Product Requirements

Sudoku Game Web App

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Brief problem statement

People are always seeking entertainment through technology today. Often, they find themselves mindlessly scrolling through social media or watching their tenth consecutive YouTube video.

Their time would be better spent solving a puzzle, which will not only reduce their boredom, but boost brain activity and cognitive function. A Sudoku web application is the perfect solution to this problem. With varying levels off difficulty and settings to alter the availability of hints, errors, and note-making features, our development would allow users to increasingly challenge themselves.
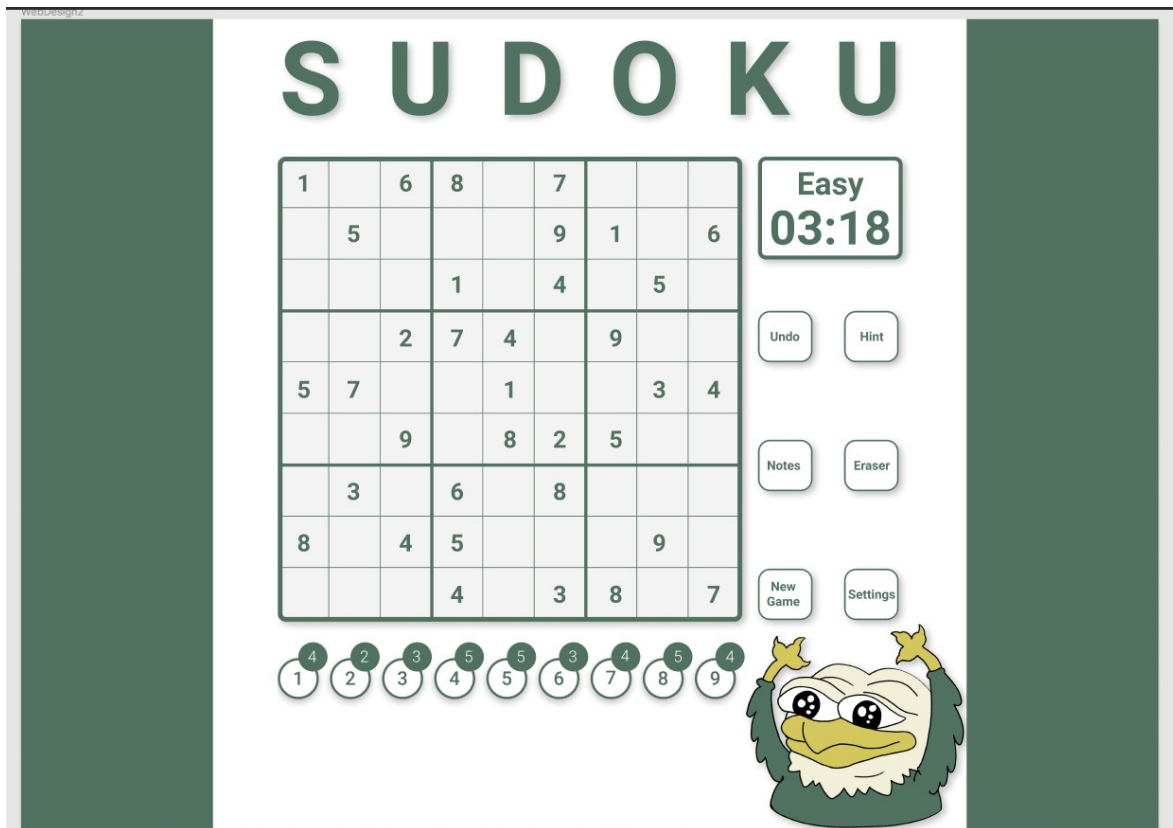
System requirements

A successful web application should meet the following requirements: (1) generate new boards as requested at a specified level of difficulty, (2) offer notes, hints, erase, and undo features with settings to alter them as desired, (3) save the current progressive of a game, and (4) track the top personal best times for each difficulty.

Programming Language	JavaScript
Operating System	Windows, Mac OS, Linux
Browser	Chrome, Microsoft Edge, Safari, etc.
Internet Connection	Required

Users' profile

This application offers a practical and fun way to spend time; therefore, the main users of this system will be those who want to spend their spare time in this manner. This means our user audience will be diverse in age, and their minimum knowledge will be basic skills in patterns and logic. To compensate for potentially young users, our application must be user-friendly and straightforward.

