ColearnApp

Project Report

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github.com/mustafacagataytulun/bounswe574-2022
v0.9

https://colearnapp.mustafatulun.com/

HONOR CODE

Table of Contents

Overview

ColearnApp is a web-based platform that enables users to engage in collaborative learning with their peers. It allows users to manage their own learning efforts and participate in a self-directed learning process without the need for a traditional lecture format.

ColearnApp allows users with similar interests to create dedicated spaces called Colearning Spaces for a specific topic and gather relevant learning materials. Within these spaces, users can create and edit articles, prepare quizzes, ask and answer questions, and contribute to a glossary of terms. These Colearning Spaces provide a collaborative environment for learning and sharing knowledge.

Software Requirements

- As a guest, I want to register to the system without email verification, so that I can use all features of the application instead of just browsing.
- As a first-time registered user, I want to select my user interest, so that the application shows recommended learning spaces to me to join.
- As a user, I want to fill my profile, so that other users can see who I am.
- As a user, I want to change my interests in my profile, so that the system can recommend me learning spaces according to my new interests.
- As a user, I want to create learning spaces, so that other like-minded users can join my learning space and we learn together.
- As a user, I want to join learning spaces, so that I can start to contribute to a co-learning effort in that space.
- As a user, I want to ask questions, so that I can get answers for it.
- As a user, I want to answer questions, so that I can help someone to learn that specific topic.
- As a user, I want to give feedback, so that the related item will become better.
- As a user, I want to receive badges, so that my time and contributions are rewarded on the platform.
- As a user, I want to upvote content, so that the content quality and helpfulness can be seen better.
- As a user, I want to downvote content, so that the bad quality content can be seen immediately.
- As a user, I want to edit content freely, so that I can feel the co-learning effort instead of just solitary learning.
- As a user, I want to report users with bad behavior, so that the platform can be free of malevolent users.
- As a user, I want to add multimedia to the platform, so that users who are not good with reading can benefit from different learning techniques.
- As a user, I want to specify recommended prerequisites for content, so that other users can understand the level of that content better.
- As a guest, I want to search learning spaces, so that I can find out if there is an existing learning space for my topic.
- As a guest, I want to view inside the learning spaces, so that I can figure out if I can benefit from that space.
- As a user, I want to add tags to learning spaces, so that other users can find the learning space easier.
- As a user, I want to add tags to content, so that other users can find content easier.
- As a user, I want to create quizzes, so that other users can measure their knowledge.
- As a user, I want to solve quizzes, so that I can measure my knowledge.
- As a user, I want to ignore other users that I selected, so that I can not be bothered by them.
- As a learning space owner, I want to mute users that I selected, so that they cannot disturb other users.
- As a user, I want to add items to the glossary of the learning space, so that new users can learn the meaning of certain terms about that topic.
- As a user, I want to see the learning spaces I joined on the home page, so that I can quickly dive into where I left.
- As a user, I want to add other users to my friend list, so that I can follow them better.

- As a user, I want to get notifications from my friends.

- As a user, I want to send direct messages to other users, so that I can communicate with them.
- As a user, I want to see a list of co-learners in the learning space, so that I can see who is with me.
- As a user, I want to see a list of online co-learners in the learning space, so that I can see what they are doing right now.

- As a user, I want to annotate a selected text from an article.

