SmartRecipe

SmartKitchen:

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Project Description: SmartRecipe is a full stack application containerized for easy cloud deployment. It is designed to help users decide what to cook by providing recipes based on user generated specifications, along with storing recipes that the users like and a pantry feature which allows users to keep track of what ingredients they have at home.

Chapter 1:

SmartRecipe is a full stack application that maintains a database of recipes acquired from the internet or uploaded by the user that can be queried with a user generated list of ingredients. The application is designed to make the decision-making process simpler for someone who is cooking at home by helping them to make full use of what they already have in their kitchen.

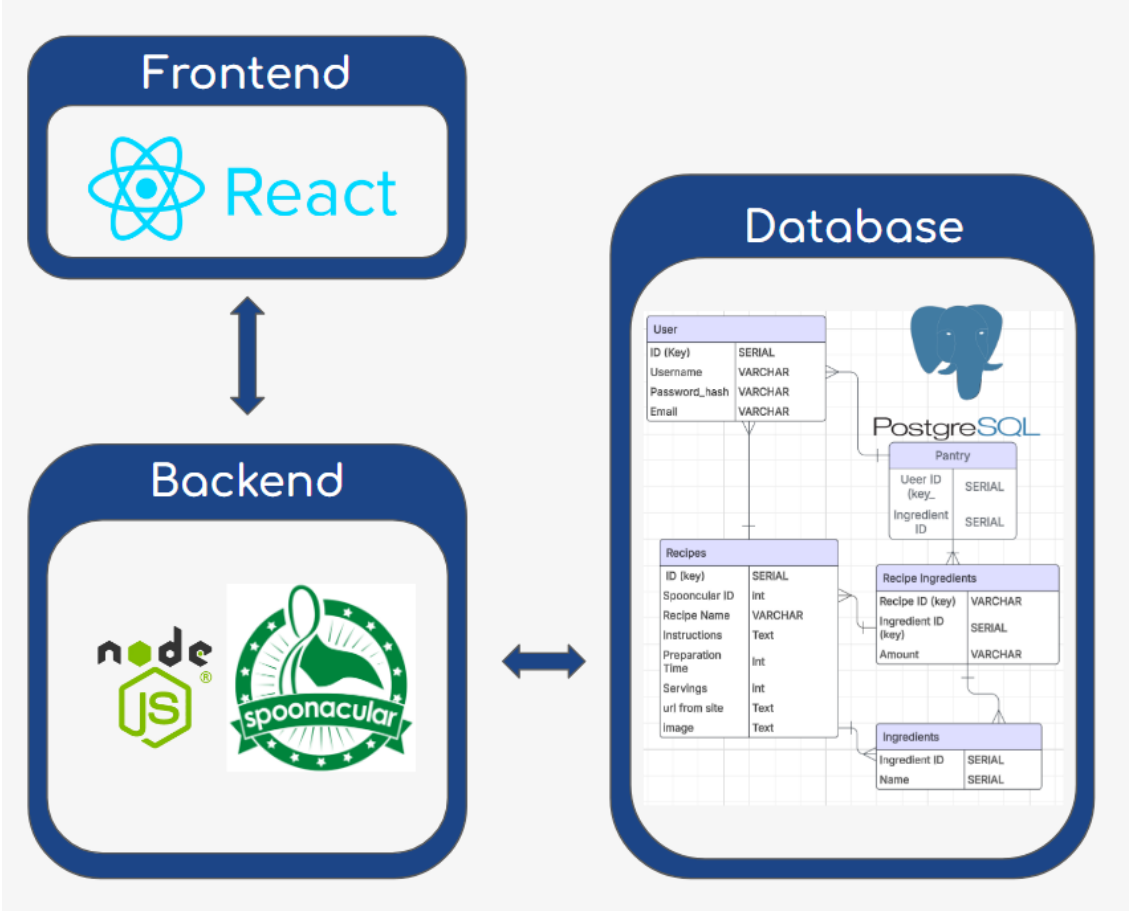
Core Components:

Frontend (User Interface):

- A user-friendly web app where users upload recipes, view pantry ingredients, and receive suggested recipes.

Backend (Processing & Database):

- Recipe Collection: A crawler designed to regularly add new recipes to the database. Recipes would include the ingredient list and directions.
- Recipe Database: Database of recipes matched with identified ingredients.
- User Management: Login, saved recipes, and personalized recommendations.



Chapter 2:

The frontend will be built using React.js and will allow the user to input their pantry ingredients, view recipes, and see missing ingredients for other possible recipes. React enables dynamic elements in the UI which are necessary for showing the recipes in a user-friendly manner.

