2048 Contest Challenge!

Beauty, Brains & Innovation

by Arden Thomas
Cincom Smalltalk Product Manager

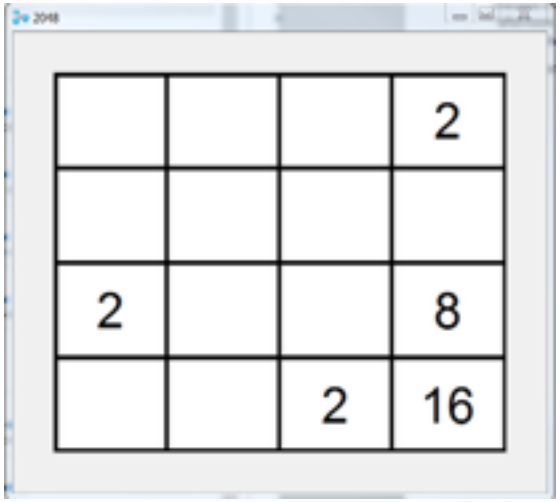
Cincom

Contents

- 2048
- Advocacy
- Contest rules and entry grading
- Categories of Solution Approaches
- 5 finalists

2048

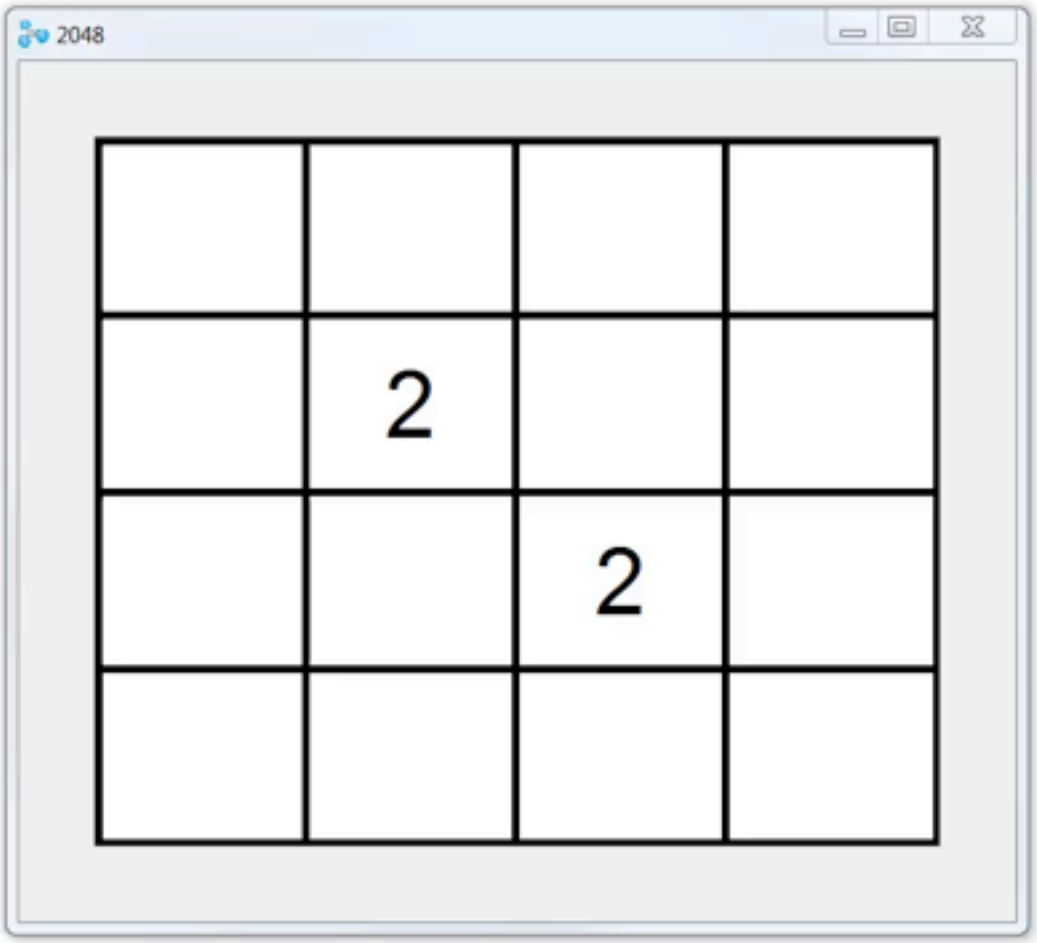
- Popular and recent single player puzzle game
- How to play;
  - 4 x 4 grid
  - Slide the tiles right, left, up or down
  - When the same numbers touch, they combine
  - After each move a 2 or 4 is added in a random empty tile
  - Goal of producing a tile with 2048
    - Or maximum score



