Lab 1: Schedule Puzzle Product

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Table of Contents

List of Figures

List of Tables

1. Introduction

Many people struggle to manage their daily tasks effectively and to prioritize their responsibilities which can lead to not being able to achieve their personal and professional goals. This can lead to a decrease in work performance, stress, and burnout. Research has shown that poor task management and productivity can lead to negative effects on mental health, job satisfaction, and overall well-being. In a study conducted by acuitytraining in 2022, 500 employees from different industries were surveyed, and only 18% of those employees said to have a proper time management system, and the other 82% of the employees would only use a list or their email inbox as a time management tool. (Richardson, 2022)

Possible characteristics of an effective solution include:

1. Flexibility: This can allow for customization and adaptability to meet the unique needs and preferences of an individual.
2. Accessibility: This ensures the solution is easy enough for anyone to use.
3. Accountability: This should be features that promote responsibility such as reminders.

With these characteristics in mind, the solution is to have a system with automated scheduling. Not everyone can come up with an effective schedule that works for them. They may create a schedule only to realize that there are several conflicts, and the individual will have to start over their scheduling process (Figure 1). With this solution, the individual can work together with the system to come up with a schedule that works for them. The individual provides tasks that need to be done, and the system prioritizes and schedules these tasks, and in

the end, the system will provide the individual with a schedule they can select from. This system is the solution, and it is called *Schedule Puzzle*.

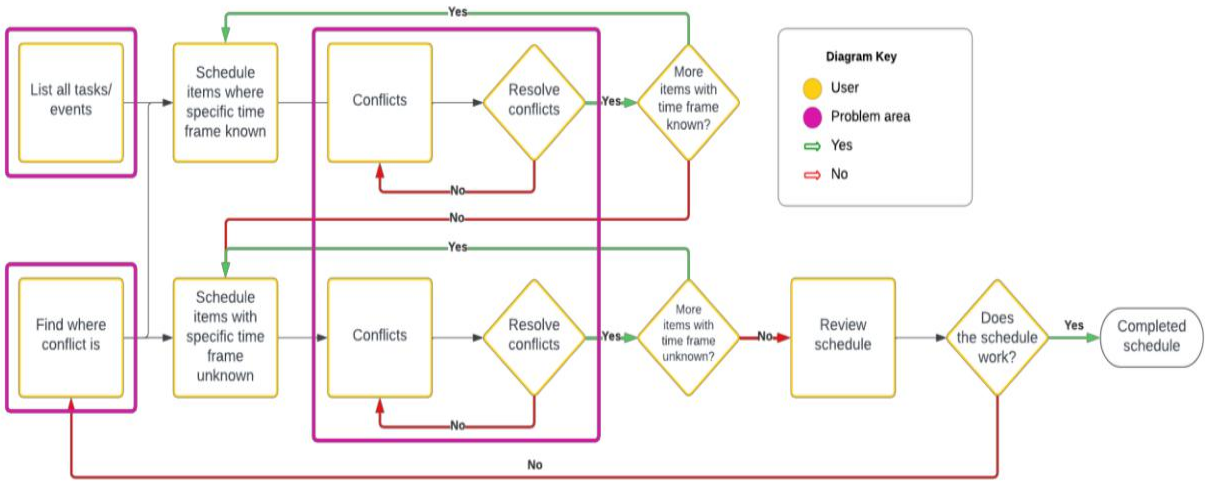

Figure 1: Current Process Flow

2. Schedule Puzzle Product Description

Schedule Puzzle is an automated schedule creation web application that allows users to input tasks/events and Schedule Puzzle will create a schedule based on the user's inputs. Schedule Puzzle will have essential calendar functions such as importing existing calendars from Google Calendar, Microsoft Outlook, and Apple Calendar and exporting a created calendar. It will also have tagging and labeling tasks and notifying users of upcoming tasks/events.

2.1 Key Product Features and Capabilities

The key feature of Schedule Puzzle is that it automates creating a schedule for the user once they input their tasks/events. If a conflict arises with scheduling, the user works together with Schedule Puzzle to resolve the conflict (Figure 2).