- As a user, I want to see all of the annotations in an article.
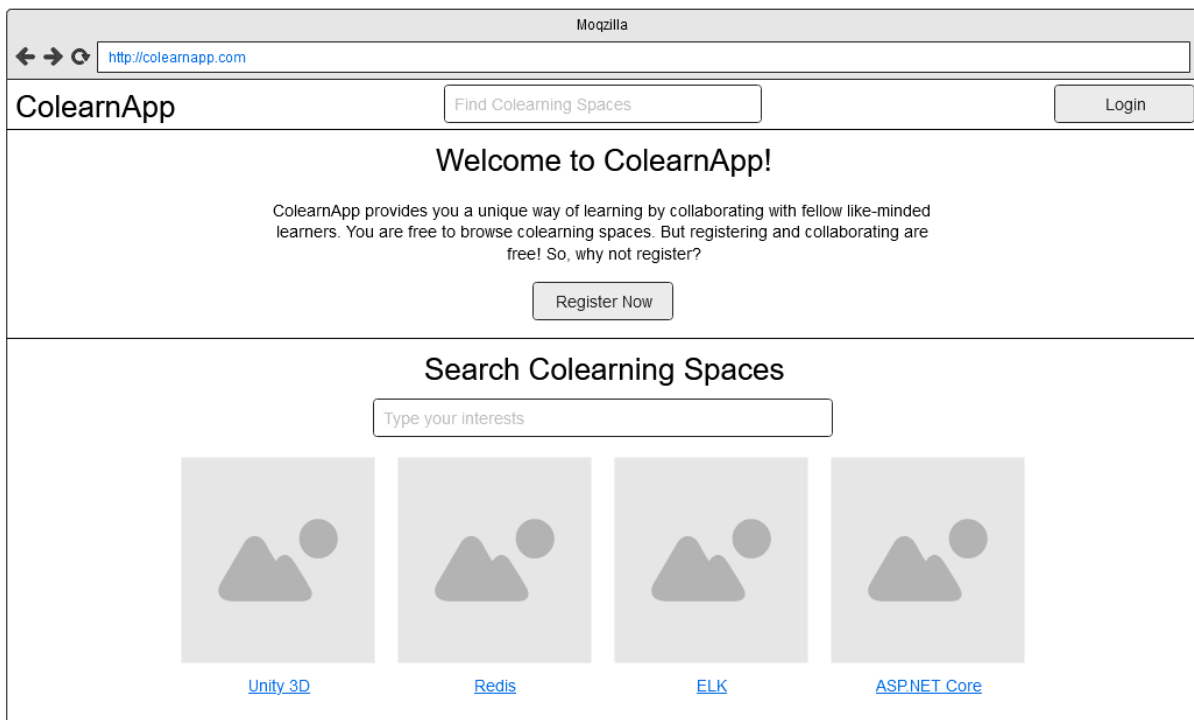
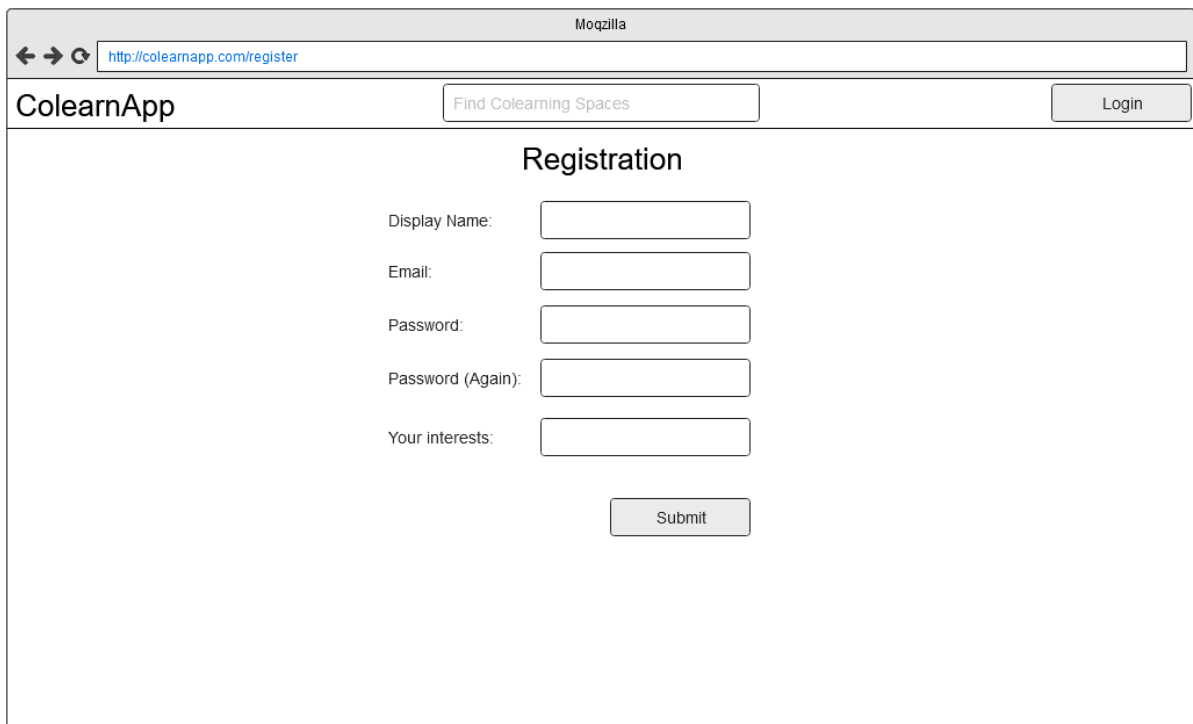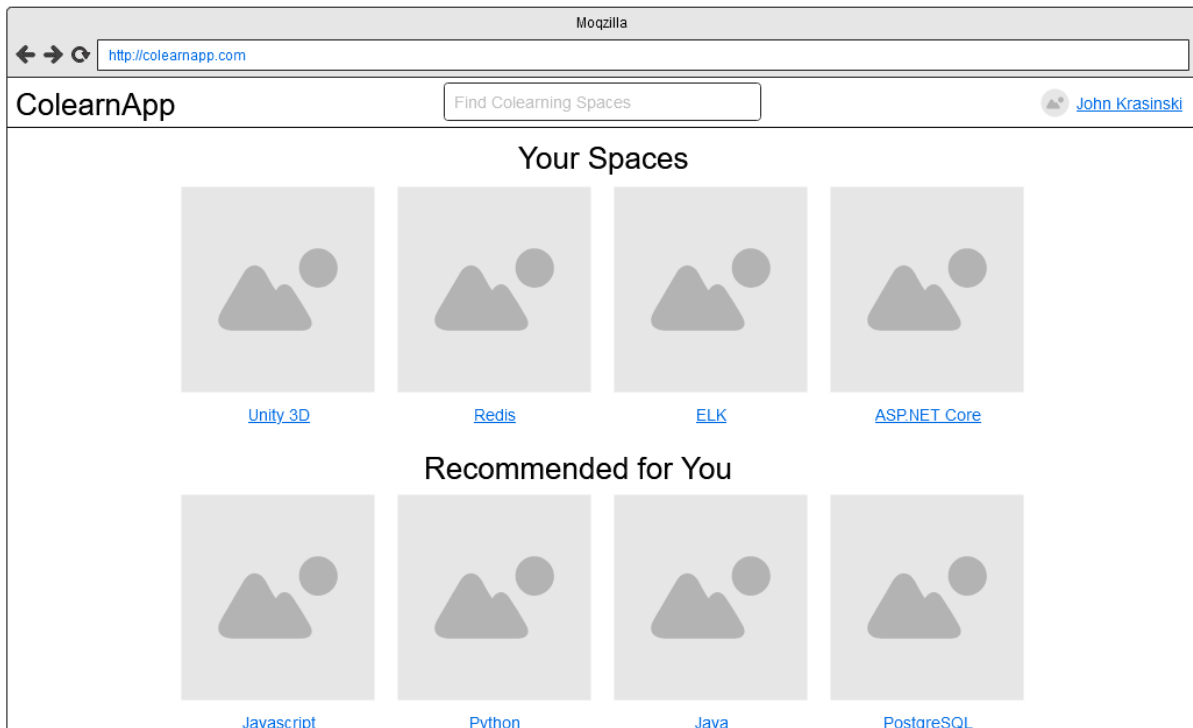- As a user, I want to delete an annotation.