Additionally, as Sudoku is an existing game, we must prepare for a range in current skill level as well. We will provide varying levels of difficulty to ensure there is a game board challenging or simple enough for any user.

List of Features

Provide a numbered list of features (FR1, FR2, etc.) that concisely, clearly, and accurately describe that which constitutes your project.

Updates as of 08/01/21

Functional requirements (FR) (user stories)

List the Priority as 1 (High Priority - Critical) to 3 (Low Priority – Would be nice if we have time)

Sprint 3 / **Sprint 4** / **Sprint 5** / **Sprint 6**

No.	User Story Name	Description	Priority
FR1	View Board / Landing Page	The user will open the application and see an initialized game board set to the difficulty of easy. All number and functionality buttons will display.	1
FR2	New Game or Continue Game Modal	Removed this feature.	3
FR3	New Game	Removed this feature.	3
FR4	Continue Game	Removed this feature.	3
FR5	Hover Highlight	When user hovers mouse over a square, an	2

		outline will appear around the outer edge to highlight it.	
FR36	Highlight Coordinating Numbers New feature	When the user selects a number, every other instance of the number on the board will be outlined as well.	2
FR6	Select Individual Square	When user clicks on a square, the coordinating row, column, and 3x3 square will highlight. *For impossible difficulty, a 4x4 square will highlight.	2
FR7	New Game Button Edited Feature	Select "New Game" beside the current game board. A modal will display with the four difficulties.	1
FR7.1 /13	New Game Modal Edited Feature	Select "New Game" beside the existing board. A modal will pop up to right of board displaying different levels of difficulty. These include "Beginner," "Intermediate," "Advanced," and "Expert," with each level reducing the number of filled in squares at the start of them game.	2
FR8	New Game Modal Exit	Select the "X" button in the top left corner of the modal to exit the modal that popped up.	2
FR9	Beginner	Select "Beginner" button displayed in the New Game modal. A 9x9 board will be initialized with 36-46 squares already filled in.	2
FR10	Intermediate	Select "Intermediate" button displayed in the New Game modal. A 9x9 board will be initialized with 32-35 squares already filled in.	2
FR11	Advanced	Select "Advanced" button displayed in the New Game modal. A 9x9 board will be initialized with 28-31 squares already filled in.	2
FR12	Expert	Select "Expert" button displayed in the New Game modal. A 9x9 board will be initialized with 17-27 squares already filled in.	2
FR13	Impossible	Removed this feature.	3
FR14 /13	Input Number (Solve Mode)	Select number from buttons one through nine located beneath the board. Either drag the number to a box on the game board to fill it or click on the box and then click on the desired number button. In solve mode, a number the size of the box will display. To undo placement of number, user may select box and click on coordinating number button again. If the user selects a filled box and then clicks on a number button other than the one displayed, the currently displayed number will be overwritten. When the setting for error limits is implemented later, an error message will display if the number placement violates a rule of Sudoku. In consequence, time will be added to the user's	1/3

		clock. *Letters will be included for Impossible difficulty.	
FR15	Track Remaining Placeable Numbers	On each number button beneath the board, there is a counter displayed on the top right to track the remaining count of that number to be played. The counters on each button begin at nine and decrement to zero. *In Impossible mode, the counter will start at sixteen since the board is sixteen by sixteen.	1
FR16 /13	Input Number (Notes Mode) <mark>Edited Feature</mark>	Select "Notes" button. Select and drag a number button onto the desired square. A small version of the number will display in the box, serving as a note for the user. Notes do not affect the error count or solve the puzzle. User may add as many notes as they want. Select "Notes" a second time to exit notes mode.	2/3
FR17	Erase	User selects box they desire to clear. Box will highlight. Select "Erase" beside the existing board. The square will be cleared, including any notes (unless the number was given with initialization).	1
FR18	Undo	Select "Undo" beside the existing game board. User may retrieve up to the last fifteen present states of the board. All notes will be restored as well.	2
FR19	Request Hint <mark>Edited Feature</mark>	Select "Hint" located beside game board. This feature will randomly fill an unfilled square with the correct number. <mark>There is a standard hint limit of 3 for every difficulty.</mark>	2
FR20	View Settings* Modal	Select "Settings" button. This feature will display a modal with different features that can be turned on and off, including error limits, auto detect mistakes, auto update notes, and light/dark mode.	2
FR21	Settings Modal Exit	Select the "X" button in the top left corner of the modal to exit the modal that popped up.	2
FR22	Error Limits	This feature may be turned on/off in the Settings modal. When enabled, mistakes by user are limited to ten for "Beginner" difficulty, five for "Intermediate," three for "Advanced," and one for "Expert." This feature is disabled for "Impossible." An error constitutes as a violation of a rule of Sudoku, rather than an incorrect placement of a number.	2
FR23	Auto detect mistakes	This feature may be turned on/off in the Settings modal. When enabled, this feature will alert the user if they mark a square incorrectly. Disabled, users will only be alerted of a mistake if they violate a rule of Sudoku.	2

