

**Sprint 2 Planning Document**

Team 18: Chunao Liu, Anurag Shah, Jenna Zhang, Yierpan Abuduwaili, Michelle He, Jingyuan Yang

**Sprint Overview:**

In this sprint, we are going to finalize front-end functionality, connect all components together and construct a full production pipeline with enhanced security. We will add an avatar and banner for both the User and Group, fully implement the group page and group library function. We will also provide each user a virtual environment for their code to run using docker in the backend to prevent malicious injection attacks. At last, we will implement an authentication system to enhance our system security and database integrity.

**Scrum Master:** Chunao Liu

**Meeting Plan:** Tuesdays/Thursdays 4:30 pm

**Sprint Challenge:**

Setting up virtual environments is one big challenge since it involves a lot of lower-level skills such as system programming and memory management. It is difficult to learn and none of us have much experience in it. Implementing a virtual environment by ourselves is literally like building a cloud service and is impossible for us to finish before sprint 2. The best solution would be to find an existing virtual environment management system, such as docker, and deploy our compilation there. Then, we will only need to pipe out the output and package / serialize it for shipment.

Setting up the OCR pipeline is also hard because identifying the run-time errors on the original picture requires us to understand and modify Tesseract’s learning process. The outcome of the neural network is very unpredictable and we might need to invest a lot of time tuning our model.

**Current Sprint Detail:**

* User Story #1

As a developper, I would like to build all models needed for our application and implement API views on backend to accept requests from frontend.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Implement database APIs to fetch, store, and delete images shared among a team. | 3 hrs | Jenna |
| 2 | Build a Code model to store code and implement associated APIs. | 3 hrs | Jenna |
| 3 | Implements APIs for all operations a team needs, such as add a team member, delete a team member, etc. | 4 hrs | Jenna |

Acceptance Criteria:

* Given that the team image APIs are correctly implemented, when users upload and save images in their teams, the images will be cached and stored in the database.
* Given that the APIs for Code are correctly implemented, when the client sends a post/get request, the backend will be able to provide the front-end with the piece of data requested or update/delete code stored in the database.
* Given that the APIs for all operations a team needs are correctly implemented, the backend will be able to process the requests sent from the frontend and respond with success/error messages or data requested.
* Given that the APIs for all operations a team needs are correctly implemented, the front will be able to receive the responses from the backend.
  + User Story #2  
    As a user, I would like to have a way to reset my password.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Implement reset password functions on the back-end to receive reset password requests from the front-end and send an email with a reset password link to the given email address. | 5 hrs | Jenna |
| 2 | Integrate Django with AWS Simple Email Server to enable email sending functionality | 4 hrs | Jenna |
| 3 | Create an HTML page where users can enter and submit their new passwords. | 2 hrs | Jenna |
| 4 | Implement email resetting api on the frontend to enable the communication between the backend and the frontend. | 2 hrs | Jenna |

Acceptance Criteria:

* Given the backend password resetting functions are implemented correctly, the backend checks if the given email is registered and sends a response back to the frontend.
* Given the connection between the back-end and the front-end is implemented correctly, a “Reset password email sent” message will be shown to the user after the server has successfully sent an email.
* Given the reset password functions are implemented correctly on the back-end, the user who initiates the reset password request will receive an email with a password reset link.
* Given the HTML page for password resetting is correctly implemented, an update password request will be sent to the back-end.
* Given the connection between the server and the database is implemented correctly, the database will update the user's record with the email address and the new password provided.
* User Story #3

As a developper, I would like to enhance the security of our application by identifying a user, machine, or device before granting access to a resource, network, application.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Implement Django Authentication System to authenticate users and requests. | 4 hrs | Jenna |
| 2 | Implement token-based authentication | 4 hrs | Jenna |
| 3 | Accept token at frontend and pass token with each HTTP request. | 2 hrs | Jenna |

Acceptance Criteria:

