Software Requirements Specification (SRS)
VS-Saturn

Team: 3
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Instructor: Professor James Daly

1 Introduction

This document is intended to provide detailed information about the proposed Visual Studio Code extension. The extension will supplement software engineers using Visual Studio Code who desire to follow the pomodoro style of work. This document will start with an overview of the project including the purpose, scope, and a general overview of the extension. Followed by specific and detailed descriptions on the functionality of the extension, along with its restrictions and constraints. We have included diagrams that help in visualizing what the project is intended to do, along with a prototype of the system. References and contacts may be found at the end of the document.

1.1 Purpose

The purpose of this document is to give detail on how the extension was constructed, who it will benefit, and give detail on improvements and faults of the extension. The intended audience of this document is specifically investors looking into monetizing the product, software engineers wanting to develop similar products, and our professor.

1.2 Scope

VS-Saturn is a plugin designed specifically for Visual Studio Code that creates a visual guide for following the pomodoro style of time management inside Visual Studio Code itself. The intent for the extension is to keep the user's focus on their work, not being distracted changing their focus on an outside application or notebook to keep track of where they are in their pomodoro. The user will have access to a list where they can add or remove tasks, along with the ability to pause or skip a timer completely. Keeping the user immersed in their work is of high priority. When signifying switches between work and break time, VS-Saturn inverts the current Visual Studio Code theme. This way the extension is not intrusive with loud pings or visible notifications, distracting the user from their work. This way, the user never takes their eyes off of Visual Studio Code unless they are on a break and can maintain focus on what task needs to be done. This is all done to achieve the goal of allowing a visible time management software that does not pull the user's attention away from their current task.

1.3 Definitions, acronyms, and abbreviations

1. Pomodoro: A format of time management where the user works for 25-30 minutes on productive work. Followed by a 3-5 minute break. After three breaks, the next break is 30 minutes long, as to reward the user for their hard work. This cycle can continue as long as the user would like.
2. VSCode: Abbreviation for Visual Studio Code. VS Code is a free source code editor where developers can edit, build, and debug code with ease.
3. User: The human using VSCode.
4. Task: An objective that the user would like to complete.

5. Timer: A display that shows how much time the user has until their next break or work time in minutes and seconds.
6. GUI: Graphical User Interface

1.4 Organization

The rest of the document is organized in the following way. Section 2 describes the software itself, including its construction, specifics on functionality, and constraints... Section 3 goes over the requirements for designing and developing the VS-Saturn. Section 4 includes design diagrams and outlines on how the VS-Saturn will work. Section 5 goes over a prototype of VS-Saturn, giving details as to where it can be found and how to operate it. Lastly, section 6 is a list of references and sources we have used during development.

2 Overall Description

This section will cover the specifics of how VS-Saturn works. It covers constraints, interfaces, functionality, user expectations, assumptions of the software and user, and objectives beyond the scope of this project.

2.1 Product Perspective

VS-Saturn aims to be an aid to programmers who struggle with time management or desire a structured time management technique. There are multiple different time management techniques such as Getting Things Done, the Important-Urgent Matrix, and Do It Now.[1] However, Pomodoro is one of the more well known techniques.[2] The philosophy behind the technique is the idea that frequent short breaks keep you more mentally clear and refreshed. It fits very well in today's day in age as it relies on self control of user and not checking your phone every ten seconds as we do today. The idea is that you focus for twenty to thirty minutes on productive work, entitled a pomodoro, and then take a three to five minute break. This forces the user to enact self-control, making checking social networks or playing a mindless phone game wait until your break. It also rewards the user for being consistent in sticking to the pattern by making every fourth break a twenty to thirty minute break. It also gives the mind a much larger break after working for an hour.

VS-Saturn implements these features by having a list for the tasks the user wants to get done, along with a visible timer to display the remaining time in the pomodoro. The task list is fully customizable so that the user can add and remove tasks as need be, as well as mark tasks complete when they are done to visually see their progress. The user can interact with the timer by pausing the timer if they need to step away momentarily, or reset it if they forgot to pause as they stepped away and want to reset it.

[1] https://www.brightpod.com/boost/10-popular-time-management-techniques
[2] https://www.brightpod.com/boost/10-popular-time-management-techniques

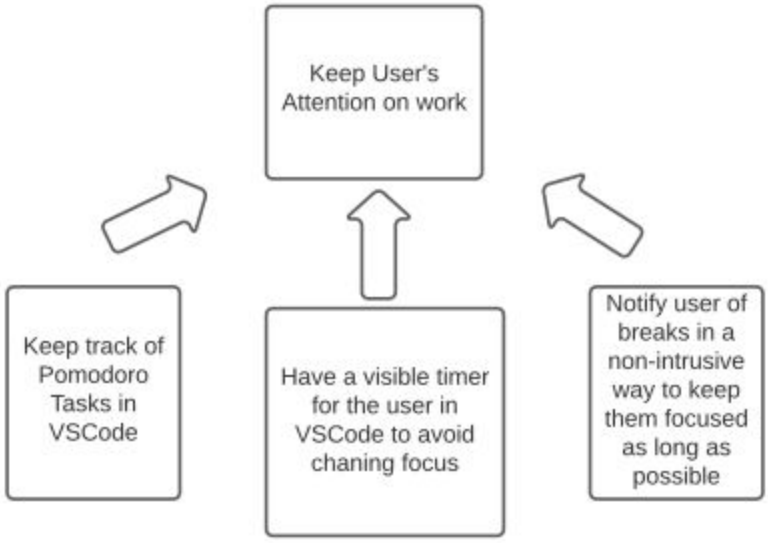
This is all available inside of VSCode on the status bar. This way, the user can see all their tasks and how much time they have left inside of the VSCode itself and not have to move their attention to a separate notebook, phone, or different application. This helps avoid distractions by keeping work and pomodoro related information all in one application. VSCode is used as it is easy to create extensions in it, and it is compatible with a hundreds of programming languages such as HTML, Java, Python, C#, C++, and many more. [3] It is readily available for hundreds of languages, and extensions are easily accessible through the VSCode marketplace, VS-Saturn is created for VSCode.