Attractive for non-Smalltalkers

Goal of introducing developers to Smalltalk

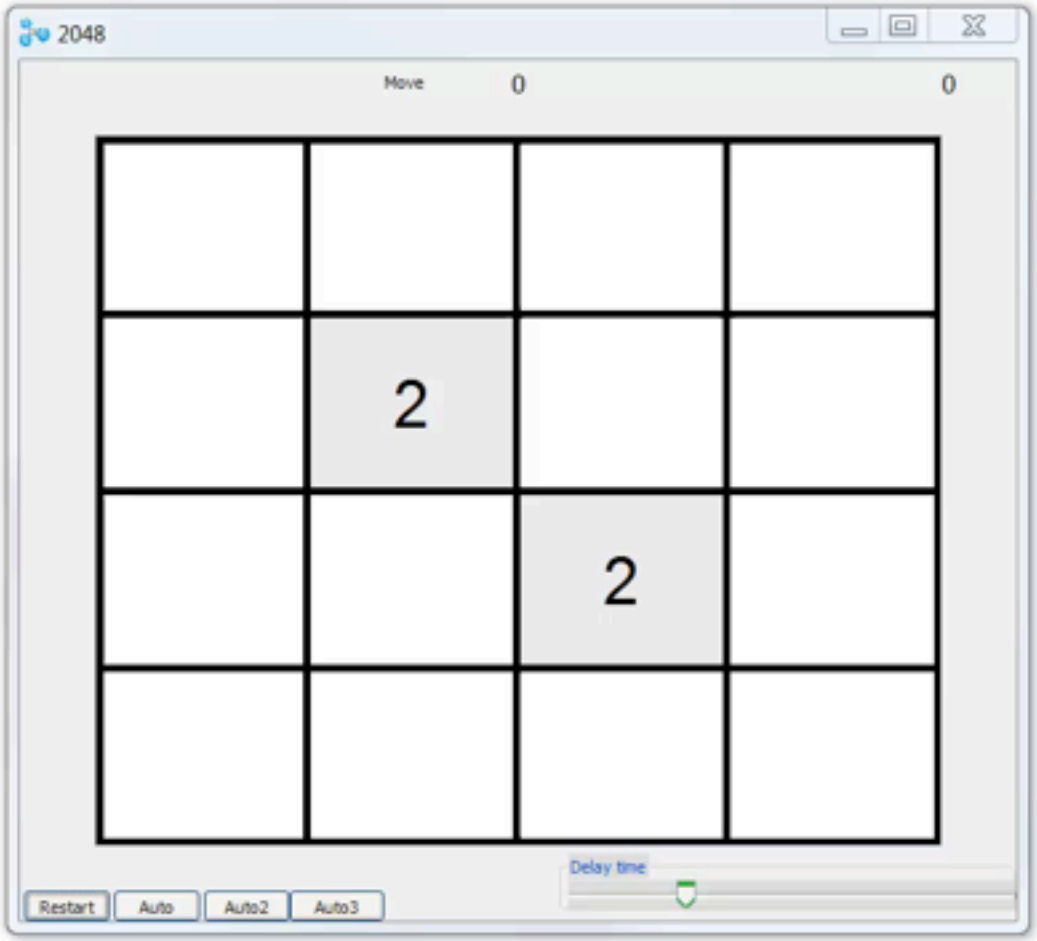
- Examples provided
- Fun way to expose developers to Smalltalk


2048
2
2

Attractive for Smalltalkers!