Design

Use Case Diagram
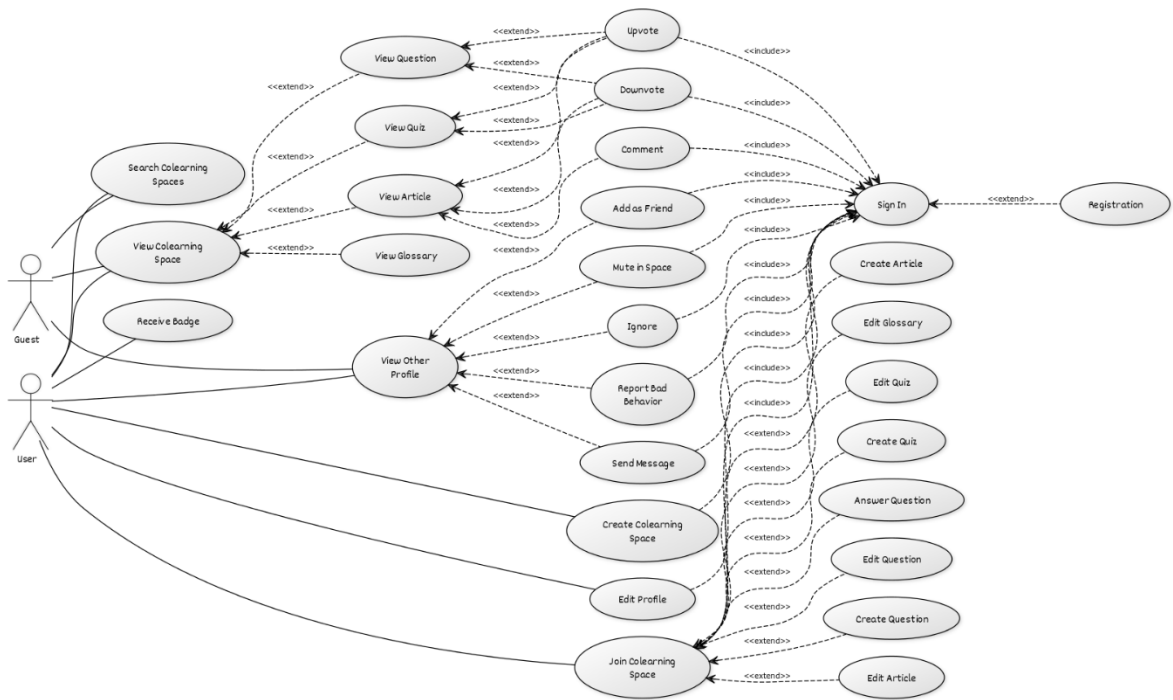
CREATED WITH YUML

Screen Mockups

Moqzilla

← → ↻ http://colearnapp.com

ColearnApp
[Find Colearning Spaces]   John Krasinski

Your Spaces

Unity 3D   Redis   ELK   ASP.NET Core

Recommended for You

Javascript   Python   Java   PostgreSQL

Moqzilla

← → ↻ http://colearnapp.com/register

ColearnApp
[Find Colearning Spaces]   [Login]

Registration

Display Name: [   ]

Email: [   ]

Password: [   ]

Password (Again):   [   ]

Your interests: [   ]

                    [Submit]

← → ↻ http://colearnapp.com/register/result

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Registration

Your registration has been completed.

