Project Title: Sudoku Solvers

Team Members:

- Michael Richards - mrichards2021@my.fit.edu
- Jaden Krekow - jkrekow2021@my.fit.edu
- Alice Luce - pluce2021@my.fit.edu
- Adrian Rodriguez - adrianrodrig2019@my.fit.edu

Faculty Advisor: Raghuveer Mohan - rmohan@fit.edu

Client: Not Applicable

Progress Matrix:

To Do	Completion	Alice	Adrian	Jaden	Michael	To Do
Database	100%	0%	0%	100%	0%	Created an initialized DB file so pre-generated puzzles are available
GUI	90%	15%	75%	0%	0%	Finish adding basic features (notes, hints, highlighting)
Visualizer	100%	85%	15%	0%	0%	Create a visualizer that works with GUI to shows board being solved
Menu	100%	0%	0%	0%	90%	A start page where the user can set up their sudoku game

Multithreading	100%	0%	0%	0%	90%	Help alleviate loading issues
Solver Algorithms	55%	20%	10%	15%	10%	Introduce three solver algorithms Hyper-arc consistency, bee colony optimization, and dancing links

1. Discussion of each accomplished task for the current Milestone:
    a. Visualizer is now set up and is able to be seen working in progress when a user has the algorithm solve the current board. Visualizer accurately highlights changes to the board as the algorithm provides them and can be configured to update at different frequencies for the user's convenience.
    b. Allows users to seamlessly change between board states where input is the solution or where the user can input multiple different digits. This will enhance user experience by giving them the tools to solve the board without any need for external tracking
    c. A pre-generated database file was added to the repository. It will aid in testing as we continue to add additions to our project, and will allow the user to be able to play Sudoku immediately without waiting for a puzzle to be generated.
    d. Hyper-arc consistency algorithm has been implemented but has bugs remaining in its search pruning algorithm. The bugs result in the algorithm incorrectly determining that a puzzle has no solution if too many spaces are removed due to the search pruning algorithm incorrectly identifying a valid path as not worth searching.
    e. Multithreading has been rewritten to handle the drawbacks of qThread multithreading, as well as becoming more modular for easier implementation. It's now fully functioning in conjunction with the menu pages and the board.

2. Discussion (at least a few sentences, ie a paragraph) of contribution of each team member to the current Milestone:
    a. Alice Luce: Developed the visualizer and implemented it for brute-force search. Beginning implementation for rules-based search

b. Adrian Rodriguez: Working with Michael to research and develop bee colony algorithms. Aside from figuring out the new solving algorithm I have been working with Pyside to Implement the note feature. In addition to making notes work I have been fixing other issues with the GUI and working with integrating visualizers into the current state of the GUI.
c. Jaden Krekow: Added .db file to repository with pre-generated puzzles users to immediately be able to play Sudoku without generating a puzzle, and allow puzzles to be available to be used for testing purposes. Hyper-arc consistency algorithm was added, but contains bugs with search pruning and if too many cells are removed will incorrectly determine that a puzzle has no solution.
d. Michael Richards: Along with researching and developing bee colony algorithms with Adrian, I rewrote the multithreading to work correctly while making it more modular and efficient in the process.

Plan for the next Milestone:

To Do	Alice	Adrian	Jaden	Michael
Solver Algorithms		Have Bee Colony Optimization done or close to done	Complete hyper-arc consistency algorithm	
GUI		With the GUI mostly finished issues may arise with visualizer implementation so ensure smooth integration		Fixed multithreading issues and while refactoring it to be more efficient and modular
Visualizer	Implement visualizer and description of algorithms for each implemented algorithm	Assist if the need arises with aspects of the visualizer	Implement visualization for hyper-arc consistency algorithm	
Poster		Develop a unique poster that effectively describes the purpose, features, research, and implementations		

1. Discussion (at least a few sentences, ie a paragraph) of each planned task for the next Milestone
    a. With most of the features now implemented the remainder of work is in implementing additional algorithms, their visualizers, and polishing the application
    b. With a survey of the application being considered, using that opportunity to get feedback from actual users will help determine tasks not previously implemented or just altering aspects of the existing features
    c. Hyper-arc consistency will be fully implemented with the bugs in the search pruning fixed. Implementation will be added to the visualizer to also allow for visualization of the search pruning happening within the algorithm.
    d. Bee-Colony Optimization will be going through the testing phase by the next milestone. We should have a working prototype that we can tinker to get perfect for milestone 6.
2. Date of meeting with Client during the current milestone:
    a. N/A
3. Client feedback on the current milestone
    a. see Faculty Advisor Feedback below
4. Date(s) of meeting(s) with Faculty Advisor during the current milestone:
    a. 2/12/2024
5. Faculty Advisor feedback on each task for the current Milestone
    a. Advisor liked the direction of the sudoku application with how it looked and how unique the visualizer feature was. Since the application takes more of an algorithm centered approach we agreed that at some point he would have students use the application in one of his classes so we could get helpful feedback.

------ on a separate page ---------

Evaluation by Faculty Advisor

Faculty Advisor: detach and return this page to Dr. Chan (HC 209) or email the scores to pkc@cs.fit.edu

Score (0-10) for each member: circle a score (or circle two adjacent scores for .25 or write down a real number between 0 and 10)

Alice Luce	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Jaden Krekow	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Micheal Richards	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Adrian Rodriguez	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10

Faculty Advisor Signature: _____ Date: _____