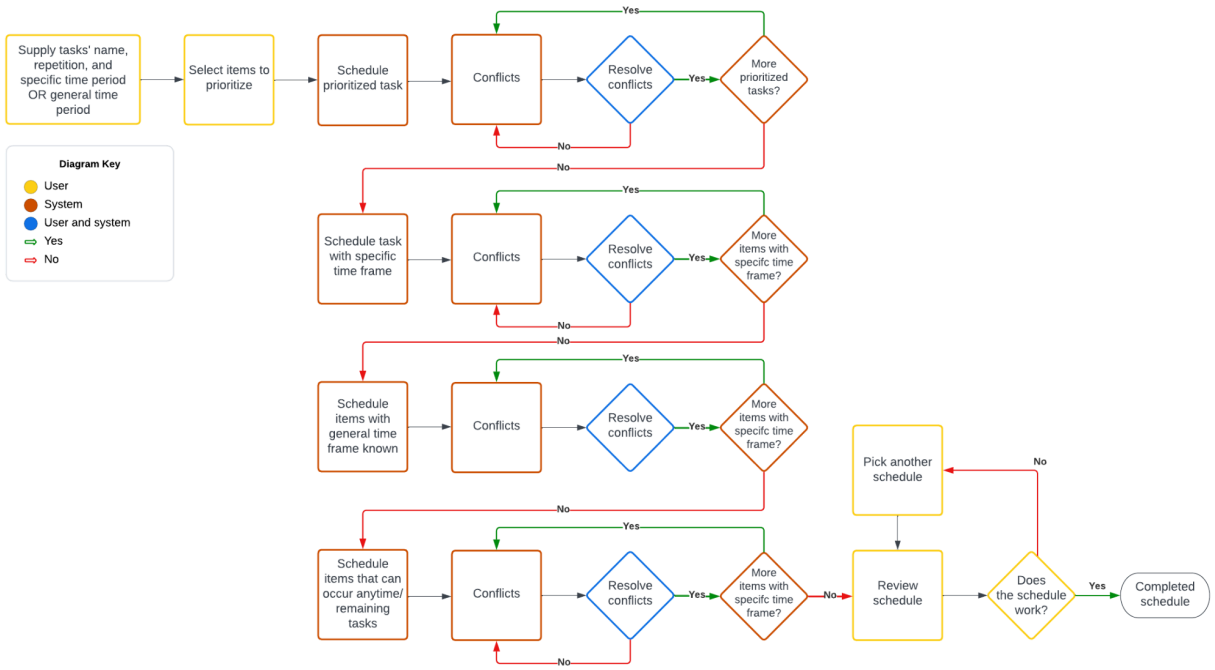

Figure 2: Solution Process Flow

2.2 Major Components (Hardware/Software)

The hardware required to support Schedule Puzzle will include desktops, laptops, cellular devices, and tablets (Figure 3). For software, there will be several components. For the front end, HTML, JavaScript, and CSS will be utilized. For the backend, Python will be used. For databases, Amazon Web Services and PostgreSQL will be utilized, and the framework will be Django. VSCode will be used as the IDE and GitHub will be used for the repository.

