
EE/CprE/SE 491

Iowa State A.I. Schedule Companion

Weekly Report #3

Wednesday, February 14 – Tuesday, February 20, 2024

Group number: sdec24-08

Client: Koby Fowler

Faculty Advisor: Abraham Aldaco

Team Members:

Koby Fowler - Overall Application Leader

Chandrashekar Tirunagiri - Frontend Design Leader

Raghuram Guddati - Backend Design Leader

Jacob Paustian - Artificial Intelligence Research Leader

Christian Deam - Meeting Manager

Anna Huggins - Team Manager/Communicator

Weekly Summary

We have made some serious headway on our project. Our frontend took the lead in progress as some of the pages for the website have been completed, and if a page can be completed, the others will shortly follow suit. Backend took a back seat as the focus seemed to be on the PostgreSQL tables and how they would interact with the backend. We were also introduced to the Lightning Talks, not in practice but by word they would be due every week from now on. Christian has decided to take over that front, and with help from his comrades, the slides for submission should be informative, while the slides for the presentation would be short, sweet, and to the point to maintain the five-minute timer.

Past Week Accomplishments

Abstraction Planning, Database Structure, Funding Investigation, Created New

GitHub Repository - Koby Fowler

- **Abstraction Planning**
 - Met with Chan to help with frontend planning and design
 - Goal: Get webpages to look closer to current Figma designs
 - Also suggested the abstraction of pages so that code files aren't overly long and readability is increased
- **Database Structure**
 - Helped organize database structure with back-end team
- **Funding Investigation**
 - Helped Anna with funding requests by researching estimated costs for ChatGPT, AWS, etc.
- **Created New GitHub Repo**
 - To implement AWS with our repo, we needed direct ownership over it. In turn, a new GitHub repo had to be created so we could access all of the applications necessary for development

Frontend Abstraction - Chandrashekar Tirunagiri

This week, I worked on the abstraction of my login and Sign-up page. And also work on the home page. I have also met with Anna to make her familiar with the code base for the front end so that we can collaborate and work on the front-end part of the application.

- **Abstraction Process:**
 - Login Page:

Originally, the login page's code resided within `ai-companion/app/page.tsx`, spanning 160 lines. This extensive codebase could have been more convenient and would have complicated the integration of API logic. To streamline this, I introduced separate directories for Components, FormFields, FormHandling, and Styles, effectively modularizing the code. The Components directory now houses the LoginComponent, FormFields contains the form logic, FormHandling is dedicated to managing form operations, and Styles has all the Style-related logic.

- Sign-Up Page:

Similar to the login page, the sign-up page code was initially located in `ai-companion/app/register/page.tsx` and also comprised 160 lines. To enhance maintainability and readability, I implemented a similar abstraction strategy. I created

distinct folders for Components, FormFields, FormHandling, and Style to segregate the code. The Components folder now includes the SignUpForm, while FormFields, and FormHandling are dedicated to managing form operations, and Styles has all the Style-related logic.