2.2 Product Functions

The major functions of VS-Saturn are as follows:

- Capable of keeping track of tasks the user creates
- Clear tasks that have been marked complete
- Count down time for every break and pomodoro
- Notify the user when a break or pomodoro starts

The following is a high-level goal diagram for development of the VS-Saturn extension. The boxes represent individual goals, and the arrows show dependency on other goals.



[3]https://code.visualstudio.com/docs/languages/overview#:~:text=On%20this%20website%2C%20we%20have,%2D%20T%2DSQL%20%2D%20TypeScript.

2.3 User Characteristics

As the VS-Saturn is designed for VSCode, it is expected that the user has at least beginner level knowledge of VSCode. They should be able to know how to access the extension marketplace and maneuver throughout VSCode's different functionalities. As it goes along with using VSCode and software engineering, typing expertise and mouse manipulation is expected as well. The ability to tell time on a digital clock is also expected of the user. Knowledge of converting minutes to hours is beneficial to the user, but not necessary. The user is also expected to have a desire to either improve or cement their time management skills. Knowledge of what pomodoro is beneficial, but not necessary as there will be a general overview of how the extension works in the extension marketplace.

2.4 Constraints

VS-Saturn is specifically built for VSCode. The user must be willing to program in VSCode as VS-Saturn will not be available or usable outside of it.

The GUI must be simple and intuitive to use. As VS-Saturn is built to relieve stress of exterior attention, using the extension should not cause the user more stress.

VSCode is only available on Windows, Mac OS, and Debian and Red Hat versions of Linux, the user is expected to be running one of these operating systems.

Hardware

Visual Studio Code is a small download (< 100 MB) and has a disk footprint of 200 MB. VS Code is lightweight and should easily run on today's hardware. Thus the user is expected to have a modern computer that fits these criteria.

Microsoft recommends:

1.6 GHz or faster processor

1 GB of RAM

2.5 Assumptions and Dependencies

As stated previously, developers and users will have experience using VSCode as a free source code editor and have at least beginner knowledge on its features and extension marketplace. It is also assumed that the hardware on the user's computer is capable of running VSCode. Thus the user will be running on Windows, Mac OS, or Linux. Along with the computer, the user is also assumed to have access to the internet to access the extension marketplace to download VS-Saturn. Lastly, it is assumed that the user has a

desire to keep track of how they are using their time and keep track of what they have accomplished in said time.

2.6 Apportioning of Requirements

VS-Saturn is built to help build time management skills. It does not, however, guarantee that the user will become an instant master of time management.

VS-Saturn is designed to notify the user in a non-intrusive way when pomodoros or breaks are up. This is done via inverting the theme while it is open. However, if the user minimizes VSCode, the user may not notice. Notifying the user in other non-intrusive ways when VSCode is minimized is beyond the current scope of the project, however, it is something that may be addressed in the future in the form of using taskbar notifications such as lighting up green on Windows or bouncing the icon on Mac OS.

Allowing for multiple users to interact with the same list and timers will be very beneficial for group work. However, VS-Saturn is designed to be used by one user on one device. Multi-user functionality is beyond the scope of the current project, however, it is something that may be added in future versions.

3 Specific Requirements

Overall Requirements

Hardware Requirements:

1. A (working) computer

Software Requirements:

1. This program can only work within VS Code, as such the runtime environment is and only will be, VS Code.
2. Task list
    a. A task is something that the user inputs to allow them to keep track of the things they need to do.
    b. They should be capable of being added, completed, removed, and modified.
3. Clock
    a. Is a timer that counts down from a specified starting point.
    b. Is capable of displaying and counting down either when the user is “at work” or “on break”.
        i. “At work” is defined as working on tasks, doing productive things.

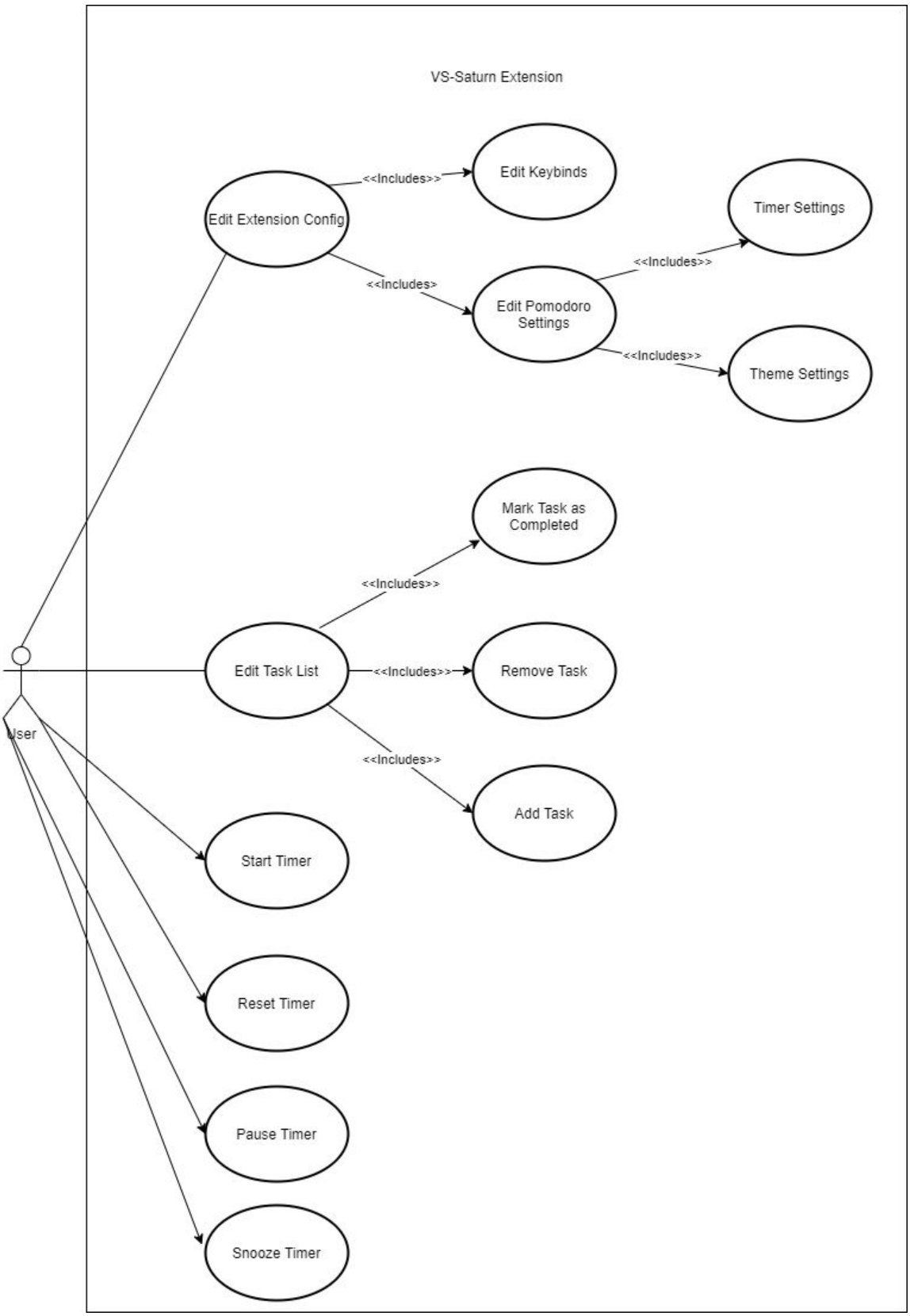
ii. “On break” being defined as not working on tasks, resting.