You can now go to homepage and start joining colearning spaces.

Home

← → ↻ http://colearnapp.com/login

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Login

Login

Email:

Password:

Submit

http://colearnapp.com/profile/edit

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Edit Your Profile

Change Picture

Display Name:

Bio:

Your interests:

Submit

---

http://colearnapp.com/profile

ColearnApp

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John Krasinski

John Krasinski

Bio

I am a curious person who likes to learn new things.

Interests

game development, wine, religion

Involved Colearning Spaces

Unity 3D
Wine Making in a Chateau

Friends

Jenna Fisher

Badge

Moqzilla

http://colearnapp.com/profile/CUEK4822

ColearnApp

Find Colearning Spaces

Steve Carell

Bio

I am a curious person who likes to learn new things.

Interests

game development, wine, religion

Badge   Badge

Involved Colearning Spaces

Unity 3D
Wine Making in a Chateau

Add as Friend

Send Message

Report Bad Behavior

Ignore

Mute in Space

Moqzilla

http://colearnapp.com/search

ColearnApp

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Search Results

White Wine Making

How to Taste Red Wines

Cannot find the colearning space you are looking for?
You can create a new one!

Create Colearning Space

← → ↻ http://colearnapp.com/space/create

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Create Colearning Space

Name: _____

Tags: _____

Submit

Add Picture

← → ↻ http://colearnapp.com/space/D38JSK2A

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Unity 3D   Leave

| Articles | Questions | Quizzes | Glossary |

12 How to Setup Environment Before Starting   New Article

5   Your First Script

8   Start() & Update()

Colearners

Steve Carell   Editing Article

Rainn Wilson   Creating Quiz

Jenna Fisher

Paul Lieberstein

← → ↻ http://colearnapp.com/space/D38JSK2A/article/3J8H77VO

ColearnApp

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👤 John Krasinski

<< Back to Unity 3D Space

How to Setup Environment Before Starting

∧ 12 ∨

Installing Unity 3D

You need to download the setup file of Unity 3D from https://unity3d.com/get-unity/download page.

Download the file and install it.

Installing Visual Studio

You need to download the setup file for Visual Studio Community from https://visualstudio.microsoft.com/ page.

Download the file and install it. Make sure you check the "Game Development with Unity 3D" workflow on installation.

Comments

Type here

Send

← → ↻ http://colearnapp.com/space/D38JSK2A/article/3J8H77VO/edit

ColearnApp

Find Colearning Spaces

👤 John Krasinski

<< Back to Article

Edit Article

Save

Title

How to Setup Environment Before Starting

Tags

#unity #setup

Recommended Prerequisites

Content

Installing Unity 3D

You need to download the setup file of Unity 3D from https://unity3d.com/get-unity/download page.

Download the file and install it.

Installing Visual Studio

You need to download the setup file for Visual Studio Community from https://visualstudio.microsoft.com/ page.

Download the file and install it. Make sure you check the "Game Development with Unity 3D" workflow on installation.

Mozilla

← → ↻ http://colearnapp.com/space/D38JSK2A

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Unity 3D

Leave

| Articles | Questions | Quizzes | Glossary |

Asset: All kind of items that is included in a Unity 3D project.

Script: A code file which defines behavior written in C# language.

Edit

Colearners

Steve Carell   Editing Article

Rainn Wilson   Creating Quiz

Jenna Fisher

Paul Lieberstein

Mozilla

← → ↻ http://colearnapp.com/space/D38JSK2A/glossary/edit

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<< Back to Unity 3D Space

Edit Glossary

Save

Term	Definition
Asset	All kind of items that is included in a Unity 3D project.
Script	A code file which defines behavior written in C# language.
New term	New definition

← → ↻ http://colearnapp.com/space/D38JSK2A

ColearnApp   Find Colearning Spaces   John Krasinski

Unity 3D   [Leave]

| Articles | Questions | Quizzes | Glossary |

2   How can I create a camera that follows the player?   [New Question]

Colearners

Steve Carell   Editing Article

Rainn Wilson   Creating Quiz

Jenna Fisher

Paul Lieberstein

← → ↻ http://colearnapp.com/space/D38JSK2A/question/5J8DUEVO

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<< Back to Unity 3D Space   ## How can I create a camera that follows the player?