* Given that the Django Authentication System is correctly implemented, when users, it will handle user login and logout in a more secure manner and store hashed passwords instead of plain text passwords.
* Given that the session-based authentication is correctly implemented, after user logging in, the server validates the credentials. If valid, it generates a token, stores it, and then sends the token ID back to the frontend
* Given that the token-based authentication is correctly implemented, the server authenticates each request from the client.
* Given that the React-Native-Cookies is successfully implemented, the front-end passes token with each HTTP request to the backend.
* User Story #4

As a user, I would like to see whether creating an account is successful or not.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | The frontend sends the user information gained, including username, email address, and two passwords to backend | 2 hrs | Michelle |
| 2 | Build an API to the database that searches if a username is already there or not | 4 hrs | Michelle |
| 3 | Build an API to the database that searches if an email address is already there or not | 1 hr | Michelle |
| 4 | If either username or email address already exists in the database, send back an error code and display an error message that asks the user to reenter information | 2 hrs | Michelle |
| 5 | If all the verification is successful, add the user to the database, send back a success code, and display a success message | 4 hrs | Michelle |
| 6 | After displaying the success message for a few seconds, redirect to login page | 1 hr | Michelle |
| 7 | Debug and test functionality | 5 hrs | Michelle |

Acceptance Criteria:

* Given the UI for the registration page is implemented correctly, when the user presses the sign up button, the user information should be sent to the backend.
* Given the API that searches for a username and the error code sending are correctly implemented, when a user enters a username that is already in use, an error code should be sent back to the frontend.
* Given the API that searches for an email address and the error code sending are correctly implemented, when a user enters an email address that is already in use, an error code should be sent back to the frontend.
* Given the APIs that search for a username and an email address respectively and the success code sending are correctly implemented, when a user enters a username and an email address that are not used by other users, the user should be added to the database, and a success code should be sent back to the frontend.
* Given the frontend is implemented correctly, when it receives code sent back from the backend, it should display the corresponding message.
* Given the frontend is implemented correctly, when it displays a success message, it should redirect to the login page in a few seconds.
* User Story #5

As a user, I want to send a typed code written in c and get feedback.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | The frontend sends the code in typen form to the backend | 1 hrs | Michelle |
| 2 | If compilation fails, send back an error code with the error message from compilation and display the error message to the user | 4 hrs | Michelle / Anurag |
| 3 | If compilation is successful, run the code. If it runs without any error, send back a success code and display the success message to the user | 3 hrs | Michelle / Anurag |
| 4 | If there is any runtime error, send back an error code with the error message from runtime and display the error message to the user | 3 hrs | Michelle / Anurag |
| 5 | Debug and test functionality | 5 hrs | Michelle |

Acceptance Criteria:

* Given the UI for the registration page is implemented correctly, when the user confirms to run the code, the code should be sent to the backend.
* Given the compiler works, when there is a compilation error in code, an error code with the error message from compilation should be sent back to the frontend.
* Given the processor works, when there is a runtime error in code, an error code with the error message from runtime should be sent back to the frontend.
* Given the compiler and the processor works, when run is successful, a success code with the output from the running code should be sent back to the frontend.
* Given the frontend is implemented correctly, when it receives code sent back from the backend, it should display the corresponding message or the run result if there is any.
  + - User Story #6 (Library page)

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | display basic info of the code | 2 hrs | Jingyuan |
| 2 | display a small preview of the code | 2 hrs | Jingyuan |
| 3 | when user clicks on the tab they can see the run results and the whole code | 4 hrs | Jingyuan |
| 4 | testing and debug | 2 hrs | Jingyuan |

* + - The library page displays a list of saved code of typen and picture forms. For each code, there is some basic information, such as name, date created, and short description of the code, displayed on the right of a small preview of the code segments. When the user click into a specific one, they can see the whole code and the details of the run results.

Acceptance Criteria:

* Given the library page shows every element, clicking on one of them should navigate to a new page which displays the code and text
* Given the original code segment pictures received from backend, the miniature picture of the code segment should be displayed in avatar form
* Given the server is in realtime, the list should be updated every time the page is loaded.