c. It must be capable of keeping time.
d. It should be able to notify the user when it reaches the end.
e. Should be able to track how many breaks have been taken.
    i. After each third short break is taken, it should set the next break timer to be a long break, which is default 30 minutes. Long break time and the amount of breaks until a long break should be customizable by the user.
    ii. Any time before the third break ends, the next break timer should be set to 5 minutes. When the pomodoro timer resets from long break to short break should be customizable by the user.

4. GUI
    a. Task Menu
        i. Is capable of allowing the addition, resolution, removal or modification of any task.
    b. Clock
        i. Clock control buttons
            1. Can manipulate the clock in such ways as, pausing, starting, skipping, and resetting it.
    c. Break completion visualization
        i. Should be capable of showing the user how many breaks have been taken and show how many are left before a long break.
    d. Intuitive layout

4 Modeling Requirements

Use Case Diagram:


VS-Saturn Extension
Edit Keybinds
<<Includes>>
Edit Extension Config
Timer Settings
<<Includes>>
<<Includes>>
Edit Pomodoro Settings
<<Includes>>
Theme Settings
Mark Task as Completed
<<Includes>>
Edit Task List
<<Includes>>
Remove Task
User
<<Includes>>
Add Task
Start Timer
Reset Timer
Pause Timer
Snooze Timer

Use Case Name:	Edit Extension Config
Actors:	User (initiator)
Description:	Settings Menu that houses Keybind Settings and Pomodoro Settings
Type:	Primary
Includes:	Edit Keybinds, Edit Pomodoro Settings
Extends:	N/A
Cross-refs:	
Uses cases:	None

Use Case Name:	Edit Keybinds
Actors:	User
Description:	Menu for Keybind settings
Type:	Secondary
Includes:	N/A
Extends:	N/A
Cross-refs:	
Uses cases:	Edit Extension Config

Use Case Name:	Edit Pomodoro Settings
Actors:	User
Description:	Menu for Pomodoro settings including Timer and Theme
Type:	Secondary
Includes:	Timer Settings, Theme Settings
Extends:	N/A
Cross-refs:	
Uses cases:	Edit Extension Config

Use Case Name:	Timer Settings
Actors:	User

Description:	Settings Menu to change break and pomodoro time
Type:	Tertiary
Includes:	N/A
Extends:	N/A
Cross-refs:	
Uses cases:	Edit Pomodoro Settings

Use Case Name:	Edit Task List
Actors:	User (initiator)
Description:	Initial step for editing task list. Starts when the user opens the task list
Type:	Primary
Includes:	Mark Task as Completed, Remove Task, Add Task
Extends:	N/A
Cross-refs:	
Uses cases:	None

Use Case Name:	Mark Task as Completed
Actors:	User
Description:	User marks tasks complete or not complete
Type:	Secondary
Includes:	N/A
Extends:	N/A
Cross-refs:	
Uses cases:	Edit Task List

Use Case Name:	Remove Task
Actors:	User
Description:	User removes task from task list
Type:	Secondary
Includes:	N/A
Extends:	N/A

Cross-refs:	
Uses cases:	Edit Task List

Use Case Name:	Add Task
Actors:	User (initiator)
Description:	User adds task to task list
Type:	Secondary
Includes:	N/A
Extends:	N/A
Cross-refs:	
Uses cases:	Edit Task List

Use Case Name:	Start Timer
Actors:	User (initiator)
Description:	The user starts pomodoro or break timer
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	
Uses cases:	None