∧   2   ∨

I want a camera in my scene which follows the player I control. How can I do that?

Answers

You can easily use Cinemachine extension for that.

Steve Carell - 01.04.2022

New Answer

Type here

[Send]

http://colearnapp.com/space/D38JSK2A/questions/create

ColearnApp

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<< Back to Unity 3D Space

Ask Question

Save

Title

How can I create multiple cameras?

Tags

#unity #setup

Question

I want to create multiple cameras for my game and switch between them by pressing a button. How can I do that?

---

http://colearnapp.com/space/D38JSK2A

ColearnApp

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Unity 3D

Leave

| Articles | Questions | Quizzes | Glossary |

4   Which is the easiest way to create a camera that follows the player?

New Quiz

Colearners

Steve Carell   Editing Article
Rainn Wilson   Creating Quiz
Jenna Fisher
Paul Lieberstein

http://colearnapp.com/space/D38JSK2A/quiz/MDJE37DJ

ColearnApp

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<< Back to Unity 3D Space

Edit

Which is the easiest way to create a camera that follows the player?

∧ 4 ∨

○ Writing a custom script

○ Using Cinemachine extension

○ Praying to God

○ In Unity 3D, a camera cannot follow the player

Check Answer

---

http://colearnapp.com/space/D38JSK2A/quiz/MDJE37DJ/edit

ColearnApp

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<< Back to Quiz

Edit Quiz

Save

Question

Which is the easiest way to create a camera that follows the player?

Tags

#unity #setup

Answers

Writing a custom script

Using Cinemachine extension

Praying to God

In Unity 3D, a camera cannot follow the player

Add another answer

Status

Most of the requirements for the application have been implemented and it is now live. There are currently no known bugs and the application is ready to use with all of its implemented features.

However, some requirements could not be implemented within the allotted development time. The following is a list of missing functionality that would be included in the project if given a longer time frame.

- The system does not have badges.
- Reporting other users for bad behavior is not implemented.
- Ignoring other users is not implemented.
- Muting other users for bad behavior by colearning space owners or moderators is not implemented.
- Adding other users as friends is not implemented.
- Sending direct messages to other users is not implemented.
- Though users can see names and profiles of other users who joined a colearning space, they cannot see what they are doing right now.

- Although the application allows users to add semantic tags from wikidata query service results, the learning space can only have one tag.

Status of Deployment

The live version of the application can be accessed at https://colearnapp.mustafatulun.com.

The application is containerized using Docker and hosted on the Google Cloud Run service, which is a serverless, managed platform. This means that developers do not have to worry about provisioning virtual machines or managing the operating system and installations on them. Additionally, the Cloud Run service supports the "scale-to-zero" feature, which means that if the application is not accessed for a certain period of time (the default is 10 minutes), the application is shut down completely, using no CPU or RAM resources. When a user attempts to access the application through the URL, it is quickly started and serves the user's request. This feature helps to lower costs for applications that are not in use 24/7. The Cloud Run service also supports automatic horizontal scaling to handle a high number of concurrent users. Finally, the service allows for the use of custom domains, which is why the URL for the application does not include any reference to Google.

The application uses PostgreSQL as the database and it is hosted on AWS RDS with the 12-month free tier.

The application allows users to upload their own profile pictures or colearning space cover images, which are saved on the AWS S3 service when the corresponding forms are submitted. These static images are served directly from the AWS S3 service when they are accessed through the application. The application's static files, which are collected using the "collectstatic" command in Django, are also stored on the AWS S3 service and served from there.

The "Forgot Password" feature of the application uses an SMTP service to send emails to users. Currently, we are using GMail's SMTP servers for this purpose. However, it would be more ideal to use a cloud service such as AWS SES, Sendgrid, or PostmarkApp. It is also possible to use an on-premises email server for this purpose.

The deployment process is initiated automatically by a CircleCI CI/CD pipeline. The current status of the pipeline can be viewed at the provided link: https://app.circleci.com/pipelines/github/mustafacagataytulun/bounswe574-2022

System Manual

The application can be run on any platform that is capable of hosting Docker containers. The following requirements must be met in order to operate the system.

- A container platform (managed service, or a VM on which Docker is installed)
- A PostgreSQL database (managed service, or installed on a VM)
- AWS S3
- An SMTP server (managed service, or an email server installed on a VM)

In addition, the annotation service used by the main application requires following components:

- A container platform (managed service, or a VM on which Docker is installed)
- A MongoDB database (managed service, or installed on a VM)

PostgreSQL Database

For the live deployment of this project, we are using an AWS RDS PostgreSQL database instance, which can be easily set up through the AWS Management Console.

