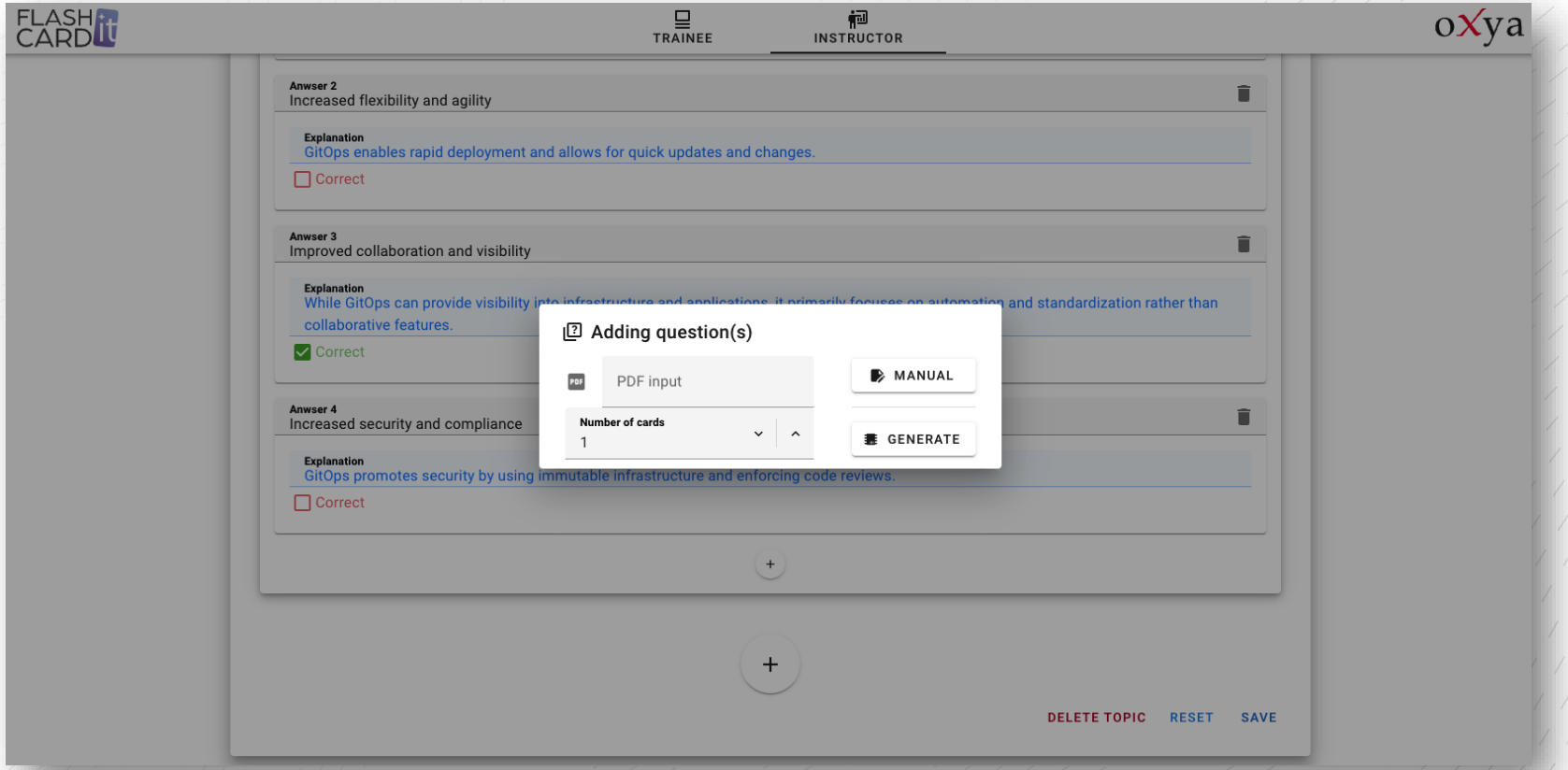
- **Trainee interface**



Description of the Solution

Sneak peak of the Interface

- **Instructor interface**



Description of the Solution

Example of a JSON object stored in the Firestore database

```
{
      "id": "f2NHj6Ju0vIhYdhwoJSb",
      ”topic": "Google Cloud Associate",
      ”flashcards": [
        {
          "question": "Is Google Cloud Functions a fully managed server
           less computing platform?",
          "answers": [
            {
              "correct": true,
              "text": "True",
              "explanation": "Google Cloud Functions is a fully managed
serverless computing platform that allows users to deploy and run code
              without having to provision or manage servers."
            },
            {
              "correct": false,
              "text": "False",
              "explanation": "Google Cloud Functions is not a fully ma
               aged serverless computing platform."
            }
          ],
          "id": "3H8HWqfwyEfdG5Q9hdUw"
        }
}
```