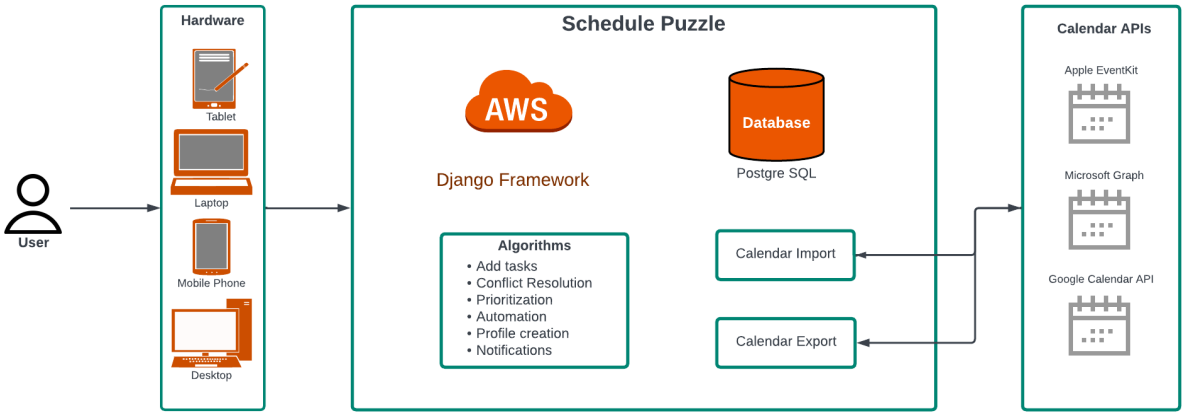

Figure 3: Major Functional Component Diagram

3. Identification of Case Study

Schedule Puzzle is intended for individuals who have difficulties managing time such as students, employed individuals, and even parents. It is also intended for individuals who already use an existing calendar application but would like help refining their calendar. For those who struggle with managing time, Schedule Puzzle will assist the individual with scheduling their tasks. In the future, Schedule Puzzle can also be used by administration clerks, organization leaders, and professionals who are starting off their new career.

4. Schedule Puzzle Product Prototype Description

The prototype for Schedule Puzzle demonstrates the functionality of the product compared to the real-world product. For the most part, the prototype will be fully functional except for when it comes to the automation, customization, and prioritization section. As shown in Table 1, automatic schedule creation and semi-automatic conflict resolution will be fully functional, but custom prioritization and natural language processing will be partially functional while behavioral suggestions will be partially functional, or even eliminated.

Feature	Real World Product	Prototype
Basic Calendar Functionalities		
Import existing schedules (.ics, .csv)	Fully functional	Fully functional
Export existing schedules (.ics, .csv)	Fully functional	Fully functional
Has daily/weekly/monthly calendar interface	Fully functional	Fully functional
Modify tasks	Fully functional	Fully functional
Create notes inside of tasks	Fully functional	Fully functional
Send reminders/notifications (push, text, email)	Fully functional	Fully functional
Automation, Customization, and Prioritization		
Automatic schedule creation	Fully functional	Fully functional
Semi-automatic conflict resolution	Fully functional	Fully functional
Custom prioritization	Fully functional	Partially functional
Natural language processing	Fully functional	Partially functional
Behavioral suggestions	Fully functional	Partially/Eliminated

Table 1: Real World Product vs. Prototype

4.1 Prototype Architecture (Hardware/Software)

For the prototype hardware, a personal computer, such as a desktop or laptop, or a smartphone will be utilized. The software will have several components, starting with the frontend, HTML, JavaScript, and CSS. The backend will be implemented in Python. The

database being utilized will be PostgreSQL. The framework will be Django. The IDE being used will be VSCode and the repository will be on GitHub.

4.2 Prototype Features and Capabilities

The Schedule Puzzle prototype will demonstrate the capability to generate schedules quickly and uniquely to the user's needs. When entering a task/event, the individual has the choice to enter a task/event in the task fields, or they can utilize the national language process where the individual can type a task as a regular sentence, and Schedule Puzzle will automatically input each task field (Figure 4).

