










## 2048 Program Exploratory Testing

Test Tour	Seedy District Tour
Object to be tested / Rough Guidance	Testing the security of the Application <ul style="list-style-type: none"> <li>- Saboteur Tour: try to 'hack' the game</li> <li>- Antisocial Tour: test out invalid inputs</li> <li>- Obsessive Compulsive Tour: repetition of inputs, button presses, etc.</li> </ul>
JIRA Issue (Link or Text)	N/A
Test Duration (Execution)	45 Minutes
Tester	Patrick Doody
Further Testing Opportunities?	

## Protocol

Nr	What done?	Status	Comment
1	Antisocial Tour : Invalid Inputs: Game should only respond to arrow buttons, WASD & VIM inputs (h,j,k,l). <ul style="list-style-type: none"> <li>- Page Up/Down works on browser window, otherwise no effect</li> <li>- The R button resets the game; no instructions that this would occur</li> <li>- When NUM LOCK disabled, arrow buttons (8,4,6,2) work as expected</li> <li>- No mouse inputs within the grid</li> <li>- Using a video game controller connected to the computer where testing showed inputs not accepted</li> </ul>	  	There is nothing incorrect here. The game accepts a limited range of inputs.  Two areas for modification are 1) more clear instructions, especially on the rest; and 2) accepting controller inputs

2	<p>Obsessive Compulsive Tour: Inputting the same inputs repeatedly</p> <ul style="list-style-type: none"> <li>- Inputting cardinal directions repeatedly for 15 seconds had no adverse effect; game played as expected (though without rationale on moves, as expected)</li> <li>- Clicking the New Game button with the mouse for 15 seconds had no adverse effect; a new game was created with the score reset to 0 and two random tiles appearing on the grid <ul style="list-style-type: none"> <li>- Pressing a directional key to move the game in between mouse clicks had no adverse effect; game worked as expected and Score was updated as appropriate</li> </ul> </li> <li>- Clicking the reset button (R on keyboard) repeatedly had no adverse effect; a new game was created with the score reset to 0 and two random tiles appearing on the grid <ul style="list-style-type: none"> <li>- Pressing a directional key to move the game in between resets had no adverse effect; game worked as expected and Score was updated as appropriate</li> </ul> </li> <li>- Using different input schemes (i.e., WASD plus directional arrows; VIM Inputs plus directional arrows; WASD plus VIM Inputs) had no adverse effect; game exhibited no errors when inputs switched</li> <li>- When inputting different directional inputs repeatedly, tester randomly merged tiles, which increases the score; the score animation is interrupted if a new addition to the score is achieved</li> </ul>	  	<p>Nothing negative to note here. Game works as expected despite attempts to overwhelm inputs. The score animation being interrupted is a good implementation.</p>
3	<p>Saboteur Tour: Within Chrome Developer Tools, the tester put breakpoints in various functions and used the console to update values of variables</p> <ul style="list-style-type: none"> <li>- Updating the Best score while in the console for one window would update the Best score in all other tabs</li> <li>- Updating the value of a tile to an Odd number (which isn't valid) does not cause an error; the tile is the value set and cannot be merged with any other tile</li> <li>- Used free online vulnerability scanner to test the public version of the program (<a href="https://play2048.co/">https://play2048.co/</a>). Public site received a low risk rating due to missing headers. These may be</li> </ul>	  	<p>Adding breakpoints to the javascript and updating variables allows someone to make changes to the game. There is no verification of the values added. Perhaps a more experienced malicious actor could make something of this, but I don't see</p>

	<p>added at the server level, so may not apply to the game itself.</p> <ul style="list-style-type: none"><li>- Ran a local scanner, Contrast, which works with Visual Studio. Results were two Vulnerabilities from the index.html, but none discovered within the javascript.</li></ul>		<p>anything that is a cause for concern. The security for the game is acceptable.</p>
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