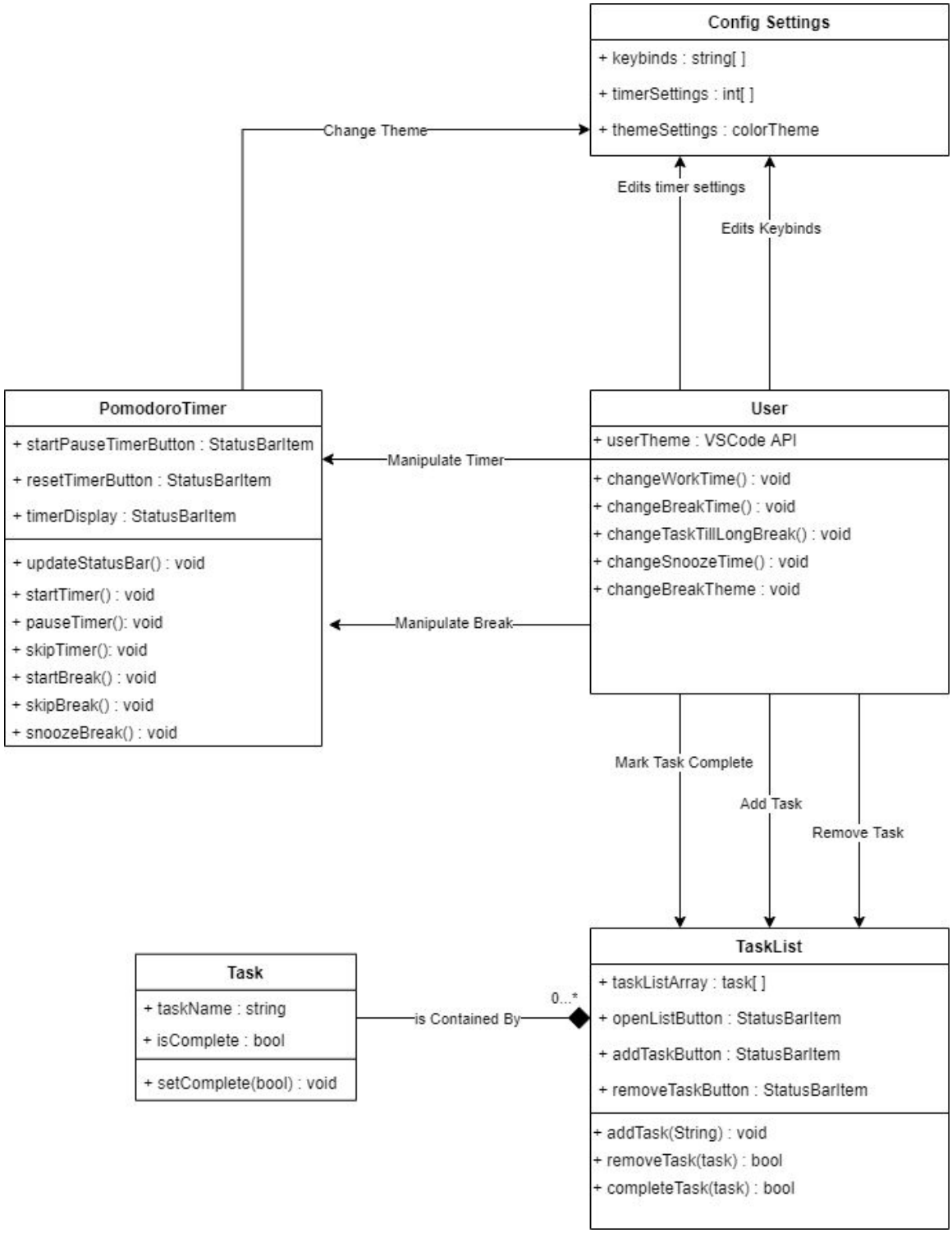
Use Case Name:	Reset Timer
Actors:	User (initiator)
Description:	User resets pomodoro or break timer
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	
Uses cases:	None

Use Case Name:	Pause Timer

Actors:	User (initiator)
Description:	User pauses pomodoro or break timer
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	
Uses cases:	None

Use Case Name:	Snooze Timer
Actors:	User (initiator)
Description:	Add five minutes to pomodoro or break timer
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	
Uses cases:	None

Class Diagram:


Config Settings
+ keybinds : string[ ]
+ timerSettings : int[ ]
+ themeSettings : colorTheme
Change Theme
Edits timer settings
Edits Keybinds
PomodoroTimer
+ startPauseTimerButton : StatusBarItem
+ resetTimerButton : StatusBarItem
+ timerDisplay : StatusBarItem
+ updateStatusBar() : void
+ startTimer() : void
+ pauseTimer(): void
+ skipTimer(): void
+ startBreak() : void
+ skipBreak() : void
+ snoozeBreak() : void
Manipulate Timer
Manipulate Break
User
+ userTheme : VSCode API
+ changeWorkTime() : void
+ changeBreakTime() : void
+ changeTaskTillLongBreak() : void
+ changeSnoozeTime() : void
+ changeBreakTheme : void
Mark Task Complete
Add Task
Remove Task
Task
+ taskName : string
+ isComplete : bool
+ setComplete(bool) : void
is Contained By
0...*
TaskList
+ taskListArray : task[ ]
+ openListButton : StatusBarItem
+ addTaskButton : StatusBarItem
+ removeTaskButton : StatusBarItem
+ addTask(String) : void
+ removeTask(task) : bool
+ completeTask(task) : bool

Element Name		**Description**
Config Settings		Menu class for settings of extension such as pomodoro timer and key binds
Attributes		
	keybinds:string[ ]	Array of strings that holds all keybinds for specific commands
	timerSettings:int[ ]	Array of integers for timer settings such as break time and pomodoro time
	themeSettings : colorTheme	Container for current theme and break theme
Operations		
	None	
Relationships	**None**	
UML Extensions	**None**	

Element Name	**Description**

PomodoroTimer		Class that contains all the functionality of pomodoro timer. This includes break notification, starting, pausing, and snoozing timers.
Attributes		
	startPauseTimerButton : StatusBarItem	A button that starts timers, the icon turns to a pause icon and will pause the timer
	resetTimerButton : statusBarItem	A button that resets the current timer to the initial time.
	timerDisplay : StatusBarItem	Container displaying the current amount of time left in the current timer.
Operations		
	updateStatusBar() : void	Update button icons and time
	startTimer() : void	Start current timer
	pauseTimer() : void	Pause current timer
	skiptimer() : void	Skip current timer and go to the next timer
	startBreak() : void	Start break timer
	skipBreak() : void	Skip break and go to next pomodoro

	snoozeBreak() : void	Extend break by five minutes
Relationships	Changes theme in Config Settings during break	
UML Extensions	**None**	

Element Name		**Description**
Task		Object class for tasks that the user will create.
Attributes		
	taskName : string	Name that appears in task list
	isComplete : bool	Bool that signifies whether or not the task is complete
Operations		
	setComplete() : void	Mark task as the opposite of isComplete
Relationships	The TaskList contains an array of 0 or more tasks	
UML Extensions	The relationship between Task and TaskList is symbolized by an aggregation	

