Lab 1 - Schedule Puzzle Product Description

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1 Introduction

Managing tasks is necessary to obtain achievements in both personal and professional lives. However, many people need help organizing and prioritizing tasks to create a schedule. Those who attempt to plan their day may realize that their set plan is no longer realistic and must start over from the beginning, as shown in Figure 1.

A study in 2022 noted that less than 1 in 5 people have a proper time management system, and out of those who did not, over 20% felt that their work tasks were never under control throughout the week (Richardson, 2022). The problem here is that people need help with time management to create a schedule that works for them properly.

Many applications have the user manually handle everything from task creation to task prioritization, which can overwhelm those who need help with time management. This is where Schedule Puzzle comes in to help. Schedule Puzzle is a web application with automatic schedule creation. It will work with the user for task creation, and then the system prioritizes those tasks and creates a schedule tailored to the user.

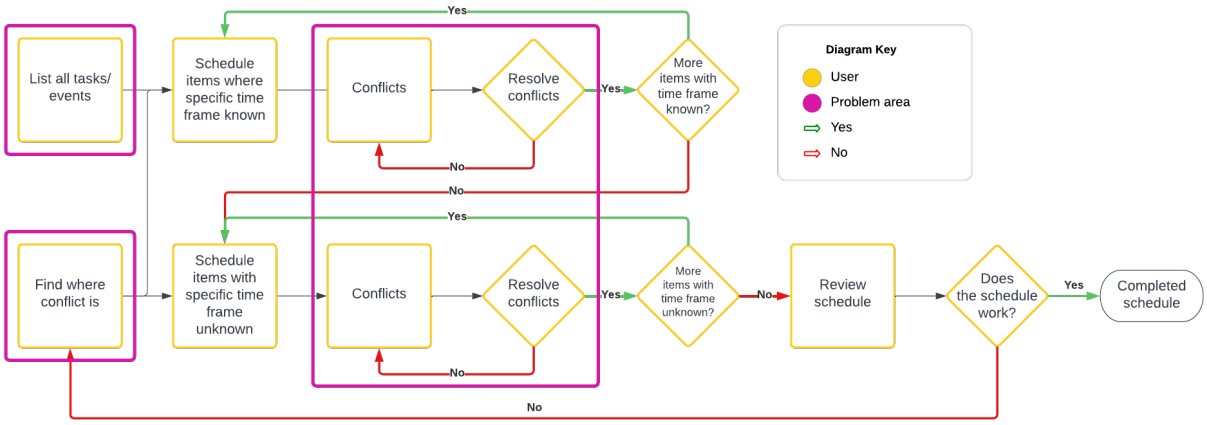

Figure 1: Current Process Flow

2 Product Description

Schedule Puzzle is a web application that assists users in prioritizing their tasks by creating a schedule. A schedule will be created based on user-specified prioritization, such as a date or a specific time. This will remove the user from having to manually add tasks to their schedule, which will help guide them to focus on completing their tasks. Schedule Puzzle handles scheduling conflicts by alerting users of overlapping tasks and adjusting the schedule to ensure no further conflicts occur. The completed schedule will assist users in managing their tasks by allowing them to focus on what needs to be done, while Schedule Puzzle handles scheduling.

2.1 Key Product Features and Capabilities

Schedule Puzzle automatically generates a schedule from tasks provided by the user, whether this may be manual input or export from another calendar. Other applications, such as Google Calendar, rely entirely on the user to input task information and handle conflict by manually moving tasks around. Conflict resolution in Schedule Puzzle is handled semi-automatically. The user will provide task information, and Schedule Puzzle will generate the schedule based on user priority levels. If a conflict occurs, a notification will be sent to the user to offer schedule change suggestions, allowing them to decide how to solve the conflict. Once the conflict is resolved, Schedule Puzzle will generate a new schedule for the user.

Task input will have a natural language process to reduce the repetitiveness of repeating input for task creation. Prioritization will be offered through various options like flagging the task, basing priority on a deadline, completion time on a specific day, or by a user-defined category. This will help users to have a customizable priority system that will give them the

freedom to prioritize in a way that best suits them or even learn which prioritization system works for them.

Schedules will be maintained within Schedule Puzzle. However, users will have the option to export to other calendar or spreadsheet applications as well as import their schedules from other applications. The ability to import will assist in consolidating multipole schedules into one concise experience for users. Notifications of upcoming events will be sent to users via email, text, or push notifications. This will help users keep on track with their schedule without having the application open before them.

Schedule Puzzle assists in time management skills by working with users to create an automated, customizable schedule with semi-automatic conflict resolution. Users can focus on what needs to be done instead of worrying about redoing their schedule or keeping track of tasks between multiple calendar applications.

2.2 Major Components (Hardware/Software)

Schedule Puzzle's structure is split into three sections: user interface, backend, and external calendar APIs, as shown in Figure 2.