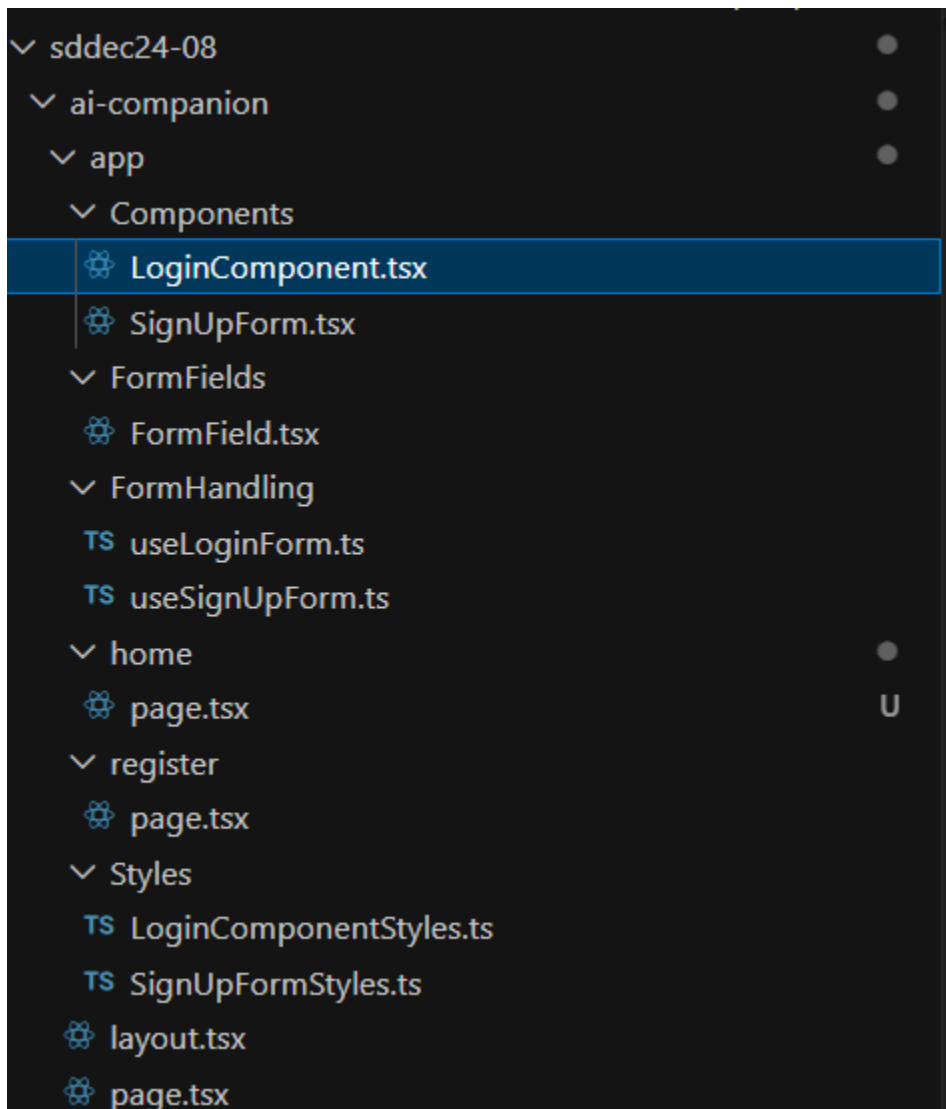


Figure 1.0: A.I. Companion Component Overview.

- Home page:

Worked on adding the key form so that the landing or the Home page has an animation of WELCOME from left to right and also implemented the nav bar on the left side of the page.

Still need to modify the homepage based on the meeting plans. This was just a template.

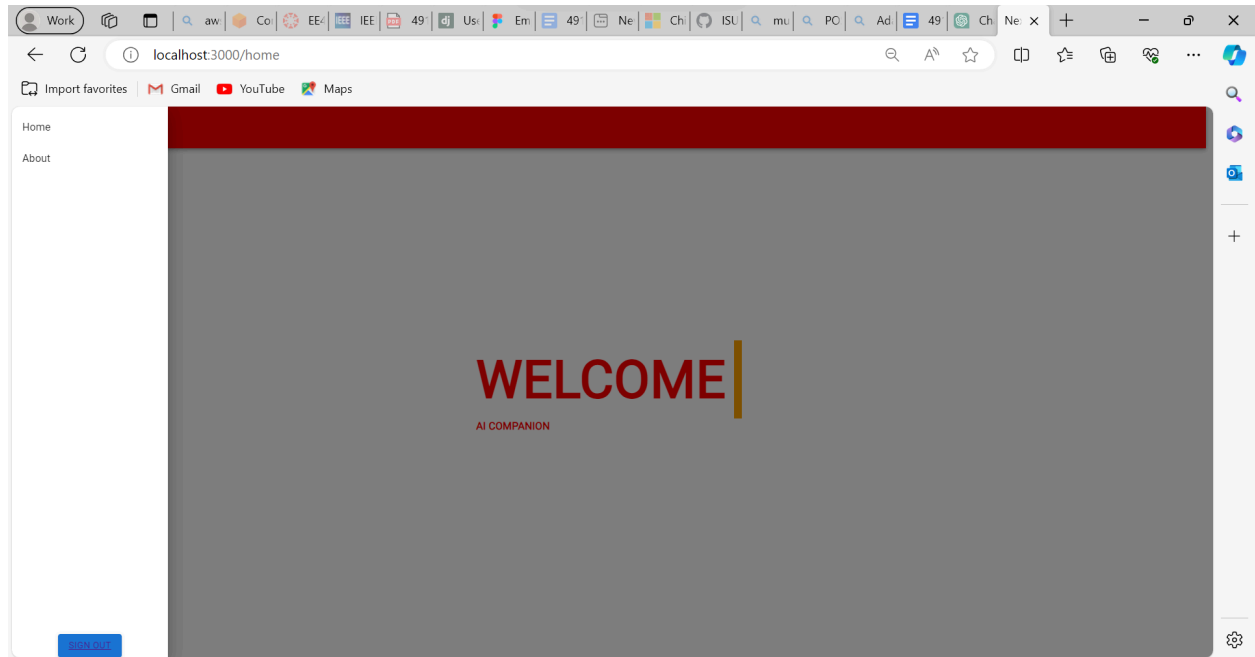


Figure 1.1: Welcome Page.