Prompt template submitted to Gemini with 2 variables: ${numberOfCards} / ${topic}

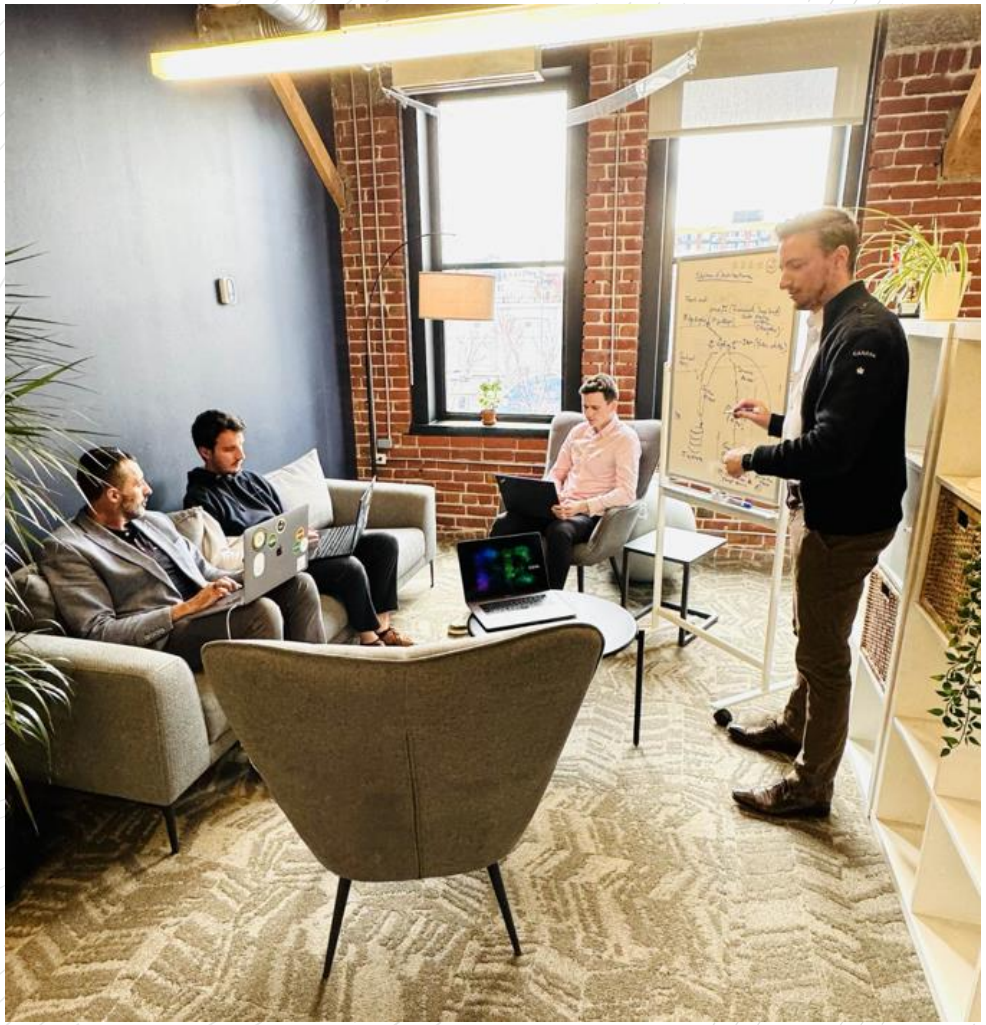
```
Generate ${numberOfCards} question-answer for the ${topic} 2024
certification.
     The question should present four potential answers.
     Only one of these answers should be correct.
     Each answer should come with a unique explanation.
     The output needs to be in JSON format, similar to the
     following example :
        [
          {"question":"What is the color of the sky?",
           "answers":
             [
               {
                "text":"green",
                "correct":false,
                "explanation":"The sky is not green, it's blue.”
               },
               {
                "text":"blue",
                "correct":true,
                "explanation":"The sky is blue because it reflect
                the water”
                }
             ]
          }
         ]
```

Future Improvement of the Application

Project Backlog

We are planning to use this application internally after the hackathon. You will find below the backlog of features we are planning to implement:

- Authentication through okta with name account,
- A role-based access with 3 types of profiles: Trainee, Instructor and Admin,
- Building and storing a corpus of document per topic,
- Creating a score for each trainee users with a feedback sent to the instructor into a dashboard,
- Using Gemini based on user response to question his or her weakness and generate new flashcards accordingly,
- Allow users to mark some flashcards as favorite to easily retrieve it for learning purposes on the welcome page.



Thank you

EMEA

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Paris, Lyon, Nice, Lille, Pau, Nantes

Belgium
Kortrijk, Leuven

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Aalborg, Copenhagen, Odense

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