Element Name		**Description**
TaskList		A container of tasks that is displayed for the user.
Attributes		
	taskListArray : task[ ]	Array of tasks that are displayed to the user
	openListButton : StatusBarItem	Button to open and close the task list
	addTaskButton : StatusBarItem	Button to add a new task to the task list
	removeTaskButton : StatusBarItem	Button to a remove task from task list
Operations		
	addTask() : void	Function that adds task to task list
	removeTask(): bool	Function that removes task from task list, returns true if successful.
	completeTask() : bool	Function that marks a task as complete, returns true if successful.
Relationships	**None**	
UML Extensions	**None**	

Element Name		**Description**
User		Class to represent the user
Attributes		
	userTheme : VSCode API	The current theme of the user
Operations		
	changeWorkTime() : void	Change how long pomodoros timers are.
	changeBreakTime() : void	Change how long breaks are.
	changeTaskTillLongBreak() : void	Change how many breaks the user must take to achieve a long break
	changeSnoozeTime() : void	Change how much time snooze extends the break
	changeBreakTheme : void	Change what theme VSCode changes to signify break time
Relationships		
	The user has relationships with Config Settings, PomodoroTimer, and TaskList. The user can edit the timer and key bind setting inside config settings. The user can also manipulate both break and pomodoro timers in PomodoroTimer. Lastly, the user can add and remove tasks, or mark tasks as complete.	