Application data will be stored in a PostgreSQL database, using PostgreSQL's relational data capabilities to link users to login information and saved recipes, and link recipes to ingredients. The database will contain a table of pantry ingredients inputted by the user, a user and password table, a recipe table detailing the instructions and prep time, a recipe ingredients table which will detail which ingredients are included in any specific recipe, and an ingredients table that will match a certain ingredient ID to their name.

The backend will be powered by a Node server using Express will connect the database, the frontend server, and the Spoonacular API, which is the source of the recipes served to the user. The Spoonacular API can take ingredients, number of recipes and diet in its request field, allowing the user to tailor the recipes to their needs. The Node server will pass data from the API to the frontend to be displayed, and enable the user to save recipes to the database and view those saved recipes.

The application will be containerized with Docker, which allows for quick deployment and simplifies communication between the different processes. The frontend, backend, and database will each be in their own containers. The frontend will contain the React server along with the HTML files and Javascript files being served. The backend container will house the Node server, and the database container will house the database, and is responsible for initializing the tables on application startup.

The CI/CD pipeline will be facilitated using GitHub actions and a Watchtower container to automatically apply any changes made during development.

Chapter 3:

The frontend container is built using the NGINX image as base. The YAML file creates a volume for the NGINX container, and the frontend dockerfile copies all the relevant frontend files into the volume.

The backend container is built with the official Node image as base. The dockerfile runs uses the "npm install" command to install all of the required dependencies in the container. It also exposes a port and runs a command to start the Node server. The YAML file sets the environment variables and ensure that the database container will start before the backend container so that the backend can successfully connect to the database.

The database container does not have a dockerfile. The YAML file builds off of the official PostgreSQL image, exposes a port and creates a volume to persistently store the data.

Final Results:

The resulting application has most of the targeted features. Users can create accounts and log in, request recipes which are served from the API, save and view those recipes and manage an ingredient list in their pantry. The main feature missing from the user experience is the ability to create and upload their own recipes. Managing the project timeline was a challenge, and this feature would have required significant development time because of the extensive changes needed in the database and the backend server. To properly implement the feature the backend would need to query the API and a table of publicly available recipes in the database and combine those results. This feature was not strictly necessary for SmartRecipe to deliver on its core promise, so it was removed. The other feature missing was the CI/CD pipeline. Because of the applications relatively low overhead and short container build times, changes to the application happened quick enough that the lack of CI/CD did not hamper development in any major way.

The design in described in the first two chapters was altered in the final product. Rather than using React the application renders static files using Bootstrap and an NGINX server to deliver the frontend to the user. This resulted in a less aesthetically pleasing frontend, but the overall functionality remained the same.

The final challenge was a relatively backwards development process. The containers for each of the processes and the Docker Compose network as a whole were operational before any of the non-containerized individual components. This meant that any bug fixes involved fixing both the container side and the software side, making fixes more challenging than they otherwise might have been.

Conclusion:

The main lesson from developing SmartRecipe is that clearly defining a development plan is important to keep features manageable and ensure that all features required for testing are done at the same time. Additionally, planning the workload for all group members in advance leads to less confusion and a shared vision of the project.

In the future, SmartRecipe's frontend could be overhauled for more aesthetic appeal, either with more styling than Bootstrap or with a different rendering pipeline. The ability for users to upload new recipes would improve user retention and draw more users to the website. With this goal in mind, future work could be done on the business side by partnering with other recipe websites for sponsored or affiliate recipes being served. These partnerships could result in the application using different sources than Spoonacular, such as other APIs or partners adding recipes to the public recipe database. These future additions would differentiate SmartRecipe from other Recipe sources on the internet, drawing in users with its ease of use and simplified meal planning.

AI could be implemented in the application in two different ways. The first would be an AI powered recipe query. Users could ask the AI for a recipe that fills a much more niche requirement, such as “I want it to be spicy”, and the AI would look through the recipe database and determine which recipes fit that query. The second would be an AI powered receipt reader, which would enable users to update their pantry without entering individual items and query the API with a list from the receipt.

In conclusion, the application could be improved by increasing aesthetic appeal, opening revenue streams and broadening recipe sources, and implementing AI to make the user experience simpler.

References:

https://github.com/HamzaBuk/CSC486Project

Hamza Bukhari

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Dedicated and ambitious Computer Science student eager to use his academic foundation and love for technology for an internship role. Proficient in languages such as Java and Python but able to use JavaScript, SQL, and C and is willing to learn more. Has hands-on experience through coursework and projects—strong problem-solving skills through participation in the Computer Science Club at West Chester University. A quick learner with excellent communication skills and is eager to help in a team environment in any way possible.