AWS S3

In order for the application to function properly, three buckets must be created. These can be created through the AWS Management Console.

- colearnapp-profile-pictures
- colearnapp-space-covers
- colearnapp-static
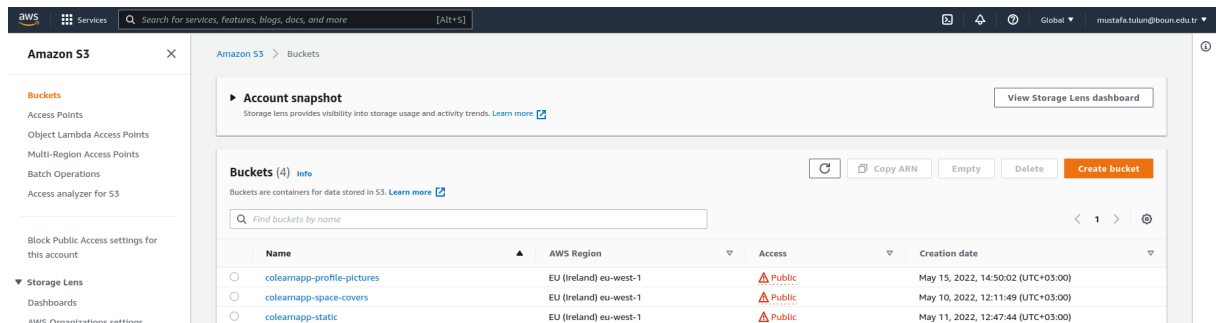
All of these buckets should have public-read permission, so this policy should be applied to each of them:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "PublicRead",
```

```
      "Effect": "Allow",
      "Principal": "*",
      "Action": [
         "s3:GetObject",
         "s3:GetObjectVersion"
      ],
      "Resource": "arn:aws:s3:::colearnapp-profile-pictures/*"
   }
  ]
}
```

The bucket name should be inserted in place of the highlighted portion.

SMTP Server

The live deployment of this application uses the GMail SMTP server, which requires authentication. To generate an app password, go to the Google Accounts Security page.
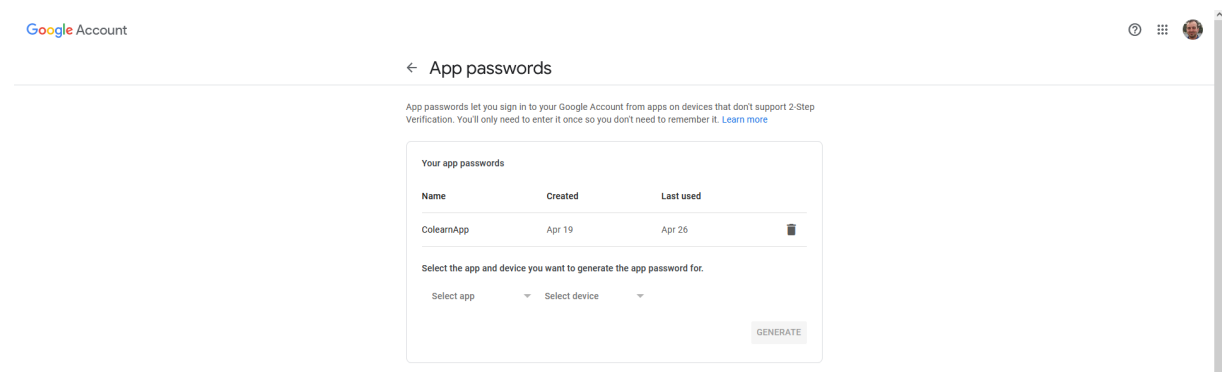
Application

The live deployment of this application is hosted on Google Cloud Run. After installing and configuring the gcloud CLI, the application can be launched by using the following command:
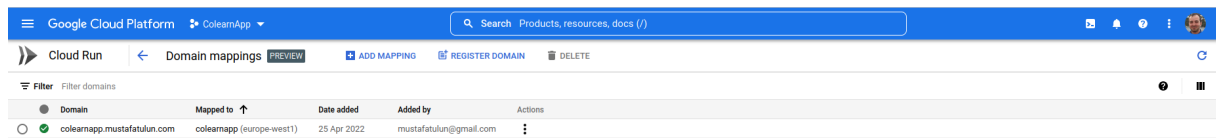
```
gcloud run deploy colearnapp --image gcr.io/colearnapp/colearnapp:latest
--min-instances=0 --max-instances=4 --allow-unauthenticated --region=europe-west1
--cpu=1 --memory=128Mi --port 8000 --timeout=15 --update-env-vars
SECRET_KEY=${SECRET_KEY},DB_HOST=${DB_HOST},DB_PASSWORD=${DB_PASSWORD},EMAIL_HOST=
${EMAIL_HOST},EMAIL_HOST_USER=${EMAIL_HOST_USER},EMAIL_HOST_PASSWORD=${EMAIL_HOST_
PASSWORD},IS_HTTPS_ENABLED=True,SECURE_HSTS_SECONDS=31536000,AWS_ACCESS_KEY_ID=${A
WS_ACCESS_KEY_ID},AWS_SECRET_ACCESS_KEY=${AWS_SECRET_ACCESS_KEY}
```

The deployment process may take up to two minutes to complete.

If you want to use a custom domain name, it can be easily set up through the Google Cloud Platform Console.
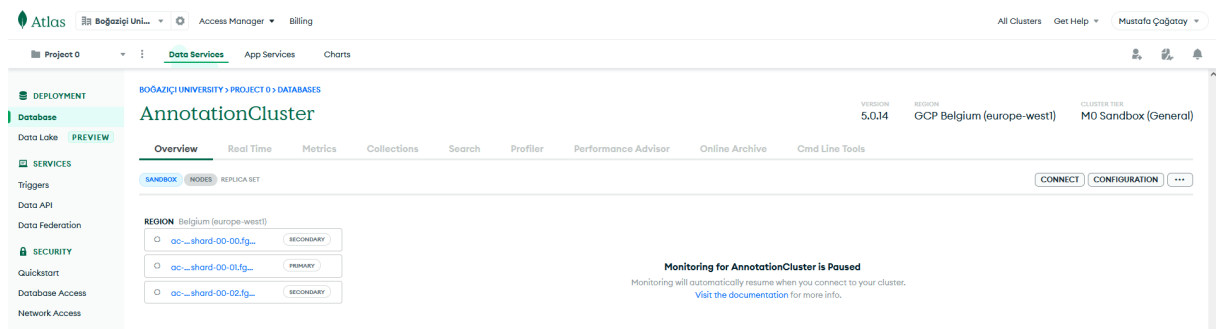
Annotation Service

Annotation service application is also hosted on Google Cloud Run. It can be launched by using following command:

```
gcloud run deploy annotationservice --image
gcr.io/colearnapp/annotationservice:latest --min-instances=0 --max-instances=4
--allow-unauthenticated --region=europe-west1 --cpu=1 --memory=128Mi --port 8000
--timeout=15 --update-env-vars
BASE_URL=https://annotations.mustafatulun.com/,DB_CONNECTION_STRING=${DB_CONNECTIO
N_STRING}
```

The deployment process may take up to two minutes to complete.

MongoDB Database

For the live deployment of this project, we are using MongoDB Atlas service for a managed MongoDB instance. Properties of the database can easily be managed via Atlas Dashboard.

User Manual

To use the application, go to https://colearnapp.mustafatulun.com and follow the prompts.

As a newcomer, the user can browse through the available colearning spaces and search for the one that best meets their needs.

From the home page, the user can view the inside of the colearning spaces by clicking on either their names or cover images.

When entering a colearning space, the user can see a list of other users who are also in that space on the left side of the screen. On the right side, the user can view the contents of the colearning space, including articles, questions, quizzes, and a glossary, by using the tabs at the top. The default page on the right is the welcoming page for the colearning space. To view more details about a particular piece of content, the user can click on it in the list.

To participate in the collaborative learning process and edit content, the user must first register. This can be done by clicking the "register" link on the home page and filling out the registration form. After submitting the form, the user will be automatically logged into the system.

Returning users can log in by clicking the "Login" link on the home page or on the top navigation bar to the right. If a user has forgotten their password, they can create a new one by following the instructions on the "Forgot Password" link on the login page.

After logging in, users can join a colearning space by clicking the "join" button in the top right corner of the space. By joining, users gain the ability to create and edit content, upvote or downvote content, comment on articles, and answer questions. If a user decides they no longer want to be a part of a colearning space, they can leave by clicking the "Leave" button in the top right corner.
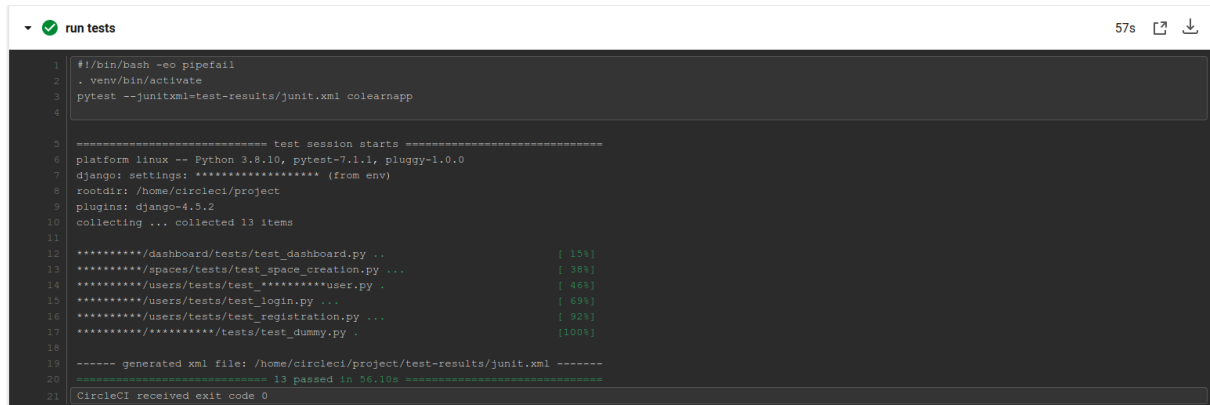
In a colearning space, users can add friends from a colearner's profile by using "Add Friend" button. After adding a colearner as a friend, users can get notifications from their friends when they created a new article, a new quiz or a new question in the related space. Users can remove friends by using the "Remove Friend" button from the friends profile page.

In an article, users can add annotations. After selecting a portion of the article, a green addition button will appear on the right side of the cursor. After clicking that addition button a form will appear. Users can enter a message for the annotation by filling the "message" section of the form. They can add the annotation by clicking the "add" button on the annotation form or close the form by clicking the "close" button. Also, the annotations on an article will be highlighted with a pale red color. Users can view the message of the annotation by pointing the cursor over it. After pointing the cursor over an annotation a "delete" button with a trash icon will appear on the right side of it, users can delete an annotation by clicking that "delete" button.

Test Results

We have thoroughly tested all implemented features on the live deployment, and there are no currently known bugs.

In addition, we have also implemented automated tests for certain features. These tests are run on every build by our CI/CD pipeline. If any errors are encountered, the pipeline will halt and the application will not be deployed. This ensures that all tests must pass before a new version of the application is released. The results of the latest automated tests can be seen below.