Terraform Scripting - Raghuram Guddati

- **Terraform**
 - This week, I worked on making Terraform scripts that work with PostgreSQL in PG Admin. Within this scope, I was able to create two tables that a primary key association intricately links. These scripts were carefully written in the " PostgreSQL-Tables " branch in the "main.tf" file.
 - This part is responsible for the connection to our PgAdmin server.

```

20 provider "postgresql" {
21   # Configure the connection details here
22   host     = "companionproddb.cjeisuasspka.us-east-1.rds.amazonaws.com"
23   port     = 5432
24   username = "postgres"
25   password = "prodbackendPass"
26 }
27
28 resource "aws_instance" "app_server" {
29   instance_type = "t3.micro"

```

Figure 2.0: PostgreSQL.

The Terraform script is located in the 'main.tf' file the is located in the 'BACKEND' folder.

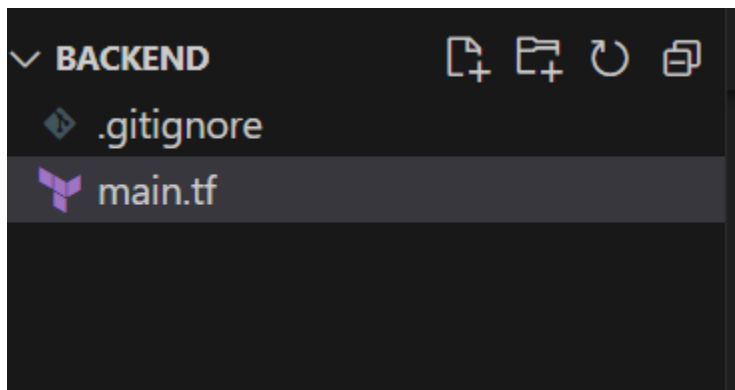


Figure 2.1: Backend/main.tf.

- **pgAdmin4**
 - Thanks to Koby's assistance, I successfully configured my pgAdmin server remotely. In the Terraform script, I also included the necessary credentials to establish seamless connectivity, ensuring smooth operations.
 - This is the pgAdmin4, and we would start having our table set up here through the terraform scripts:

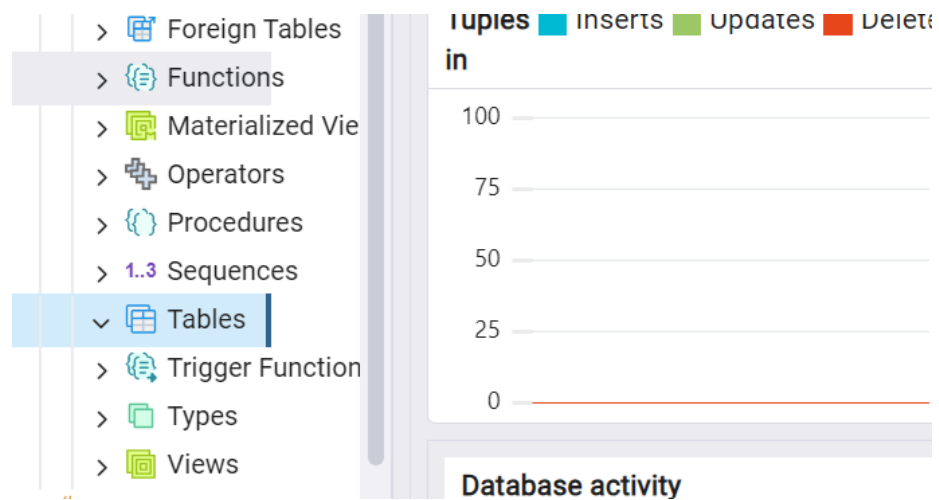


Figure 2.2: Database.