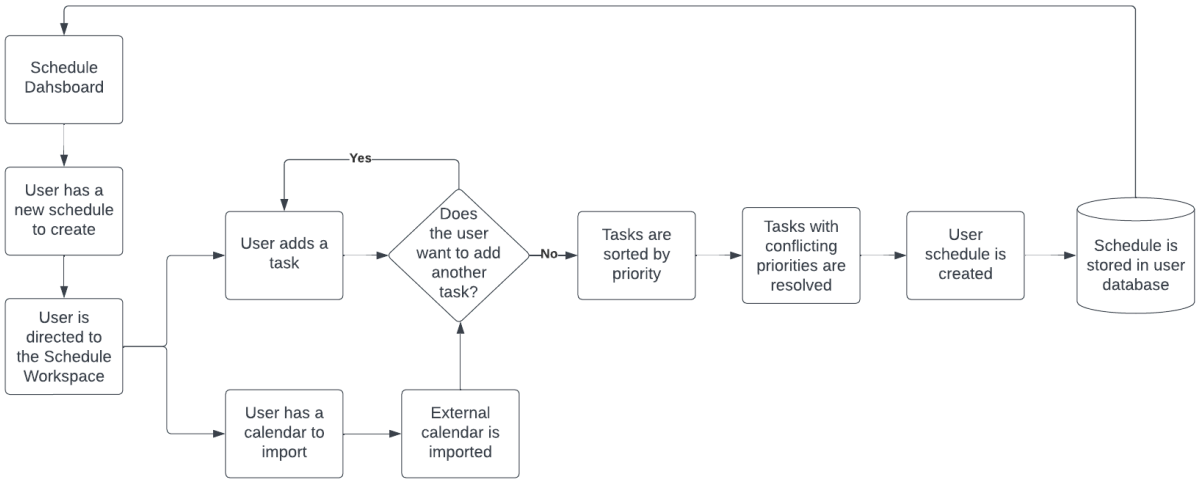

Figure 4: Automated Schedule Creation Algorithm

The prototype will also feature semi-automatic conflict resolution to reduce any conflicting priorities. The table below lists the fully functional and partially functional features the prototype will have (Table 1).

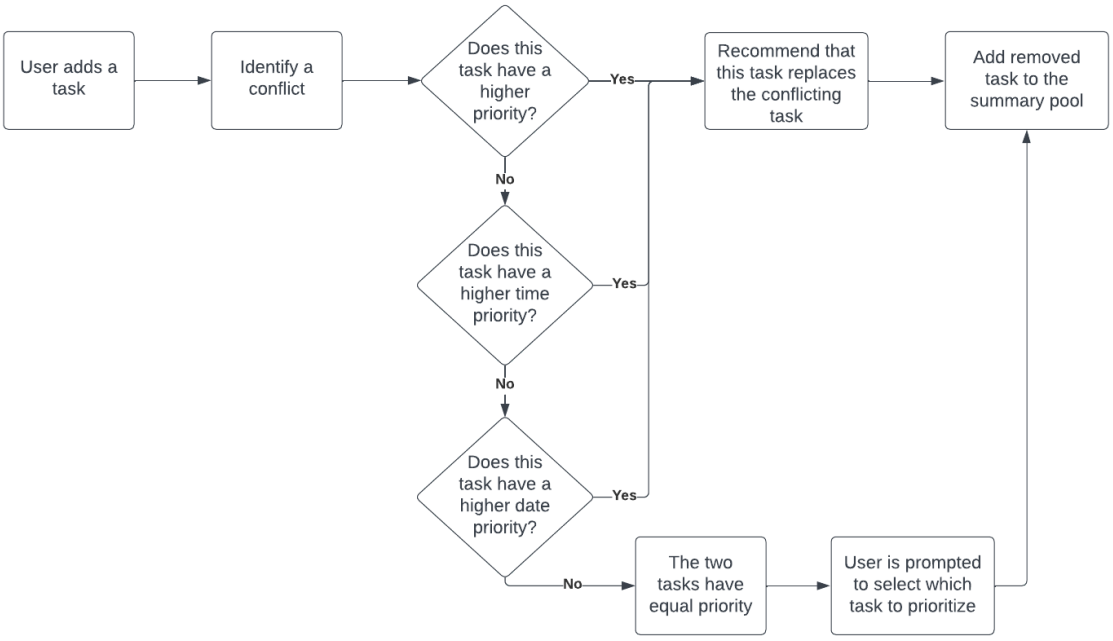

Figure 5: Conflict Resolution AlgorithmTable 1: Real World Product vs. Prototype

4.3 Prototype Development Challenges

During the development of the prototype for Schedule Puzzle, these challenges may be encountered:

1. Learning how to work with the Django framework and implementing it into Schedule Puzzle.
2. Learning APIs such as Google API.
3. Implementing natural language processing.

5. Glossary

- **Task:** A catch-all term for things that need to be done by the user.
    - One-time task: Appointments & meetings
    - Recurring task: Chores, school, work
- **Application Programming Interface (API):** Software that allows two or more computer programs to communicate.
- **Comma Separated Value (CSV):** A text file format that uses commas to separate values.
- **Internet Calendar Scheduling (ICS):** A file format that allows for import, export, and sharing calendars.
- **Django:** Python framework for secure and maintainable websites.
- **HyperText Markup Language (HTML):** Designed for creating web pages.
- **Integrated Development Environment (IDE):** Software application used for software development.
- **JavaScript:** A scripting language for creating dynamic web page content.
- **Natural Language Processing (NLP):** Machine learning used to interpret human language.
- **PostgreSQL:** A relational database management system.
- **Python:** A programming language used to create a variety of different programs.

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