

Atari Sudoku

V1.3 03/15/2013

Welcome to the Atari version of Sudoku. It is written in 6502 assembler and runs on the most basic of Atari systems. My goal when writing this was to keep it under 8K. It might not make sense to people who weren't there when these computers were first rolling out but at the time, quite a bit could be accomplished in a little amount of memory. It was something to be proud of. Time has marched on and so has technology. I was looking at an email the other day that took up more memory than my 800 had in total. A single email and it wouldn't fit inside my first computer.

Like I said my intention was to write a program in machine language on the Atari that would build a valid sudoku puzzle. They are pretty simple in design, 9 rows and 9 columns all split into 9 groups of 9 numbers. You cannot duplicate a number on a row, column, or in a group. When I started this I didn't even realize that you could start placing the numbers in a blank puzzle and then get into a deadlock situation where you couldn't generate a valid puzzle, but that is truly the case. My program starts with a blank grid and then starts placing the 1's in random spots around the grid, adhering to the rules. Once all of the 1's are placed, then onto the 2's. It's pretty straight forward but starts to slow down usually around the 7's, and 8's. That's when the number of available spaces starts to dwindle and the rules dictate how it will play out.

Once I got the Atari to generate a valid puzzle, I turned my attention to speeding up the process. Since we are working with a pretty slow clock speed (compared to the systems we have now) and there can be quite a few cycles trying to find a working combination it can take quite some time to generate a valid puzzle. Sometimes the stars fall into place and one is generated almost immediately, but that's not the norm. So I turned to figuring out how I was going to make this work without having people fall asleep in hopes of getting to play. I came up with a way to basically take a valid puzzle and shuffle it, just like a deck of cards. As long as you shuffle according to the rules, you maintain a valid puzzle. To keep with the "created on an Atari" theme, I loaded up about 10 valid puzzles created on my actual 800, and then randomly pick one of them, and then shuffle it till it can't be recognized. So now there are two options when starting up the game. Play with a shuffled puzzle which comes up instantly, or let the Atari go through the motions and come up with a valid puzzle the hard way.

Since I had the puzzle creation sorted out, I then turned to adding in different levels of play. You have the following options before starting gameplay:

BEGINNER
EASY
MEDIUM
HARD
HARDER
EXTREME

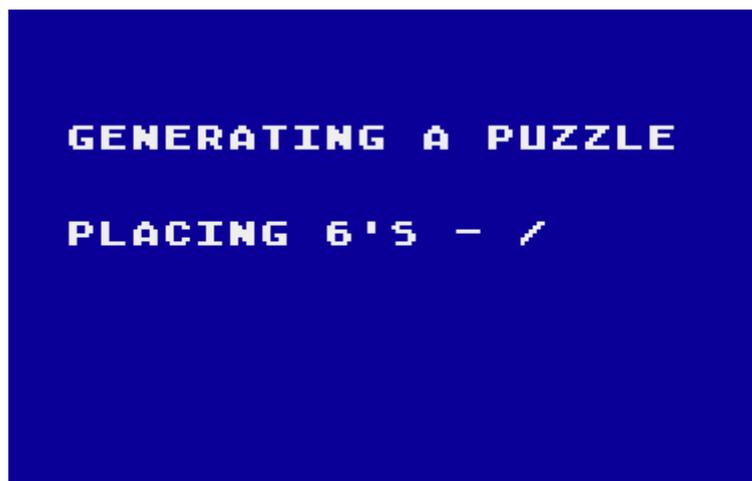


Use the SELECT button to choose a level of play. See below for a detailed description of the different levels of play.

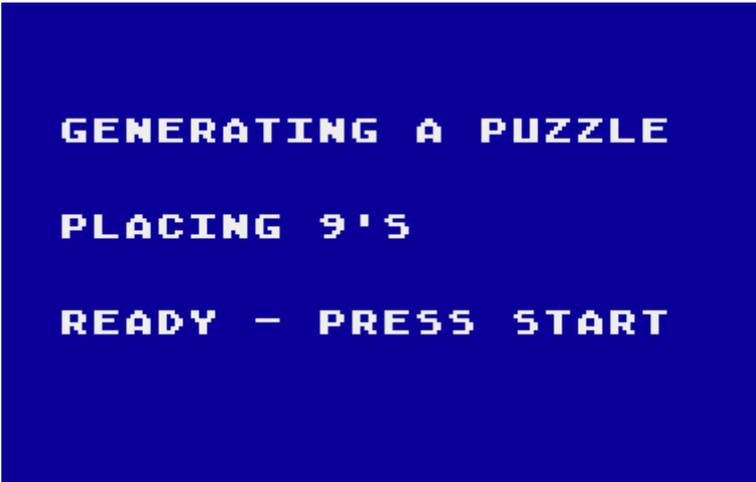
You can use the OPTION button to then move down and decide whether or not you want an Atari Generated Puzzle.