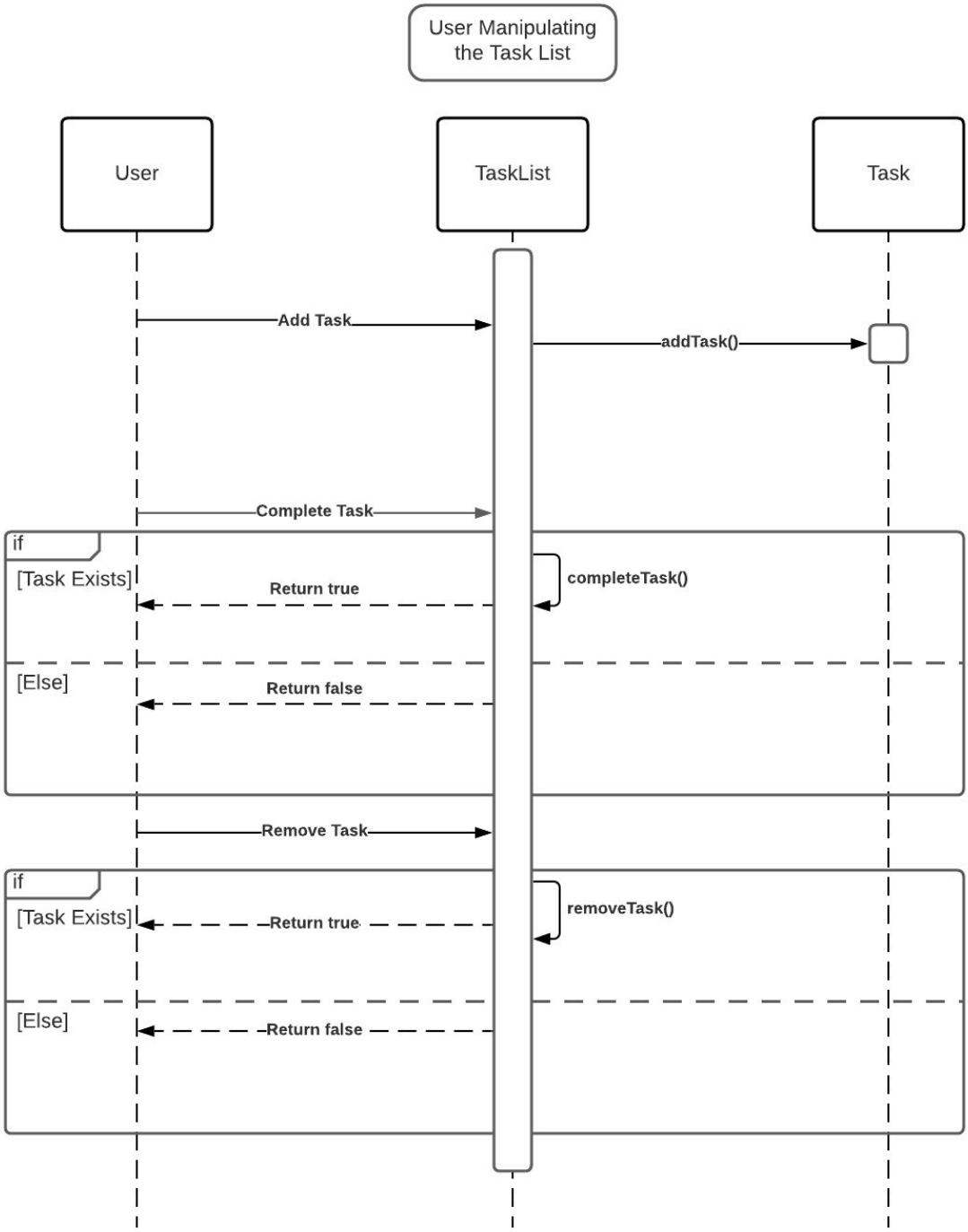
UML Extensions	**None**

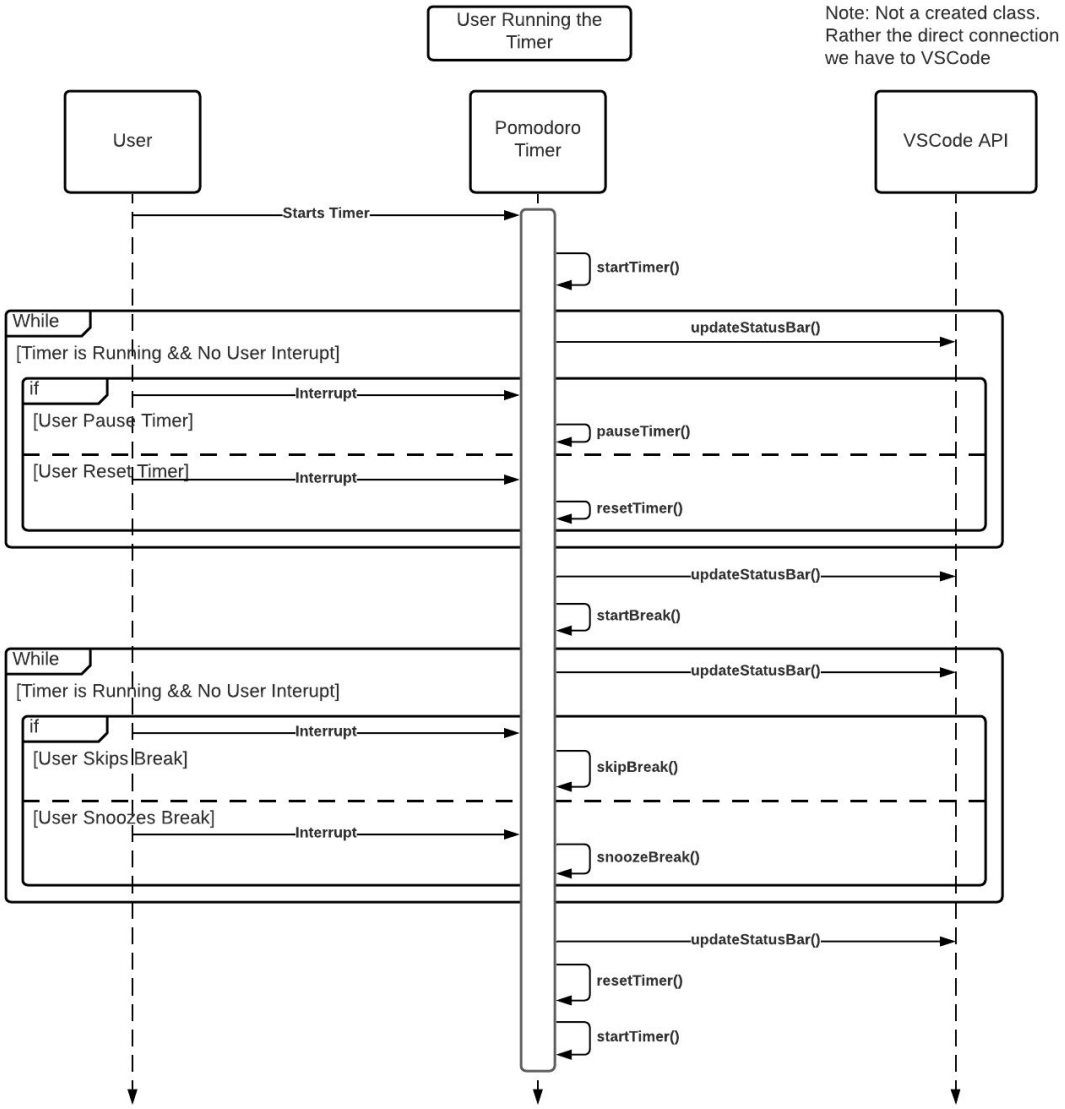
Sequence Diagram:

The following sequence diagrams give an example of the user interacting with the task list, and interacting with the pomodoro timer.

When using the task list, if the user adds a task, it appears in the task list. If a user desires to remove a task or mark a task as complete, the system will first find out whether or not the task actually exists before deleting the task.

The pomodoro timer starts with the user starting a pomodoro. Then, while the timer is going, the user can pause or reset the timer at any given moment. While all this is happening, the status bar is being updated with the correct icons and remaining time. Then the break starts, changing the theme and starting a new timer. While this timer is running, the user can skip or snooze the break at any given moment. The status bar continues to update throughout the break as well. The cycle continues as long as the user desires.


User Manipulating the Task List
User
TaskList
Task
Add Task
addTask()
Complete Task
if
[Task Exists]
Return true
completeTask()
[Else]
Return false
Remove Task
if
[Task Exists]
Return true
removeTask()
[Else]
Return false


User Running the Timer
Note: Not a created class. Rather the direct connection we have to VSCode
User
Pomodoro Timer
VSCode API
Starts Timer
startTimer()
While
[Timer is Running && No User Interupt]
updateStatusBar()
if
[User Pause Timer]
Interrupt
pauseTimer()
[User Reset Timer]
Interrupt
resetTimer()
updateStatusBar()
startBreak()
While
[Timer is Running && No User Interupt]
updateStatusBar()
if
[User Skips Break]
Interrupt
skipBreak()
[User Snoozes Break]
Interrupt
snoozeBreak()
updateStatusBar()
resetTimer()
startTimer()

5 Prototype

- Describe what your prototype will show in terms of system functionality

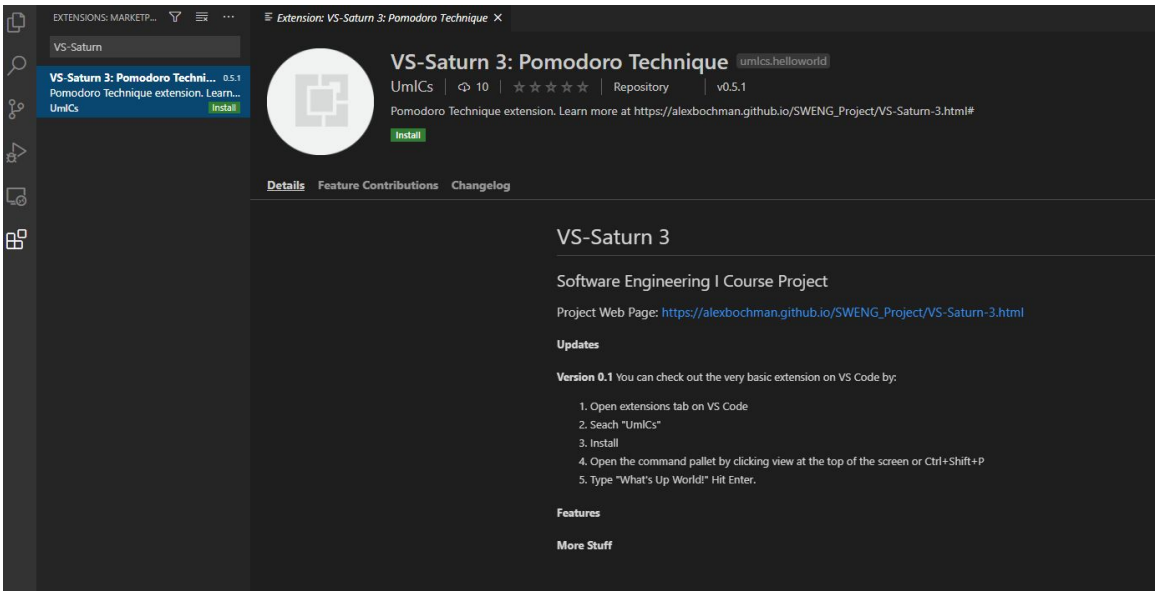
The following prototype was implemented to show what the final product will look like visually. It is essentially an empty shell with no functionality. Its sole purpose is to show what using the VS-Saturn will look like. This includes showing the time and list user interfaces.