* User Story #7 (group member page)

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | display basic info of each group member | 2 hrs | Jingyuan |
| 2 | display a small avatar | 2 hrs | Jingyuan |
| 3 | Let team leader invite other team member and add team members accordingly | 4 hrs | Jingyuan |
| 4 | testing and debug | 2 hrs | Jingyuan |

* The group member page shows every group member inside the team. If the user is a team leader, he can have an extra button to invite other team members to the team. When each of the team member’s icons is clicked, a profile page would be displayed.

Acceptance Criteria:

* Given the team member page shows every element, clicking on one of them should navigate to a new page that displays the account info of each team member
* Given that every user is connected, the team leader can send invitations to new team members who are not currently in the team
* Given the server is in realtime, the list should be updated every time the page is loaded.

* User Story #8 (Multithreading Compiler)  
  As a user, I would like to be able to process my images at the same time as other users.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Make Compiler pipeline multi thread compatible | 4 hrs | Anurag |

* Currently, the compiler can only handle 1 compilation at a time. This is because of the way it is implemented. This will bottleneck our pipeline, since OCR computations can be done multithreaded. It will require a restructure.
* Acceptance Criteria:
  + - * 1. Given multiple threads using the compiler pipeline, it compiles code as expected and returns the relevant STDOUT and STDERR outputs.
        2. Given multiple threads using the compiler pipeline, it functions just the same as it does in the current implementation with only 1 thread safely using it.
        3. Given more languages to add to the compiler pipeline, no additional filters need to be constructed to retain this compatibility.
* User Story #9 (OCR)

As a user, I would like the application to tell the difference between handwritten and typeform code images, process images at a slight tilt or skew, and provide outputs that indicate where my errors are located.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Complete integration of OCR and related pipeline into Django backend without errors | 4 hrs | Anurag |
| 2 | Create an image post-processing model to highlight syntax error lines in the output image (if any). | 6 hrs | Anurag |
| 3 | Segment the Handwritten and Typeform page data into words. | 5 hrs | Anurag |

* Acceptance Criteria (number indicates task it is related to):
  + - * 1. Given a Django function that calls OCR, the code does not give any errors regardless of the directory python is operating in at that point in time.
        2. Given code images with and without syntax errors, the code produces the correct output, with highlights in their respective locations.
        3. Given a page image, segmentation accurately separates word forms and does not clump or skip words.
  + User Story #10 (Camera)

As a user, I would like to take a picture or select a photo for backend processing and receive an output image that shows me the result in a separate window.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Take a picture and send the static picture to backend | 3 hrs | Yierpan |
| 2 | Build a API for image sending and receiving | 5 hrs | Yierpan |
| 3 | Receive the result back from backend and show the result | 6 hrs | Yierpan |
| 4 | The static page should be able to save the picture | 3 hrs | Yierpan |
| 5 | testing and debug | 3 hrs | Yierpan |

Acceptance criteria:

* Given the camera is implemented correctly, the static picture taken should be sent to the backend.
* Given the pipeline is set up correctly, the user should be able to receive the result in a new window with redlines indicating errors.
* Given the result is received by the frontend, the user should be able to save the work.
  + User Story #11 (Account Page & Redirection bars)

As a User, I would like to see my user info and edit my information and I would like to navigate through pages.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Display user info and they should be editable if the backend database is complete or only thing left should be linking the data | 3 hrs | Yierpan |
| 2 | Implement sidebars and topbars to pages that require redirections | 6 hrs | Yierpan |
| 3 | Combine Pages and components with Jingyuan | 3 hrs | Yierpan |
| 4 | testing and debug | 2 hrs | Yierpan |

Acceptance criteria:

* Given the frontend and backend connects correctly, users should be able to fetch their data and should be able to change their information.
* Given the UI pages are implemented correctly, the navigation should be bug-free and take the user to the correct page.
* Given all the pages are implemented by the end of the sprint, all the components should be connected.
* User Story #12 (Scripting / Backend state transfer)