Education

West Chester University Of Pennsylvania

Bachelor of Science in Computer Science

August 2022–Current

Anticipated Graduation Date: May 2026

West Chester, Pennsylvania

Cumulative GPA: 3.57

Technical Skills

Languages: Java, Python, SQL, C, JavaScript, Haskell

Tools: GitHub, Linux, IBM SPSS

Mathematical Proficiency: Calculus, Number Theory, Discrete Mathematics, Statistics

Projects

September 2023 - November 2023

Email Processing | Java

- Developed an algorithm that utilized emails from a dataset and created features including Bigrams, character count, word count, and calculating the Euclidean Distance between emails.
- Collaborated with team members to optimize efficiency and work more effectively and in a timely manner.
- Optimized the algorithm's performance to enhance speed and decrease memory space.

November 2023 - December 2023

Snake Game | Java

- Programmed a snake game using Linked Lists and GUIs with a team.
- Optimized program to run on Linked Lists. Noted difference in time complexity between programs.
- Facilitated group collaboration through assigning work. Reported issues or complications that may have occurred to the group and suggested what could be added to improve performance for future tests.

October 2023 - November 2023

Algebraic Tree Expressions | Java

- Made a functioning Tree Searching algorithm that went through all the parent and child nodes to find viable mathematical expressions in the trees
- Find and Discover what nodes had potential expressions and then see if it was actually a real expression or not.

January 2024 - March 2024

Game LeaderBoard Tracker| Python/SQL

- Took statistics about the "Ranked Ladder" from the public API from Riot Games' "League of Legends" and then inserted the data into a SQL server using the Psycopg2, Pangres and SQLAlchemy imports. This then was made to update and take into consideration the win-lose record of the players and the moving of the leaderboards.
- Queried the SQL Table and made it possible to filter the "League of Legends" leaderboards by the "puuid", the ingame name of the player, characters played, etc.

August 2024- December 2024

Search Algorithm | Haskell

- Created a search algorithm in Haskell that consisted of recursive calls as well as cases to make it as efficient as possible
- gained familiarity with Haskell and can code in it if needed now
- gained knowledge of potential search algorithms and how to go about finding the most optimal options from them.

December 2024-Febuarary 2025

League of Legends DataBase | Python & PostgreSQL

- Created own database originating from the API provided by Riot Games, goes into detail on all the different interactions that the player can have with the game and store it in an SQL table that is easily accessible from a Bot.
- Included all potential games including the ones that are not in the API such as "Pro-Games" by scraping the League of Legends Esports website and storing the data in tables that can be sorted by game patch as well as the date of the game played, champions played, etc.

Jonathan Nguyen

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Highly motivated student deeply interested in machine learning, software engineering and data science. An internship would allow me to lend my problem-solving and analytical skills to help your company improve, whilst developing my skills in the computer science field.

EDUCATION

WEST CHESTER UNIVERSITY OF PENNSYLVANIA West Chester, PA Exp. Graduation: May 2025

- Bachelor of Science in Computer Science
- GPA 3.83/4.0

RELEVANT COURSEWORK

SOFTWARE ENGINEERING

- This course focuses on more advanced topics in object-oriented programming, including project design, planning, and testing using milestones and checklists

PROGRAMMING LANGUAGE CONCEPTS/PARADIGMS

- An examination of the conceptual underpinning of programming languages and of the paradigms into which they fall. Topics will be drawn from those comprising the field of programming language such as abstraction, bindings, concurrency, design, encapsulation, history, representation, storage, and types.

DATA STRUCTURES AND ALGORITHMS

- Topics include data abstraction, recursion, lists, stacks, queues, linked lists, trees, hashing, searching and sorting algorithms, and the evaluation of algorithm efficiency.

ARTIFICIAL INTELLIGENCE

- Topics will be drawn from any of those comprising the field of AI such as agent architectures, automatic truth maintenance, constraint satisfaction, expert systems, fuzzy logic, games, genetic algorithms, knowledge representation, machine learning, neural networks and connectionism, natural language processing, planning, reasoning, robotics, search, theorem proving, and vision.

DATA SCIENCE

- The course includes basic statistics, an intro to machine learning, and an intro to data visualization. Students will learn how to read different types of data files and use statistical tools and machine learning tools to analyze them

EXPERIENCE

Debate Judge and Coach May 2018- May 2021

Charles F. Patton Middle School, Unionville High School – Kennett Square, PA

- Evaluated and provided structured feedback to 20 students, helping them improve their analytical thinking and communication skills through critical evaluation of debates and speeches.
- Guided students in developing speeches, enhancing their ability to organize thoughts logically and present ideas effectively—skills crucial for problem-solving in programming and software development.