```
1   #!/bin/bash -eo pipefail
2   . venv/bin/activate
3   pytest --junitxml=test-results/junit.xml colearnapp
4
5   =========================== test session starts ===========================
6   platform linux -- Python 3.8.10, pytest-7.1.1, pluggy-1.0.0
7   django: settings: ****************** (from env)
8   rootdir: /home/circleci/project
9   plugins: django-4.5.2
10  collecting ... collected 13 items
11
12  **********/dashboard/tests/test_dashboard.py ..              [ 15%]
13  **********/spaces/tests/test_space_creation.py ...           [ 38%]
14  **********/users/tests/test_**********user.py .              [ 46%]
15  **********/users/tests/test_login.py ...                     [ 69%]
16  **********/users/tests/test_registration.py ...             [ 92%]
17  **********/**********/tests/test_dummy.py .                  [100%]
18
19  ------ generated xml file: /home/circleci/project/test-results/junit.xml ------
20  =========================== 13 passed in 56.10s ===========================
21  CircleCI received exit code 0
```

The following users can be used for manual testing.

Email: josephmckinney@example.com
Password: Qwerty!123456

Email: elizabethbrooks@example.com
Password: Qwerty!123456

Assets

The following design assets were used in the development of this application.

- Bootstrap Starter Template (https://startbootstrap.com/template/bare), MIT License.
- Profile avatar placeholder large (https://commons.wikimedia.org/wiki/File:Profile_avatar_placeholder_large.png), BSD License.

The following libraries were used in the development of this application.

- django-bootstrap5 (https://github.com/zostera/django-bootstrap5), BSD 3-Clause License.
- Django Markdownify (https://github.com/erwinmatijsen/django-markdownify), MIT License.
- django storages (https://github.com/jschneier/django-storages), BSD 3-Clause License.
- Psycopg (https://www.psycopg.org/), GNU Lesser General Public License.

References

During the development and deployment of this application, we made use of the following resources.

- Offical Django documentation
  https://docs.djangoproject.com/en/4.0/
- Get Started With Django Part 2: Django User Management
  https://realpython.com/django-user-management/
- Coverage.py documentation
  https://coverage.readthedocs.io/en/6.3.2/
- Django-storages documentation
  https://django-storages.readthedocs.io/en/latest/index.html
- Django-bootstrap5 documentation
  https://django-bootstrap5.readthedocs.io/en/latest/index.html
- Bootstrap v5.0 documentation
  https://getbootstrap.com/docs/5.0/
- Google Cloud Run documentation
  https://cloud.google.com/build/docs/deploying-builds/deploy-cloud-run
- Bucket Policy Examples for AWS S3
  https://docs.aws.amazon.com/AmazonS3/latest/userguide/example-bucket-policies.html
- Docker documentation
  https://docs.docker.com/samples/django/
- CircleCI documentation
  https://circleci.com/docs/

- JavaScript manual

  https://developer.mozilla.org/en-US/docs/Web/JavaScript

- Web Annotation Data Model

  https://www.w3.org/TR/annotation-model/