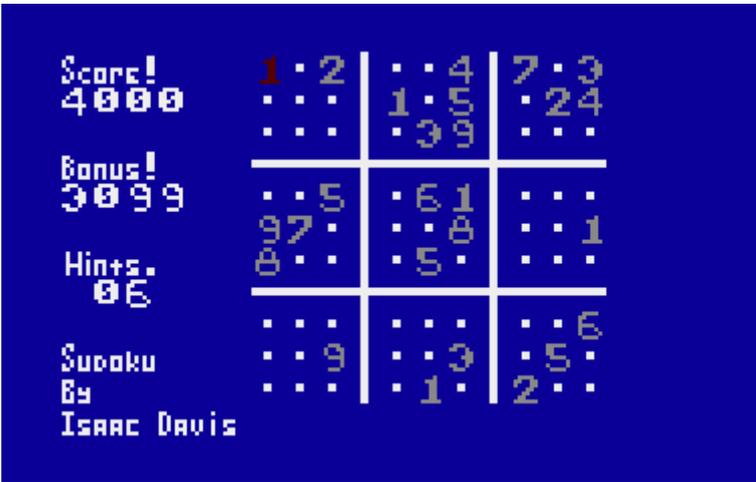
Once you have made your selections, press the START button. From here the computer will either shuffle up a puzzle for you, or start trying to create a puzzle for you from scratch. Keep in mind that this option could take some time. It all depends on luck and how the numbers fall in the grid. This is how the screen will look when the Atari is working on your puzzle. There are times when it will put down numbers all the way to the 8's and there just aren't any working combinations. It will automatically start over after a certain number of tries. Keep in mind that it could take a couple of tries to actually get something valid. Patience might be needed, but when you get your puzzle you can smile knowing that it was generated on your 8 bit computer just for you.



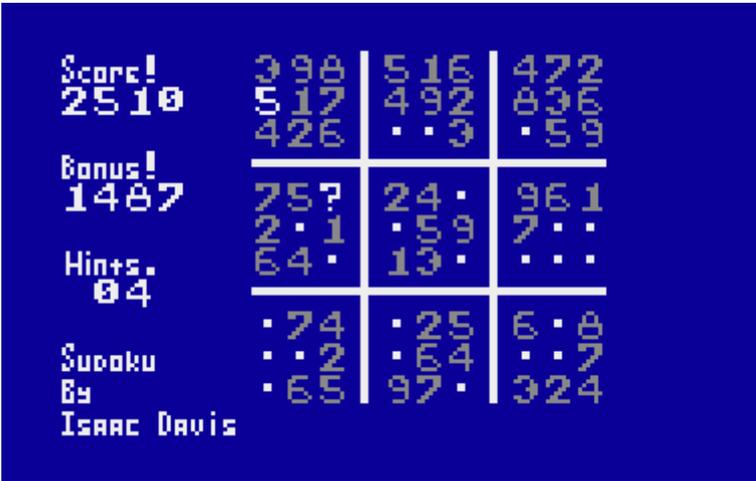
Once the puzzle is generated you will get a screen like this, and a beep to alert you that it's ready. From here, press the START button or the button on your joystick to begin playing.



Once you begin playing the screen will look like this



The blank squares are denoted by the “.” in them. These are chosen at random as the puzzle is generated. Your cursor is red in color if on a square with a number, or a ? when on a blank square. The squares that are locked are set in gray color, and the squares that you are able to change will have a white color in order to help you remember which ones you have changed. For instance the top left 5 has been filled in by the player.



Gameplay:

Once you have pressed the START button and a puzzle is presented you will have to go fill in the empty squares. Use your joystick to move around the grid. When you are on a square that you can change, you can hold down the joystick button and move the stick up or down to raise or lower the number.

You can now move around the grid using the arrow keys on the Atari. You can also use the numbers keys to enter in a number directly.

HINTS

To use a hint during gameplay you press the START button. Note that you have a limited number of hints so use them wisely. If you have filled in every square and the game hasn't finished then you have a square wrong. I do realize that there can be multiple solutions and it makes it harder the higher you go up in difficulty, but just like the newspaper there is one solution you are striving for. They don't print all the possible permutations and I am not going through them all either. So use up a hint if you have them all filled in and the game hasn't declared you a winner. A couple of things will happen when you use a HINT. Every time you use a HINT, you get 200 points taken away from your score. The next thing that will happen is that every square you have guessed incorrectly will go blank again. To compound the pain of using a hint, you will also lose 20 points for every square that was guessed incorrectly. So use the hints wisely.