Task(s) - Jacob Paustian

- **Research into LangChain**
 - Langchain was the API I decided to use for the purpose of managing GPT's context window. This includes everything from:
 - Chat message history retention
 - Context about the purpose of conversation
 - The ability to feed datasets as context
 - Langchain even had support for a popular web scraping tool called Cheerio.
- **Research into Cheerio**
 - Given its extensibility with LangChain, Cheerio was my choice for web-scraping framework. Ultimately, I figure it makes the most sense for one of our primary sources of information to be web-scraping for many reasons.
 - It's public and static, meaning users could be linked to it as a source.
 - It's reliable, as it's not from any third parties.
 - It's up to date, and would not require devs here to update any information ourselves UNLESS a link was discontinued.
- **Created an Express service to host all future AI development work**
 - Ultimately, two decisions could be made: A Python service or a Node.js service? Python is decidedly the leader in AI-related work right now; however, I choose Node.js for two reasons:
 - Node.js has substantially better performance, even at scale, versus Python.
 - TypeScript is the language of choice for our other services, so for the sake of simplicity, it may make life easier for other devs.
 - The shockingly large community support for AI work in Node. Given everyone and their mom and their mom's cat are trying to implement

chatbots to their company's web pages, there is a surplus of information available.

- **A working demo (with messages from the user being sent from Postman)**

```
backend AI-Service npm run dev
> backend@1.0.0 dev
> nodemon src/index.ts

[nodemon] 3.0.3
[nodemon] to restart at any time, enter `rs`
[nodemon] watching path(s): *.*
[nodemon] watching extensions: ts,json
[nodemon] starting `ts-node src/index.ts`
25
628
{ message: 'What course comes after SE 491?' }
The course that comes after SE 491 is SE 492: Senior Design Project II.
{ message: "What's the difference?" }
SE 492 is the course that comes after SE 491. SE 491 is Senior Design Project I and Professionalism, while SE 492 is Senior Design Project II. The difference between the two is that SE 491 focuses on preparing for entry into the workplace, selected professional topics, technical writing skills in developing project plans and design reports, and design review presentations. On the other hand, SE 492 emphasizes the successful implementation and demonstration of the design completed in SE 491, as well as the evaluation of project results. SE 492 also includes technical writing of the final project report, oral presentation of project achievements, and project poster.
{ message: 'Can you bullet point the prereqs for 491?' }
- For CPR E major: CPR E 232, credit or enrollment in CPR E 308, completion of 29 credits in the CPRE professional program, ENGL 314.
- For EE major: EE 232, credit or enrollment in EE 322, completion of 24 credits in the EE professional program, ENGL 314.
- For SE major: SE 317 and SE 339, ENGL 309 or ENGL 314.
- Co-req: CPR E 308 or COM S 352.
{
  message: 'Wait can I take it in the spring? Someone told me it was fall only...'
}
SE 491 is offered in both the fall and spring semesters.
{ message: 'Do you want to play 20 questions with me?' }
I'm here to assist you with any questions you have regarding software engineering courses at Iowa State University. Feel free to ask anything you'd like to know!
```

Figure 3.0: Working Demo.

As you can see, I can ask it questions after it has scraped [this page](#). Furthermore, its context is constantly updated, so users can reference previous messages. In addition, attempts to change the subject (like playing 20 questions) are disallowed, as the AI has been given context as to its purpose: an AI to help someone with questions about Iowa State's SE program.

PostgreSQL - Christian Deam

- **PostgreSQL**
 - Tasked with working on the SQL workbench for the backed, successfully (after somehow failing) installed the pgAdmin4 software used for PostgreSQL.

- Created a query for creating the tables of users and student_info. The fields within were specified between Raghu and Koby (may need to adjust/combine later). Then decided that it should be one query to create both and not individual queries, so I made one query called “create_users_and_studentinfo” which makes both tables simultaneously (will fail if either is already made).
- Made a query for taking JSON data and putting it in the tables. It is incomplete, as I do not know exactly what the JSON data looks like, but it is at least a template that works under manual insertion. (Looks like I needed to understand the prompt and should have done this).
- **Other**
 - I was assigned to create the Lightning Talk slides. Will receive assistance from teammates along the way, especially for the one(s) we will be presenting.