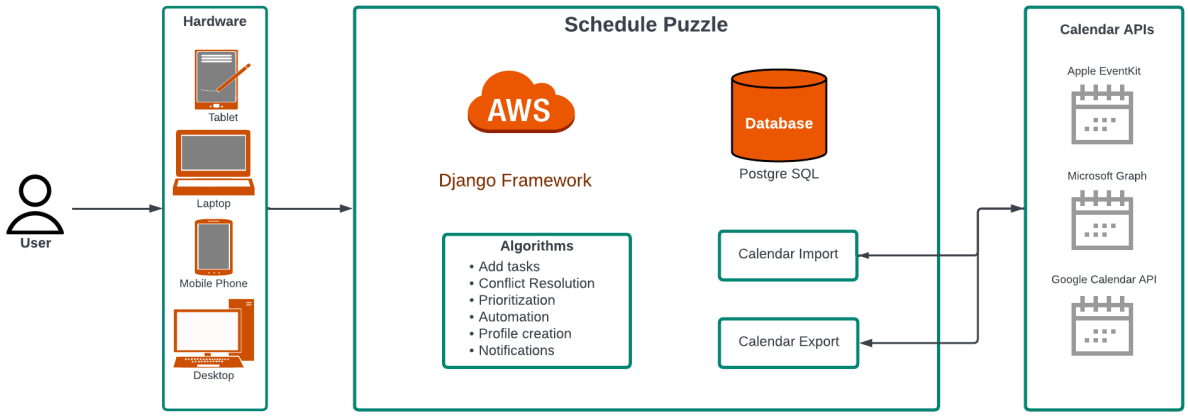

Figure 2: Major Functional Component Diagram

The user interface is a web browser available on desktop and mobile devices. Once a user is logged in, a dashboard will show schedules already created. If users wish to create a new schedule, they will be directed to their schedule workspace. The workspace will resemble a calendar where import, export, and manual task creation will occur. The front end of Schedule Puzzle will be programmed in JavaScript, CSS, and HTML. Amazon Web Services will host the website itself.

The importing and exporting of schedules will be handled by external calendar APIs of their appropriate applications. This will be Google Calendar API for Google Calendar, Apple EventKit for Apple Calendar, and Microsoft Graph for Microsoft Outlook. Python is the backend programming language of choice, with its Django library being used for the website framework. Django will interact with the PostgreSQL database to store user account information and their created schedules.

3 Identification of Case Study

Schedule Puzzle is being developed to assist those who struggle with time management and those who have their tasks split among multiple calendars. Time management is an important skill to help people complete their tasks within a required timeframe. A traditional calendar system requires manual input to shift tasks around if there are any scheduling conflicts. A scheduling conflict can cause the entire schedule to need to be reworked, which can be overwhelming to some people who already struggle with task management. Schedule Puzzle is designed to automate schedule creation to reduce the time people spend creating schedules.

Customizable prioritization options are designed to assist in creating a personalized system that lets Schedule Puzzle create a schedule that will work for people. Although only some people need help with prioritizing tasks, having the ability to have multiple options available can

still assist in learning which type will work best. Schedule Puzzle is to be used by anyone struggling with time management or people who wish to consolidate their multiple schedules into one location with the benefit of semi-automatic conflict resolution. Schedule Puzzle hopes to work with people to create a streamlined scheduling process.

4 Product Prototype Description

The Schedule Puzzle prototype is a web application demonstrating the feasibility of automating schedule creation with semi-automatic conflict resolution. It will provide basic calendar functions such as creating events and tasks and unique core features such as conflict resolution and custom prioritization options.

4.1 Prototype Architecture (Hardware/Software)

The prototype will require the user to have a mobile or desktop device with internet access. The main dashboard is where users can view and create their schedules. The dashboard will be programmed with CSS, HTML, Python, and JavaScript. HTML and JavaScript will be used to create the interface of the dashboard. Python and its web framework, Django, will be used as the backend to manipulate data within the PostgreSQL database. Python will also be used for machine learning algorithms for natural language processing and behavioral suggestions.

The calendar APIs will be accessible within the main dashboard through the export and import options. The export option will allow users to request an export of their finished schedules to Google Calendar, Apple Calendar, Microsoft Outlook, or a CSV file. The import option will allow users to request an import of their third-party calendars into the main dashboard.

4.2 Prototype Features and Capabilities

The prototype will demonstrate the basic functionality of a calendar application and unique core features, as shown in Figure 3. The basic features are task creation, daily/weekly/monthly calendar view, notes creation within a task, import/export, and notifications. These features are necessary to help users visualize their schedule and prepare for the conflict resolution stage. The unique features that will be demonstrated are the automatic schedule creation and semi-automatic conflict resolution. These two features make Schedule Puzzle unique and are the main idea behind helping users create a schedule tailored to them. Custom prioritization and natural language processing will be partially implemented, and behavioral suggestions will be limited in their implementation or removed entirely from the prototype.

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

Figure 3: Real-World Product vs. Prototype

4.3 Prototype Development Challenges

There are expected challenges in completing the Schedule Puzzle prototype. The lack of familiarity with the different programming languages is an obstacle for the development team. Another challenge is the implementation of the different calendar APIs for import and export. Utilizing machine learning for natural language processing and behavioral suggestions is the most challenging. The team is not only learning a new language, but they will also have to learn how to work with machine learning models to offer predictive auto-complete text, see a pattern as to what time of day the user completes their tasks, and offer suggestions to prioritize their tasks depending on that time frame. To stay ahead of these challenges, the team will spend the first part of development learning the required tools and consolidating resources to act as a continuous reference sheet throughout the prototype development.

Glossary

API: Application Programming Interface to allow multiple computer programs to communicate with one another.

CSS: Cascading Style Sheet language used to describe how elements are displayed on a screen.

CSV: A text file format that uses commas to separate values.

Django: Python framework for secure and maintainable websites.

HTML: HyperText Markup Language designed for creating web pages.

JavaScript: A scripting language for creating dynamic web page content.

PostgreSQL: A relational database management system.

Python: A programming language used to create a variety of different programs.

Task: Catch all term for things that need to be completed by the user

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