FR24	Auto update notes	This feature may be turned on/off in the Settings modal. When enabled, this feature will automatically remove notes that conflict with a number played by the user in the coordinating row, column, and square. Disabled, users must manually erase their notes.	2
FR25	Light Mode/Dark Mode	This feature may be turned on/off in the Settings modal. Light mode displays a white screen with black outlined features, while dark mode displayed a dark screen with white outlined features.	2
FR26	Track Time ==Edited Feature==	The system will record the time of the current game, but ==the data will not be saved afterwards.==	2
FR27 /26	View Completed Game Modal ==Edited Feature==	After a puzzle is successfully solved, a modal will pop-up displaying the completed difficulty level and time.	3
FR28	Completed Game Modal Exit	Select the "X" button in the top left corner of the modal to exit the modal that popped up.	3
FR29	View Save Game Modal	==Removed this feature.==	3
FR30	Save Game Modal Exit	==Removed this feature.==	3
FR31	View Create Account Modal	==Removed this feature.==	3
FR32	View Sign-In Modal	==Removed this feature.==	3
FR33	Sign In Modal Exit	==Removed this feature.==	3
FR34	View Personal Statistics Modal	==Removed this feature.==	3
FR35	Personal Statistics Modal Exit	==Removed this feature.==	2

Non-Functional Requirements (NFR)

Describe any constraints or cross-cutting characteristics of the system in a manner that is clear, specific, and testable. Each NFR should have a unique identifier (e.g. NF1, NF2 NF3). Only present those which are applicable to your system. Categories include but are not limited to:

- Functional Suitability or (Accuracy) (A)

- Performance Efficiency (P)

- Compatibility (C)

- Usability (U)

- Reliability (R)

- Security (S)

- Maintainability (M)

- Portability (Pb)

See the characteristics for each NFRs above: https://iso25000.com/index.php/en/iso-25000-standards/iso-25010

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No.	User Story Name	Description	Priority
NF1 (A)	Functional Suitability or Accuracy	Do our functions meet all the specified tasks and user objectives? Do the functions consistently produce correct results and meet our needed degree of precision? Do our functions appropriately and effectively accomplish our goals?	1
NF2 (P)	Performance Efficiency	Does our development execute in a timely manner? Does our development efficiently use resources? Do the maximum requirements of our product meet our requirements? How does our development handle higher workloads?	2
NF3 (C)	Compatibility	Can our development perform required functions while sharing a common environment with other resources and products? Does our system exchange information with other products and systems efficiently?	1
NF4 (U)	Usability	Is our development user-friendly? Does our development solve the problem statement? Does our software include appropriate preventative measures to combat user error? Is our web application aesthetically pleasing?	1

		Does our development successfully accommodate our range of audience?	
NF5 (R)	Reliability	Does our web application consistently function under normal conditions? Is our development accessible? Does our web application operate as intended despite hardware or software failures? Does our software recover data and reestablish desired state in the event of an interruption or failure?	2
NF6 (S)	Security	Does our development ensure data is only accessibly for those authorized to have access? Does our system prevent unauthorized access or modification of computer programs or data? Does our development have means of proving an event took place so the actions cannot be repudiated later? Can the identity of a subject or resource be proved to be the one claimed?	2
NF7 (M)	Maintainability	Is our development composed of discrete components such that the modification of one has minimal impact on others? Are our systems assets usable for building other assets? Is the impact on a product of an intended change accessible? Is our system easily modifiable? Are our system and its components testable?	1
NF8 (Pb)	Portability	Does our system affectively adapt to evolving hardware, software, and environments?	2
NF9	Customizability	How can users customize their Sudoku game board?	3