To achieve the highest score you will have to select the highest level, use the least amount of hints, and complete with as much bonus left as possible. You are rewarded with higher beginning score, a higher bonus and a possibly higher score for filling out more of the 10 point squares.

GAME LEVELS

These options control a couple of factors. First and foremost, how many of the game squares are blank that you must figure out. Second, the starting base score goes up as the difficulty as does the bonus score. Third, the higher you go up in difficulty the more Hints you receive.

BEGINNER Level

Starting Score – 2000
Starting Bonus – 1000
Number of Hints – 4
Blank squares - 15

EASY Level

Starting Score – 2500
Starting Bonus – 1500
Number of Hints – 4
Blank squares - 25

MEDIUM Level

Starting Score – 3000
Starting Bonus – 2000
Number of Hints – 4
Blank squares - 35

HARD Level

Starting Score – 3500

Starting Bonus – 2500
Number of Hints – 4
Blank squares - 45

HARDER Level
Starting Score – 4000
Starting Bonus – 3000
Number of Hints – 6
Blank squares - 55

EXTREME Level
Starting Score – 5000
Starting Bonus – 4000
Number of Hints – 8
Blank squares - 65

Every time you fill in a square you get 10 points added to your score. If you go back and blank it out the 10 points go away. This allows people choosing a higher starting level to attain a higher score.

When you finish a puzzle the program will automatically recognize that you are successful. The screen will blink, a noise will play and your bonus (if any is left) will then be added to your final score.



Score!	491	528	736
2140	376	194	258
	285	376	914
Bonus!	864	952	173
1005	957	813	642
	123	647	895
Hints.	618	735	429
04	732	469	581
Sudoku	549	281	367
By			
ISAAC DAVIS			

After the bonus has been added this will be the final screen.



Score!	491	528	736
3151	376	194	258
	285	376	914
Bonus!	864	952	173
0000	957	813	642
	123	647	895
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From here you can press START to be taken back to the options screen to begin again.

There have been two new additions to the program. When you are playing the game, you can press the following keys:

Q – This will quit the current puzzle and take you back to the main option screen. At the moment there is no warning. You will be sent back to the main screen without a confirmation.

F – This will toggle the current font. Right now there are two fonts loaded into the program.

Here is the writeup on the creation of the game that I am posting along with the disk image. For more of this look for the thread in the Atari 8-Bit Computers section in the forum on AtariAge,

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I am releasing the latest version of my sudoku game. I want everyone to keep in mind that I had certain criteria when I started this little project. Inspired by the likes of Doug Neubauer and Star Raiders I wanted to keep this within an 8K limit. My initial goal was for the Atari to generate a valid sudoku puzzle on its own and do it in under 8k. Please also do not think that I am in any way comparing myself to Doug, or my game to Star Raiders. We/they are a hyperspace across the galactic map in comparison. My sheer amazement of what was accomplished in 8K was the sole factor in my goal. So far that has been a success. My original Atari 800 was able to generate a valid sudoku puzzle in under 8k worth of code. I also set a goal of using assembler. I remember my parents drove me over to Houston, TX in order to purchase Synassembler. We bought it and it sat on my shelf for years. I am using it to produce this game as I own a copy and feel that I owe it to my parents to put the money they spent so long ago to good use. I would also like to thank Darren Schebek for releasing his Envision font editor. Again my program is not even near the same class as Envision, but I was able to use it to make some font changes.

Once I got a valid puzzle generated, I then started adding in some basic gameplay so that you could take advantage of the puzzle and give it a go at trying to solve it. That too is complete (workable lets just say) although it does lack a lot of polish. I know when I posted the earlier version there was some discussion about upgrades. I am willing to entertain them but am very limited on what I can actually put in as this is a spare time only project and I have much less right now than I would like. But that is the situation. I can say right off the bat that any requests to turn this into a full graphic experience using all 48K is going to be turned down.

I pop into AtariAge quite frequently. I did notice that Fernando Marrin was putting together a cart with a huge list of all games made and saw my game included on the list. I was quite tickled to say the least. To even be mentioned in the company of so many games that shaped my youth and my career was quite flattering. So I looked up the last disk that I was working on and pulled out the latest copy of the game. I have had discussions with Albert about turning my game into a cartridge, and I also had a chat with Steve Tucker about it. Both gave me some great ideas, but that was years ago and I haven't been able to really turn this into something that I think people would want on a cartridge. I guess I will leave that up to the individual.