A fun challenge for experienced Smalltalk developers

- Developers get to
  - Show their skills
  - Share their knowledge
  - Show what Smalltalk can do
- Excellent demo's to non-Smalltalkers


2048
Move
0
0
2
2
Delay time
Restart
Auto
Auto2
Auto3

Rules and Entry grading

Scores are based on:

- Animation
- Simple, clear code
- Heuristic rules
- Innovative features
- Best score (avg of 10 runs)

Interface

- Regions and Labels
- Input fields, dividers
- Action buttons
- Custom view

Heuristics

- Deep look ahead
- Board valuation

Heuristics

- Deep look ahead
  - Choose move that has the highest score (at depth n) following random moves

Heuristics

- Board valuation 1
  - larger corner values
  - empty cells
  - like adjacent numbers
- Board valuation 2
  - Two move look ahead
  - minimized differences in adjacent cells
  - merging high values
- Board valuation 3
  - Two move look ahead
  - board score
  - increasing left to right, top to bottom values
  - That a move is possible

Average score of ten runs …

Name	Entry1			Entry 3 level 1			Entry 2			Arden	
Runs	26304	2048		27204	2048		7276	512		8584	512
	19192	1024		35292	2048		6584	512		8520	512
	6468	512		12016	1024		2284	256		12600	1024
	6700	512		34596	2048		11160	1024		10184	512
	16168	1024		35500	2048		10000	1024		14140	1024
	15312	1024		35772	2048		2976	256		16844	1024
	15940	1024		27072	2048		768	64		10140	512
	15528	1024		5296	512		5972	512		4364	256
	12536	1024		6856	512		2824	256		8448	512
	37968	2048		36368	2048		6584	512		14636	1024
Average	172116	1126.4		25597.2	1638.4		5642.8	492.8		10846	691.2
				Level 3							
				32100	2048						

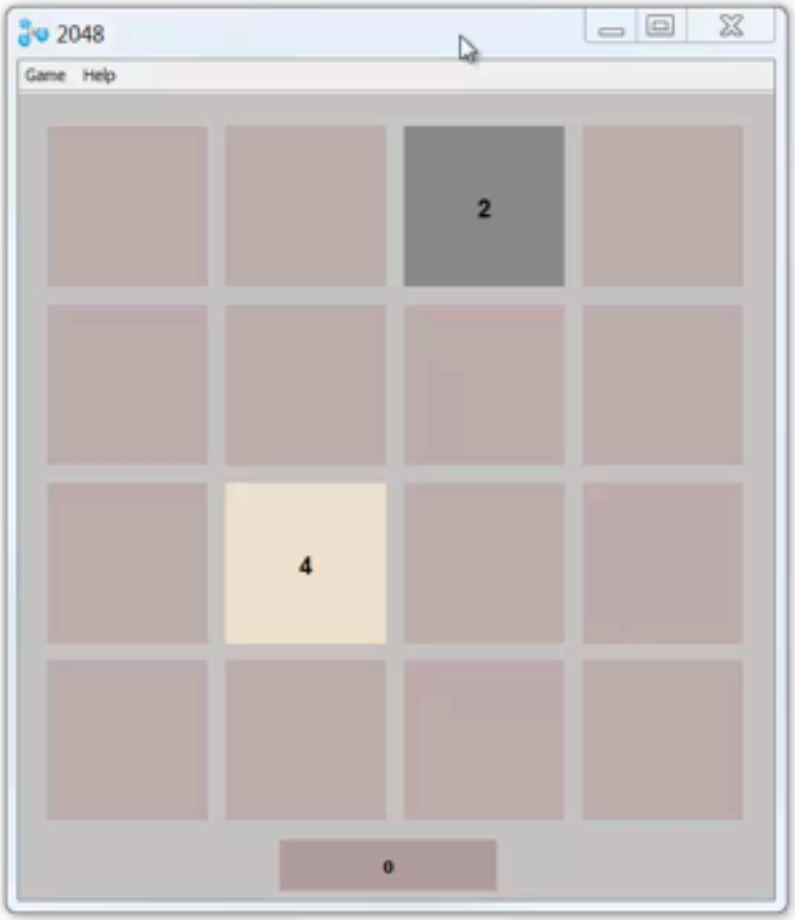
Cincom.

