December 30th 2023

Today I created an account on Replit. Replit is a website in which you can create Python applications. It provides an area to input the code into and an area to view the output of your program. This is a way to test your code quickly and easily. I then started watching a Python tutorial. This part of the video covered variables, outputs, inputs, and type conversions. I followed along with the instructor and did sample exercises myself. Here is a link to the video.

[Python for Beginners](https://youtu.be/kqtD5dpn9C8?si=GNnsS1vhfNl48TLh)

December 31st 2023

Today I watched more of the Python tutorial. I learned about strings and various operators. The operators I learned about were math (+ - \* /), logical (and, or, not), and comparison (>, <, ==, <= !=), . These are very good to know because when I am making my program I will be using these a lot. I also learned about the “if” statements and conditions. I continued to follow along with the video and did my own coding.

January 1st 2024

Today I finished the Python tutorial and learned about while and for loops, lists, list methods, the range function, and tuples. While and for loops are used to repeat a single or many lines of code. Lists are pretty straightforward, they are used to represent a list of objects and are put in square brackets [ ]. List methods are commands such as add, remove, clear, len, and more. The range function is a method that allows you to quickly create lists. Lastly, tuples are lists of numbers that cannot be changed (immutable).

January 4th 2024

Today I started working on my program. I was able to make the program ask the user to input their solved sudoku puzzle row by row. The program is then able to create lists for the columns and the smaller 3x3 boxes of the puzzle. I printed all of these lists out to test if my algorithm was working properly. I also learned about functions which will be very useful in my program.

January 6th 2024

Today I did some more good work on my python program. I added a section of code that allows the program to verify if the rows that were entered contain 9 numbers, contain only numbers, and don't contain the number 0. I also made a variable called valid\_list which checks every row entered by the user and if it finds an invalid row, the user must enter the row again. I also started using functions.

January 7th 2024

Today I did some more hard work on my program. I made quite a few changes to the validating function to make the program give a more detailed error when mistakes are detected. I now tell you whether the error is in a row, column, or small box and how many errors there are. I did this because I thought the previous error messages weren’t very helpful. I also added code which made the display of the puzzle more spaced out and appear more like an actual puzzle. I then added a message that congratulates you if the puzzle is valid and a message that tells you if the puzzle is invalid and what your mistakes were. I had to do quite a bit of debugging today because I was doing things that I had never done before and was making a few mistakes. For example, I was using the wrong statement to check whether the error list was empty. I needed to use Google to find the proper statement.

January 8th 2024

Today I worked on tidying up the project. I added notes to make it easier to understand what the code was doing, moved some code around, and explained the functions in more detail. I also had my mom test my project since it would be good to have someone else test the code. My mom tried to get as many error messages as possible and was successful. I had to make sure that the functions were defined before they were used or else I would get an error message.

January 20th 2024

Today I did a lot of work on my presentation. I reviewed and edited the slides I had previously worked on. I started by creating a timeline on the history of Python and continued on to the background research. I then created slides and put the algorithm in to the presentation. After that I began working on the observations and inserted pictures of what the program did when the user inputted an incorrect puzzle. Then I changed the challenges slide by adding more to it and changing the formatting.

Background Research

Can I create a software program that can check Sudoku solutions using Python?

Python is a high level programming language used to create software. It’s commonly considered to be a beginner friendly language because it handles much of the complexity for the user. This allows for beginners to focus on programming concepts instead of details. I’d like to use this opportunity to learn a programming language to create a program that can check Sudoku solutions and tell you where there are errors. I am excited to learn Python because I have an interest in coding but have only used the block programming language Scratch. Python is much more complicated and the type of language that’s used by professional coders. It will therefore take a while to learn, but I think that it will be really cool to be able to have a more advanced knowledge of coding.

Now we need to talk about what Sudoku is. Sudoku is a puzzle consisting of a 9x9 grid, made up of rows, columns, and 9 smaller 3x3 grids. Within this grid some numbers are pre-populated and the puzzles come in various levels of difficulty. Each row, column, and smaller grid must contain the numbers 1 through 9 and no numbers can be duplicated. Your goal is to fill up the remaining cells. Often, making a mistake and not realizing it will make the puzzle unsolvable. Sudoku was first invented in 1984 in Japan by a man named Maki Kaji. He spotted a similar kind of game in a newspaper. Sudoku is a shortened version of an expression in Japan called “Sūji wa dokushin ni kagiru” which means “the digits are limited to one occurrence”. Sudoku is a very popular game that tests your problem solving skills.

Why does programming a Sudoku solver using Python interest me? My Dad has always enjoyed solving Sudoku puzzles. When I was older, I started watching him solve them and asked a lot of questions about what he was doing. I began doing some very simple 4x4 puzzles with my Dad to start getting the hang of them. I thought they were very fun and wanted to try more challenging ones. Every day in the newspaper a 9x9 puzzle is published. These range from 1 to 6 stars in difficulty, with 1 being the easiest and 6 the hardest. I think it would be helpful to have a program to tell me if my Sudoku solution for a puzzle is correct. I learned some programming in school using Scratch and enjoyed this very much. I would like to challenge myself with a language that’s more readily used by software developers and my brother introduced me to Python. I feel like this project would be perfect for me as it involves 2 things that I enjoy very much.