- Collaborated with other coaches to organize debate scrimmages and competitions, improving team collaboration and streamlining practice sessions, similar to agile teamwork in tech environments.
- Managed multiple students and activities simultaneously, demonstrating strong time management and multitasking, applicable in fast-paced, project-based work environments.

SKILLS

- **Programming Languages:** Java (Runtime Polymorphism, OOP), Python
- **Frameworks & Tools:** Apache Spark, Hadoop, VS Code, Jupyter Notebook, SQL, Linux
- **Concepts:** Data Structures, Algorithms, Software Development Lifecycles (SDLC)

INVOLVEMENT

- Member of the Upsilon Pi Epsilon Honor Society
  - Recognized for academic excellence in the computer science curriculum
- Member of the WCU Computer Science Club
- Participated in multiple West Chester Programming Contests

PROJECTS

Sleep Quality Analysis: Physical Activity and BMI Impact

- Tools Used: Python (Pandas, NumPy, SciPy, Matplotlib), Statistical Analysis (Mann-Whitney U, Spearman Correlation, Kruskal-Wallis, Dunn's Test)
- Dataset: Sleep Health and Lifestyle Dataset (Kaggle, 374 entries)
- Conducted a comprehensive analysis to explore the relationship between physical activity, BMI, and sleep quality using statistical techniques.
- Preprocessed data by combining BMI categories, checking for missing values, and ensuring data consistency through Pandas
- Performed Mann-Whitney U Test and Spearman Correlation to analyze the relationship between physical activity levels and sleep quality, finding a statistically significant but weak positive correlation ($r = 0.178$, $p < 0.001$).
- Used Kruskal-Wallis H-Test and Dunn's Test to compare sleep quality across BMI categories, identifying significant differences between Normal and Overweight groups ($p < 0.001$).
- Concluded that higher physical activity levels are associated with better sleep quality, and BMI plays a nuanced role in sleep health.
- **Key Skills:** Data preprocessing, hypothesis testing, statistical analysis, data visualization, and critical interpretation of results.

Seth Conley

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A detail-oriented software developer who works well independently and in a team, and an adaptive learner who welcomes outside perspectives and alternative solutions.

Education

West Chester University of Pennsylvania — Expected Graduation May 2025
Bachelor of Science - Computer Science
Masters of Science – Computer Science — Expected September 20 25 – December 2026
GPA: 3.8

Academic Achievements:

- Dean's list 5 semesters
- Membership in the computer science honors society Upsilon Pi Epsilon
- Placed third in the West Chester University Programming Competition

Relevant Coursework

- Computer Science 1-3
  - Learned coding basics such as variable types, loops and methods/functions.
  - Developed an understanding of how to translate a solution from spoken language into code.
  - Created programs like a recursive depth-first maze solving algorithm that utilized the concepts we learned in class while applying clean code practices.
- Data Structures and Algorithms
  - Learned data structures like Stack, Queue, and Hash maps.
  - Learned what makes a program efficient through runtime analysis using Big O notation.
  - Learned what makes algorithms effective, efficient, and complete.
  - Wrote code implementing graph exploration algorithms.
- Software Engineering
  - Learned advanced Object-Oriented Programming principles.
  - Learned how to write readable code.
  - Eliminated redundant code with methods where appropriate.
  - Utilized the SOLID design principles.
  - Applied various design patterns to make code that is extendable yet not modifiable.
- Computer Systems
  - Learned about computing operations at the bit level.
  - Wrote C code that demonstrated how data is stored in memory and how it can be manipulated.
  - Studied assembly code.
  - Learned how CPUs function.
  - Discussed the Memory Hierarchy of RAM and CPUs.
- Big Data Engineering
  - Learned the MapReduce programming paradigm
  - Worked in spark using a Docker image provided by our professor to simulate multiple machines working in parallel.
  - Learned multiple methods of parallelizing statistical analysis.
  - Practiced developing programs by replicating algorithms using Python.
  - Wrote a technical paper analyzing a large dataset.
- Topics in Computer Security
  - Learned about cybersecurity on machines running the ARM instruction set.
  - Analyzed assembly code in order to write programs that took advantage of vulnerabilities specific to the ARM instruction set.
  - Utilized Stack Overflow attacks, Return Hijack Attacks, and Shellcode Attacks.
  - Learned how to use "gadgets" to execute a Return Oriented Programming Attack.
  - Worked with a group to complete a "Capture the Flag" style activity for the final project.