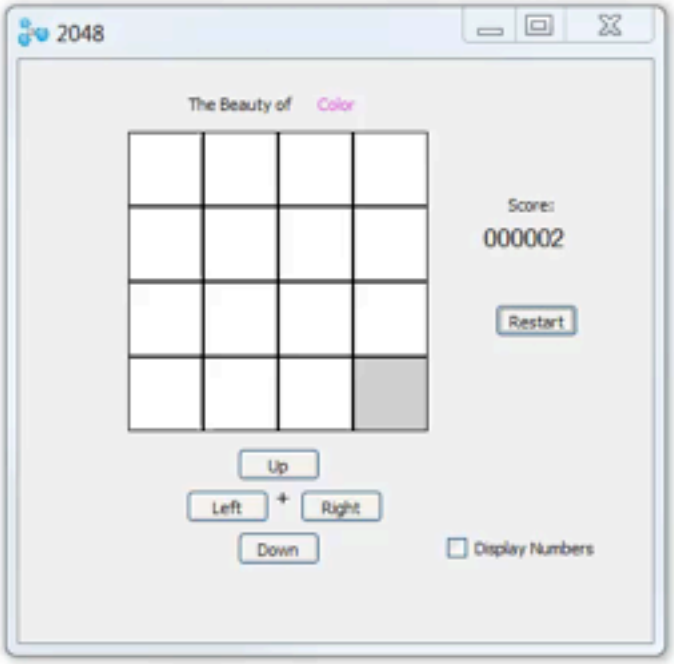
The finalists ….

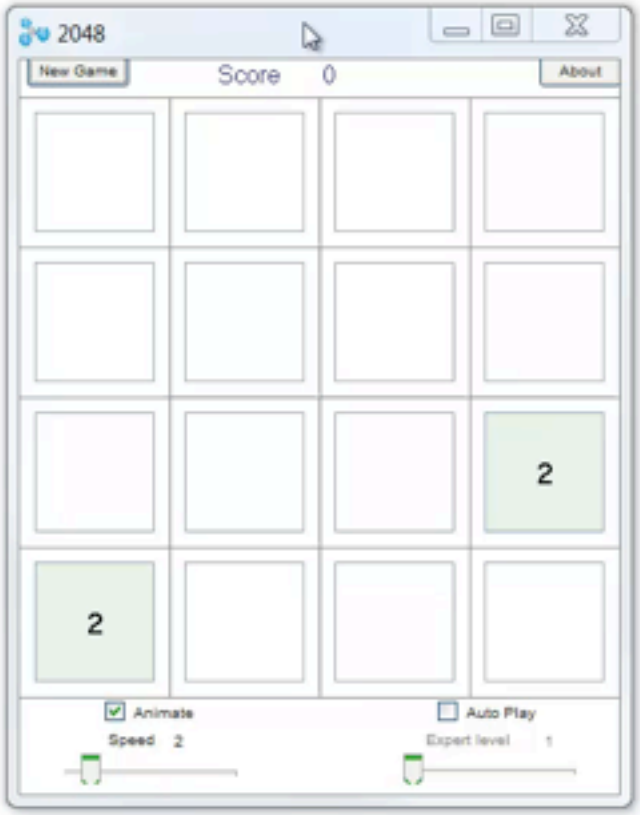
Cincom.