Noting that I was initially writing this on a real 800, and have done 99% of the work on a real 800, I tried to write the gameplay as I was using real hardware. That concept doesn't translate as well with the emulators. It's nothing against the emulators, but more from a hardware point of view. For instance when you are sitting with a real 800 in front of you and an option screen comes up, it's

second nature in my opinion to reach up for the Option/Select/Start buttons to make your selections and get the game going. Not as obvious on an emulator since the buttons are usually mapped to F2, F3, and F4. The real hardware made them so much more prominent. You throw in the fact that some people who are using the emulator have only seen pictures of the real hardware that is something that is hard to make intuitive. I also wanted to build in my experience with joysticks and how I felt that most games you picked up the joystick and immersed yourself in the game. The keyboard became a secondary experience if it was needed at all. For instance Ali Baba and the Forty Thieves, I played that forever it seemed and never had to even touch the keyboard. I do realize it was multiplayer and such but it just seems to me that at that time, reaching for the keyboard was something you only had to do on the more complicated games like Flight Simulator. These are just my observations and I am sure everyone will have their own opinion on this. With all of that in mind I tried to keep gameplay joystick oriented. I did have to use the Start button as my trigger for the Hint, but gameplay can be completed with just the joystick.

Upgrades I think are do-able:

- 1) On the selection screen, use the joystick to scroll through the selections. The joystick button already works to start the game.
- 2) Letting you input numbers on the puzzle with keyboard entries. - Done.
- 3) A way to abort. Maybe zeroing out the score, displaying the completed puzzle, then taking you back to the options page.
- 4) Kaz atarionline.pl came up with an awesome looking splash screen. Not sure how big it would be and would still like to keep this in the 8K barrier. But I do understand that its my own little hangup here and not really relevant these days. Something I just need to give some more time mulling over. I am keeping it as a possibility that's why I am listing it here.
- 5) I would like to re-work some of the timing internals. Like the joystick pause. I have a loop there to burn some time but I am thinking it isn't consistent. It should be more driven off the clock and not just using loops in code. For now it works but isn't very elegant. If you remove this it becomes totally unplayable as you hit the joystick and the cursor goes into overdrive and is impossible to control.

Upgrades I do not have time for:

- 1) Better graphics. I know that the screen I used limits the fonts but I don't have the time at the moment to go in and redo all of that part of the game. I would also like to still keep this to an 8K endeavour.
- 2) Changes to the way the game is played. For instance I think at some point someone wanted to be able to put in a puzzle and have the computer solve it. Not going to happen here, that's a completely different gameplay and logic.

Notes:

This program was started in 2006 and has been slowly progressing since. I would like to thank a couple of people that have written tools or just provided inspiration along the way:

Doug Neubauer – Author of Star Raiders. I am still blown away at what you achieved in 8K. Truly amazing in 1981 and still amazing in 2013.

Steve Hales – Author of Synassembler. Drove 150 miles to pick up a copy of this back in the 80's and my parents spent a lot of money so I would have a good assembler. Glad I finally got to put it to good use.

Darren Schebek – Author of Envision. When this was released to the public I grabbed a copy and used it to modify the fonts for the game. It works beautifully and was a breeze to use.

Albert – www.AtariAge.com. What can I say about AtariAge? Albert has provided us a place to converge and I am in awe of some of the people that have stopped in along the way. It's just a great place to go for Atari related information.

Steve Tucker – APE/ProSystem. With Steve's interface and software my Atari will live on well into the future. It made it possible to start writing this game on a real 800, and then very simply pop over to the PC and test it on an emulator. If you went back in time and told me this would be possible when I got my first 810 drive I would have told you to get the <bleep> out of here.

My parents – If it weren't for their generosity I wouldn't be typing this up today. My Dad was a geek before they even existed and helped to guide me toward my career. We spent a lot of time together working on the old Atari. Doing crazy things at the time. Like putting in a hangup circuit on our MPP-1000E modem so it would hang up the phone after a caller was logged off my BBS, which Mom and Dad allowed me to run in the overnight hours provided I got up in time (6AM) to turn it off for the day. Driving for hours to pick up some piece of software, or Mom using her crazy typing skills to help us key in a game from a magazine just a little bit faster. It was an amazing time to grow up, I had amazing parents, and I wouldn't trade it for anything.

My wife – For putting up with me scribbling notes all over the place that she doesn't understand, and also allowing me to lay in bed and handwrite code till the wee hours of the morning.

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