Front-end Environment Setup & Meeting, Meeting Coordination - Anna Huggins

- **Development Environment Setup**
 - Finally, beginning work on the frontend, I:
 - Updated Visual Studio Code on my laptop and desktop
 - Ensured I had access to the repository and tested npm
- **Met with Chan to Discuss Front-end Plans (2/16)**
 - On Friday, I met with Chan to get more up-to-date on his front-end work
 - Overall, the primary focus has been abstracting our current pages (i.e. homepage and login pages)
 - We also discussed slight changes to the general homepage design and what other elements could be added
 - “Class Stats” - general information on seats available in specific courses the user is interested in registering for
- **ETG Follow Up**
 - Emailed ETG again regarding our funding request
 - Provided more information regarding our AWS expenses
 - Still waiting to hear back from ETG regarding the additional information
- **OARDE Meeting**
 - Due to schedule conflicts, we rescheduled our meetings with Matt Pistilli to Wednesday (2/21)
 - General Overview:
 - The meeting should be brief; Matt plans on providing some general information on tools to set up our survey and suggest possible questions we could add to our survey

Individual Contribution Tracker

Name	Individual Contributions	Hours this Week	Hours Cumulative
Raghuram Guddati	<ul style="list-style-type: none"> - wrote a terraform script that creates two tables: "Users" and "StudentInfo". They have a unique identifier, "UserId". - set up the pgAdmin4 server with the help of Koby. Now, we can start creating tables as we proceed. 	6.0	18.0
Christian Deam	<ul style="list-style-type: none"> - Created query for creating users and student_info. - Created query for inserting JSON data (this took most of the time, it also seems like I shouldn't have done this). -Created Weekly Summary 	6.5	10
Jake Paustian	<ul style="list-style-type: none"> - Performed more research on LangChain, the API necessary for many advanced features we will need in the future. - Became acquainted with the Cheerio web-scraping framework. - Created a new Express backend service for servicing our AI features. - Set up a very rudimentary web crawler to scrape a website and buffer its information. - Information buffers and chat memory from last week's research combined allow us to provide GPT with a proper dataset. 	11.0	20.5
Anna Huggins	<ul style="list-style-type: none"> - Created "when2meet" to plan when to meet with Matt from OARDE - Rescheduled meeting with Matt for Wednesday (2/20) - Installed software for front-end development/setup environment - Met with Chan to discuss front-end (2/16) - Followed up with ETG regarding funding 	6.0	15.0
Chandrashekar	<ul style="list-style-type: none"> - Abstracting login and sign up 	9.0	18.0

Tirunagiri	- Worked on the home page		
Koby Fowler	- Planning abstraction - Database structure - Helped front-end with general design - Helped figure our total costs for funding request	7.0	29.0

Pending Issues

Issue #1 - Confirming Funding for ChatGPT API and Amazon Web Services (AWS)

- **Anna Huggins**
 - Status: Still Pending (2/20)
 - In their reply email, ETG asked a few follow-up questions regarding our project's expenses
 - I responded with some specifics about our AWS costs, but I have yet to hear back regarding AWS, domains, or ChatGPT API funding

Plans for the Upcoming Week

Koby Fowler

I will begin planning the CI/CD for the backend in the upcoming week.

Chandrashekar Tirunagiri

For this week, I plan to meet Jacob and Raghu, whom I was supposed to meet last week but couldn't manage time with. I will ask Jacob for a quick rundown on the ChatGPT API, how gpt API is being implemented, and the related research, and also meet Raghu for the backend run down.

We are also set to meet Matt for the survey on what questions should be there on the survey. Finally, this week, Anna and I will work on more front-end features, such as making the home page more user-friendly.

Raghuram Guddati

Next week, I will spend more time with Koby, Chandrashekar, and Christian, going over backend tactics. I also want to start simple roundtrip communication between the frontend and backend. Since Chandrashekar set the framework for the frontend, I'm looking forward to starting the data POSTING processes into our tables.

I also want to learn more about pgAdmin4 and see how it can help us achieve greater efficiency in our database management jobs.

Jacob Paustian

I will likely be looking into expanding the AI service. For one, the code right now is ugly as sin. For two, it will need abstracted out greatly to support more than just SE classes. Finally, it will need a tremendous amount of work to support multiple conversations simultaneously, especially while being performant. So much so, that I suspect I will need ChatGPT 4 in full in order to handle it, as ChatGPT 3.5 has harsh limits on the number of requests sent in a small period of time.

Christian Deam

Since we are meeting up properly on Wednesday, I want to figure out additions I can do on the backend/SQL side of things. That way, I can have something else to do because other than Lightning Talks and the summaries for these reports, I don't have anything to do.

Anna Huggins

- Create updated Figma pages, as well as additional pages
 - As Chan has gone through developing our primary pages, we've undergone some design changes, and updating our Figma to reflect this may be beneficial moving forward
- Help Chan continue developing pages, i.e.) abstract homepage and create additional pages for the frontend now that I have my development environment set up
- Meet with Matt Pistilli regarding survey suggestions
- Meet with the entire team to discuss the current status, as well as how both the frontend and backend functions currently