5.1 How to Run Prototype

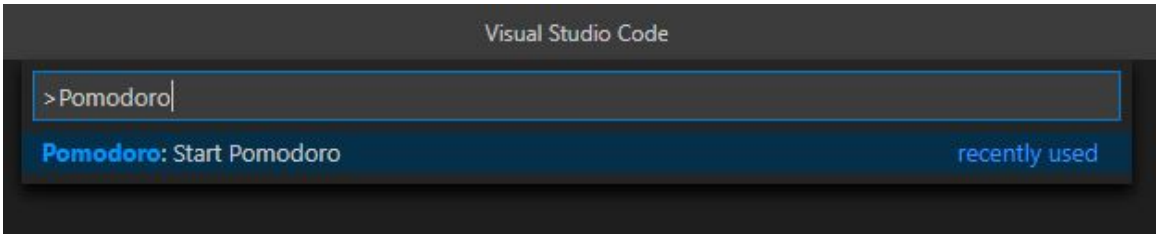
How to Download and Run VS-Saturn:

1. Download Visual Studio Code
2. Open the Extension Marketplace
3. Search “VS-Saturn” into the search bar and click on “VS-Saturn 3: Pomodoro Technique”
4. Click “Install”
5. Press “CTRL + SHIFT + P” on Windows or Linux, or “CMD + SHIFT + P” on Mac OS to open the Command Palette.
6. Type in “Pomodoro” into the Command Palette
7. Press “ENTER” or click on “Pomodoro: Start Pomodoro”

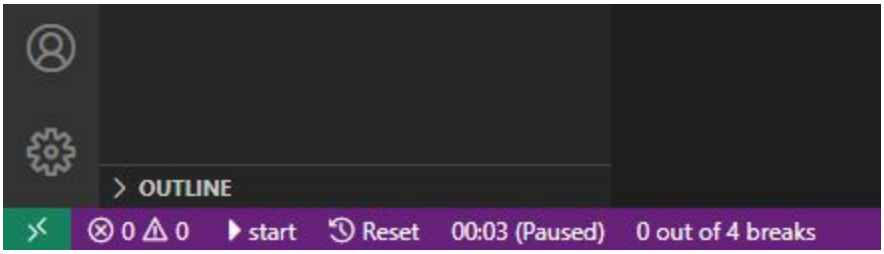
VS-Saturn in Visual Studio Marketplace:



Command Palette View:



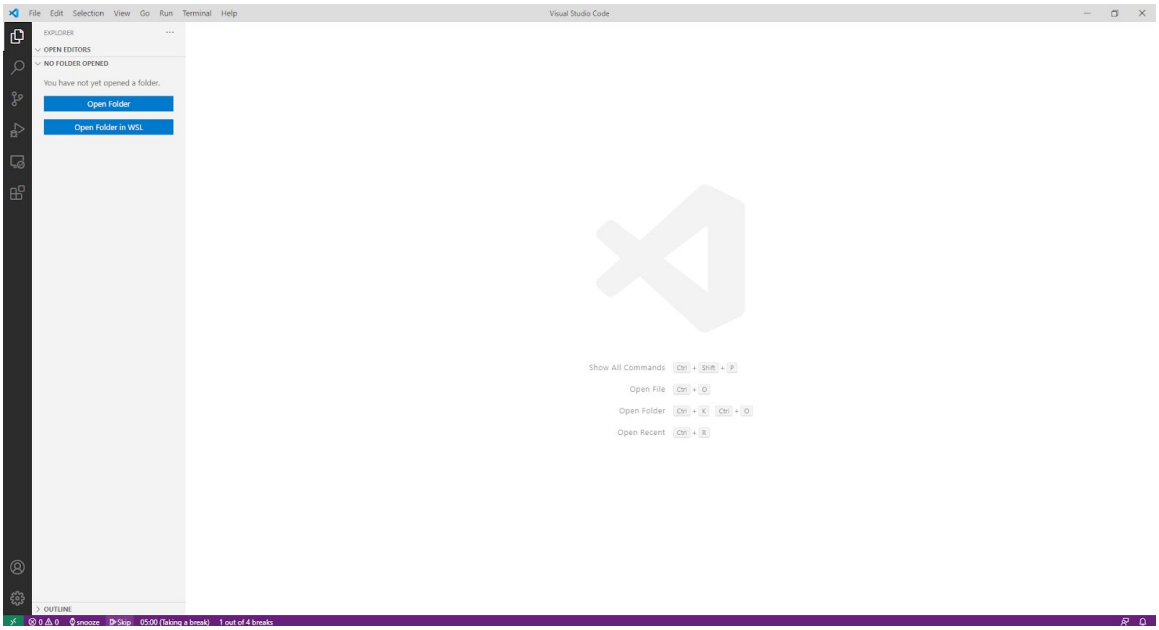
Status Bar View at Start of Pomodoro:



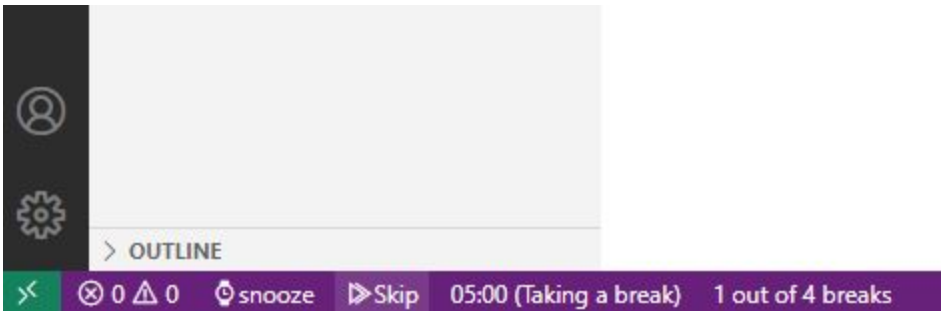
5.2 Sample Scenarios

In the download and start guide, the initial startup of VS-Saturn was displayed. The following is what VS-Saturn looks like when the user's pomodoro timer is up and the break starts. In this example, the user's default theme is the dark theme, thus the break theme is the light theme.