As a Developer, I would like the backend to have a fully functioning production pipeline. After receiving a compilation request, Django should activate the OCR script with the correct image and fetch the output code into the script that activates the virtual environment. After that, a script should fetch the pipe outcome from the virtual environment and send it to the OpenCV script. In the end, the outcome should be sent back to the user’s end.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Write a script that can pass and run the OCR given a picture and call it after the user uploads a picture | 3 hrs | Anurag |
| 2 | Write a script that can pass the OCR output (code) into a docker environment | 4 hrs | Anurag |
| 3 | Write a shell script or C program to create a pipe that can redirect the output of the docker environment into the system, including stack trace and terminal output | 8-9 hrs | Anurag |
| 4 | Write a script that can pass the stack trace to the OpenCV pipeline to highlight the error | 7 hrs | Anurag |
| 5 | Write a script that can pass the OpenCV output in a formatted way, save the result in the library and send it back to the user | 6 hrs | Anurag |

Acceptance Criteria:

* Given a user’s picture, the script must parse it correctly to the OCR wrapper
* Given the code from the OCR, the script must parse it correctly to the Compiler in a virtual environment
* Given the run-time output, the script should determine either sending the terminal output straight back to the user or sending it into the OpenCV wrapper for further error processing
* User Story #13 (Virtual Environment)

As a developer, I would like all users’ code to compile in a virtual environment. The backend system must remain the same no matter what code the user is running. If there is any runtime error, the backend will fetch the first line number that causes the problem and throws it into the OpenCV, which will return the original image the user sent with highlighted runtime errors.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Setup a Docker virtual environment for any incoming compilation request | 7 hrs | Anurag |
| 2 | When the OCR production is done or the user sends typen code, create a docker environment and run the code | 7 hrs | Anurag |
| 3 | If the program happens to have a runtime error, send the stack-track to the OpenCV pipeline to highlight any errors in the output | 7 hrs | Anurag |

Acceptance Criteria:

* Given the user’s code, it must be able to run in the correct compiler environment
* Given the user’s code, no matter what the user’s code has, the state of the backend system must remain the same before and after the compilation. Any changes should only happen inside the virtual environment.
* After compiling, if a runtime error is detected, the program should activate the OpenCV script with the line number of the first error detected.
* After compiling, if no error is detected, the program should send the exit code and terminal output back to the user in a log format
* User Story #14 (Image Transfer & Server security)

As a developer, I would like to make sure that all types of mobile Image package & request can be processed by our Backend. Since Android and Iphone have different ways to store and send their pictures, our backend API should be able to accept and store images in base64 encoding, uri and temporary file attachment. Also as a developer, I would also want to enhance my backend security by hiding any sensitive information, closing any unnecessary ports, etc.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Further enhance the Image transfer API so that it supports multiple image types, such as base64, uri, etc. | 5 hrs | Chunao |
| 2 | Reconfigure the image output in form of uri so that front-end can easily download the image | 3 hrs | Chunao |
| 3 | Helping front-end to finalize the image transfer, ensure the transfer and database correctness | 4 hrs | Chunao |
| 4 | Using encoder to encode our backend security settings so that it won’t become a server vulnerability | 2 hrs | Chunao |

Acceptance Criteria:

* Upon receiving a base64 image HTTP POST request, the server should be able to save it in the correct database, process it with the OCR and return the image back to the front-end for verification
* Upon receiving a HTTP POST request with image uri, the server should be able to save it in the correct database, process it with the OCR and return the image back to the front-end for verification
* Upon receiving a HTTP POST request with TempImage Attachment, the server should be able to save it in the correct database, process it with the OCR and return the image back to the front-end for verification
* User Story #15 (Apache Server config)

As a developer, I would like to run my server with Apache server module so that I can have a continuous delivery with a much more general service size. We no longer need to specify port number when calling API, and future implementation of server features will be available with Apache server structure

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Download, construct and configure Apache Server on AWS EC2 | 5 hrs | Chunao |
| 2 | Redownload and Recompile wsgi.so so that they have a matching version of python executable | 3 hrs | Chunao |
| 3 | Unit testing to make sure the server is stable | 4 hrs | Chunao |

Acceptance Criteria:

* The Apache server should be able to run on port 80
* The Apache server should read the wsgi.py from django and redirect the I/O from and toward the socket
* Given a front-end’s API request, the backend server should be able to process it with verification
* Remaining Backlog:
* ~~As a user, I would like to have a welcome page when I open the app.~~
* ~~As a user, I would like to have a “remember me” feature at login.~~
* ~~As a user, I do not need to log in again if I’ve logged in before and did not log out.~~
* ~~As a developer, I would like to send a password resetting link to users via their email addresses when they forget their passwords.~~
* ~~As a user, I would like to be able to create my own account.~~
* ~~As a developer, I would like to link users’ accounts with their emails/phone numbers.~~
* ~~As a user, I would like to have a profile page where I can edit/update my info.~~
* As a user, I would like to be able to change the theme of the app (light/dark).
* ~~As a developer, I would like to have a navigation bar that directs users to different pages.~~
* As a developer, I would like to prompt users to re-login when the account is inactive for a week.
* As a user, I would like to be able to deactivate/reactivate my account.
* As a developer, I would like to delete a deactivated account permanently if the user does not reactivate within 90 days.
* ~~As a user, I would like to use the Apps feature without creating an account.~~
* ~~As a user, I would like to have a way to reset my password.~~
* As a developer, I would like to load pictures and snapshots faster using multi-thread.
* As a user, I would like to have a profile picture and a banner.
* As a user, I would like to see if there is any syntax error in my code, have the lines physically underlined with a marker on my code image, and have a popup after clicking on that inform me about the full error details encountered at that line.
* As a user, I would like to access an archive of the scanned documents in digitized text form that can be saved in an editor app (such as the Note app in iOS).
* ~~As a user, I would like to retake a photo of the code if the image taken is not satisfying.~~
* As a user, I would like to join/create/leave multiple teams.
* As a team member, I would like to see who is the coordinator/creator of the team.
* As a team manager/member, I would like to see the team members.
* As a team manager/member, I would like to be able to access all shared code between the team.
* As a team manager, I would like to remove a user from the team.
* ~~As a user, I don’t need to see the login page as I re-enter the app starting from the second time.~~
* As a team manager, I would like to have access to view and change the team members’ code.
* ~~As a user, I would like to be able to upload a photo from my phone’s library in place of taking a new photo.~~
* As a user, I would like to save the OCR-generated code on my device storage.
* As a user, I would like the backend to be able to figure out what language my code is in, and use the correct compiler.
* As a user, I would like to delete the archive of a scanned document if it is no longer needed.
* As a user, I would like to have my C/C++ code compiled & run.
* As a user, I would like to have my Java code compiled & run.
* As a user, I would like to have my C# code compiled & run.
* As a developer, I would like to design various user roles so that users with different roles can access different features.
* ~~As a developer, I would like to allow users to have multiple roles.~~
* As a developer, I would like to use cacheManager to load data so that the backend does not need to retrieve data from the database every time there’s a request so that data access latency is decreased (if possible).
* ~~As a developer, I would like to store each user’s authentication information in a SQL query.~~
* ~~As a developer, I would like to be able to retrieve entries of a specific user’s authentication information during the user’s login session~~
* ~~As a developer. I would like to keep track of each user’s current status, either logged in or not logged in~~
* ~~As a developer, I would like to be able to store each user’s uploaded pictures in a relational database~~
* As a developer, I would like to be able to retrieve the picture after the OCR detection and send it back to the front-end
* ~~As a developer, I would like to keep track of each user’s team information in a relational SQL query~~
* As a user, I would like to be able to access photos I have taken previously
* ~~As a developer, I would like the database to be able to store the image filename, detected code, and compilation results/error messages~~
* As a product manager, I would like to see continuous delivery on the backend.
* As a product manager, I would like to have unit tests for both the front-end and back-end.
* As a user, I would like to be able to take photos from slight angles or at a slight tilt, and not have that affect the app
* As a developer, I would like to have an image preprocessing suite that can de-skew and remove lines/spots
* ~~As a developer, I would like to have a separate segmentation algorithm for typeform code images~~
* As a developer, I would like to ensure that each model can correctly place spaces in the program where necessary for the compiler