Projects

- Paper Presentation: *AI/ML for Network Security: The Emperor has no Clothes*
    - Presented a technical paper with a group to the class.
    - Portrayed the key points of the paper without unnecessary technical detail.
    - Received an A and feedback from the professor complementing the presentations clarity.
- Analysis of Steam Review Dataset using Apache Spark
    - Investigated 42 gigabyte dataset of Steam game reviews.
    - Performed Descriptive analysis of the dataset including average review percentage, genre-specific review averages and review trends over time.
    - Performed Technical analysis using a Frequent Itemset algorithm to find trends at the individual user level with regards to frequently grouped genres and games.

Experience

- Acme: Jan 2023-Present
    - Collaborated with coworkers to efficiently complete a variety of tasks.
    - Adapted to a dynamic environment that required different roles for each shift.
    - Communicated clearly and concisely with customers.

Technical Skills

- C, Java, Python
- Microsoft Excel, Word, PowerPoint
- Apache Spark
- SPSS Statistical Software

Activities

- West Chester University Computer Science Club
    - Discussed concepts with more experienced students and learned about additional ways to engage with the field.
- Placed third in the West Chester University Programming Competition
- Executive Board of West Chester Fencing Club

Taifur Rehman
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EDUCATION

AUGUST 2021 - Present
PURSUING BACHELOR'S DEGREE, WEST CHESTER UNIVERSITY

My name is Taifur Rehman, and I am currently pursuing a B.S. in Computer Science and a minor in Finance. As a computer science major during my time in college, I have concluded that my career objective is to seek a position in a competitive environment that would challenge me to push my boundaries and expand my knowledge in computer science, and further myself in this field. Along with this goal I hope to become a successful professional in this field by demanding and developing knowledgeable skills for growth. I possess exceptional abilities that make me adept at collaborating within a team, coupled with a strong dedication to teamwork, recognizing it as a crucial element for achieving success. My capacity to collaborate with individuals from diverse backgrounds and personalities underscores my commitment to fostering a collaborative environment. I am resolute in my pursuit of company objectives through the facilitation of productive and efficient work processes.

EXPERIENCE

June 2023 – August 2023
Intern, Creoal Consulting

- Shadowed team meetings regarding a project managing the transfer of a company site
- Created and edited Oracle Human Capital Management (HCM) tutorial videos through verbal narration, quality checks, text-to-speech via Jira, and Articulate 360 Storyline to send to our customers as well as creating Oracle Transactional Business Reports (OTBI) reports.
- Developed and delivered presentations showcasing a variety of topics receiving feedback on presentation skills, demonstrating effective communication to my audience, and ability to engage and inform.
    - Individual "Meet the Interns"
        - Personal introductions presentation
    - Collaborative Presentation with other interns
        - Introduction to the project I was assigned to (Project Sherlock)
        - Discussed goals and my role in the project which included the building of data conversion documents like CV.027, CV.065, and FBDI (File Based Data Import) reports
    - Collaborative "Oracle vs Workday"
        - Presentation which compared and contrasted the spaces of Oracle and Workday
        - Why you as a customer should use Oracle along with a demo of an Oracle ERP environment

June 2022 – August 2022
INTERN, Quantic

- Provided product support on Point-of-Sale system (POS) issues reported by customers and merchants
- Worked with the support team on issues reported via phone, email, and SMS
- Performed product testing & configurations and reported issues and bugs to the development team on product improvement.
- Responsible for managing daily inventories such as printers, routers, handheld POS devices, adapters, etc.
- Managed daily customer shipments and inventory stock. Reported daily to the finance team on inventory updates.

TECHNICAL SKILLS

- **Programming:** Java, Python
- **Tools:** Jira, Articulate 360, Microsoft Suite, Google Suite
- **Other:** POS Systems, Inventory Optimization, Customer Service

SOFT SKILLS

- Verbal & Written Communication | Analytical & Problem-Solving | Attention to Detail
- Multitasking & Organization | Critical Thinking | Resilience

ACTIVITIES & LEADERSHIP

- **Muslim Student Association (MSA), West Chester University (2022-2024)** – Board Member

- **South Asian Student Association** – Member

- **Muslim Interscholastic Tournament (MIST)**
  - **2021:** Finance Committee – Secured sponsorships, managed venue logistics.
  - **2022:** Regional Emcee, Competition Host, Basketball Referee.
  - **2023:** Regional Competitions Committee – Recruited judges, ran events.
  - **2024:** Finance Vice-Chair – Led fundraising & financial planning.

- **Volunteer Experience**
  - Muslim City Fest Philadelphia
  - Health Clinics – Assisted underserved communities with free health check-ups.