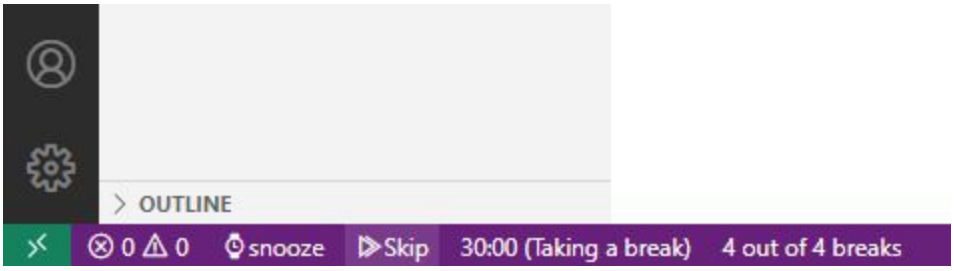
VSCode's theme is now the light theme



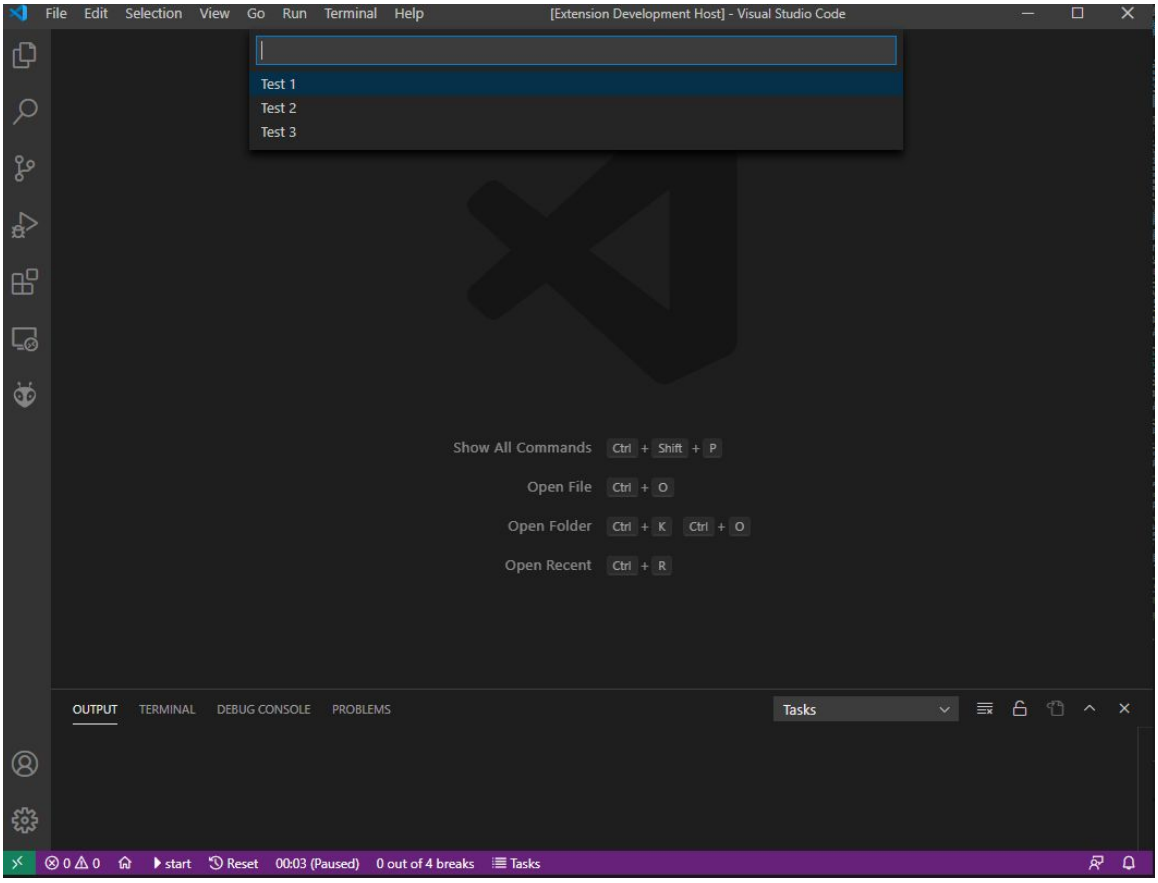
The status bar updates to show that the user is on a break, marking off one break. The buttons have also switched from Start and Reset to Snooze and kip respectively.



The following is how VSCode looks after the user has taken their set number of breaks to achieve a long break. In this example, the user must take three breaks in order to get a thirty minute break.



The following is what the task list will look like. The user clicks on Tasks on the status bar and opens the list on the top of VSCode that displays their tasks. The user will be able to add, remove, and mark tasks as complete in future versions of the prototype.



6 References

Start of your text.

[1] Code, V., 2020. Language Support In Visual Studio Code. [online] Code.visualstudio.com. Available at: <https://code.visualstudio.com/docs/languages/overview#:~:text=On%20this%20website%2C%20we%20have,%2D%20T%2DSQL%20%2D%20TypeScript.> [Accessed 18 November 2020].

[2] Tay, D., 2020. 10 Popular Time Management Techniques. [online] Brightpod.com. Available at: <https://www.brightpod.com/boost/10-popular-time-management-techniques> [Accessed 18 November 2020].

7 Point of Contact

For further information regarding this document and project, please contact **Prof. Daly** at University of Massachusetts Lowell (james_daly at uml.edu). All materials in this document have been sanitized for proprietary data. The students and the instructor gratefully acknowledge the participation of our industrial collaborators.