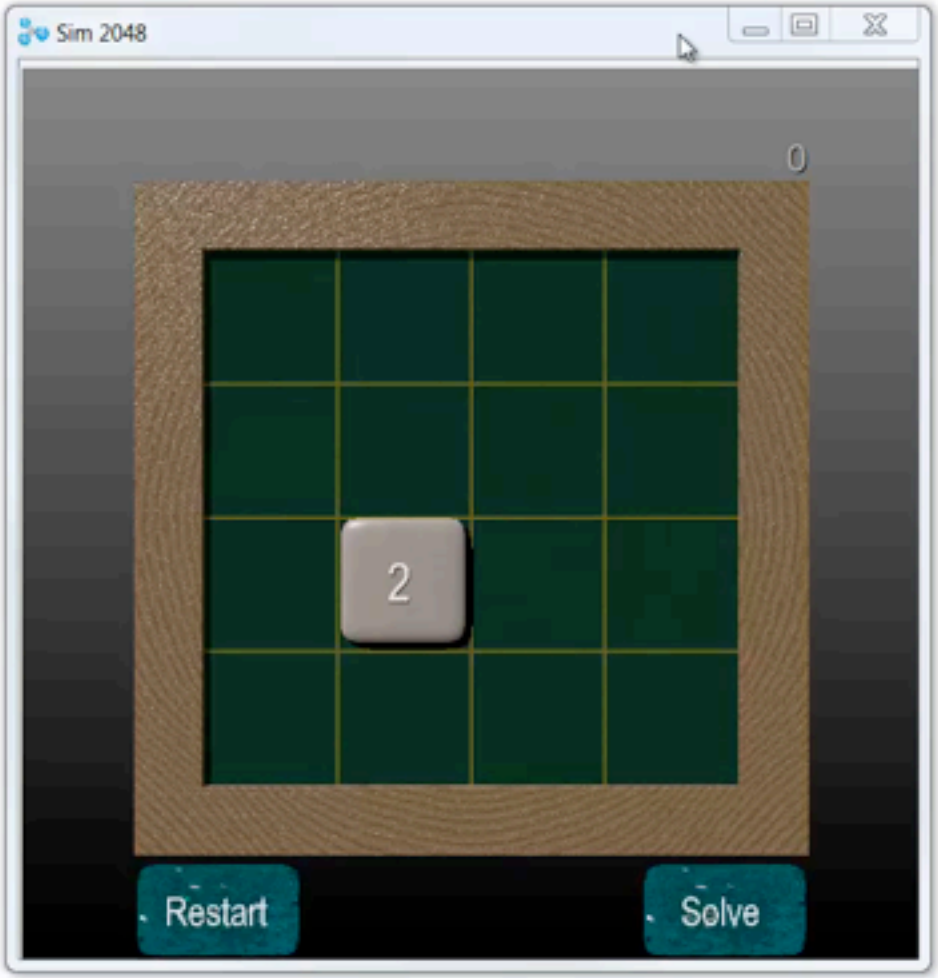
The finalists ….

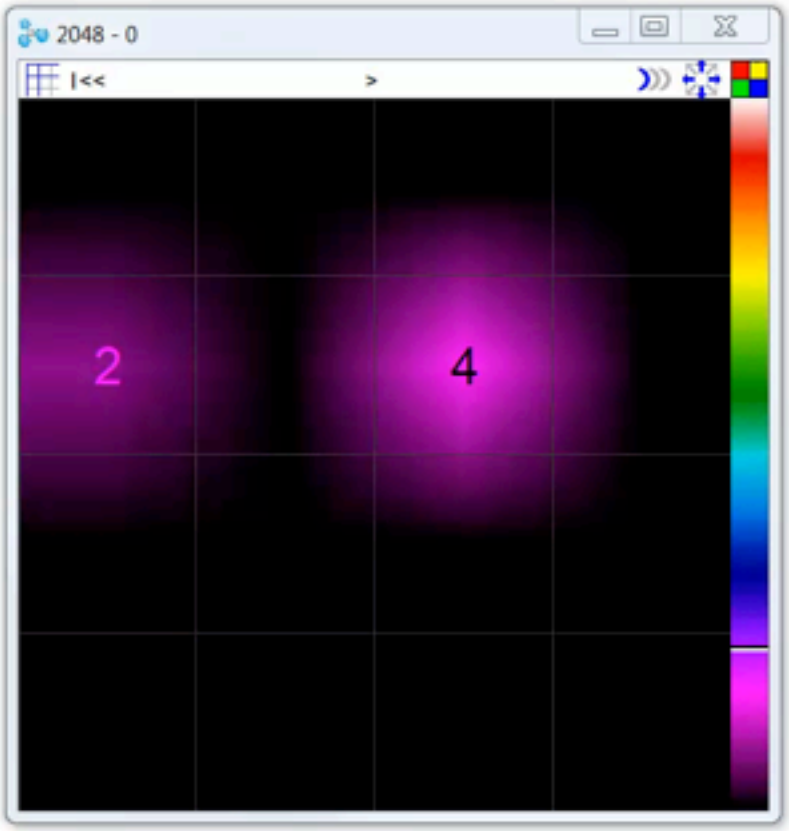
Cincom.


2048
Game Help
2
4
0


2048
The Beauty of Color
Scores:
000002
Restart
Up
Left
Right
Down
Display Numbers


2048
New Game
Score 0
About
2
2
Animate
Auto Play
Speed 2
Expert level 1


Sim 2048
0
2
Restart
Solve


2048 - 0
I<<
>
2
4

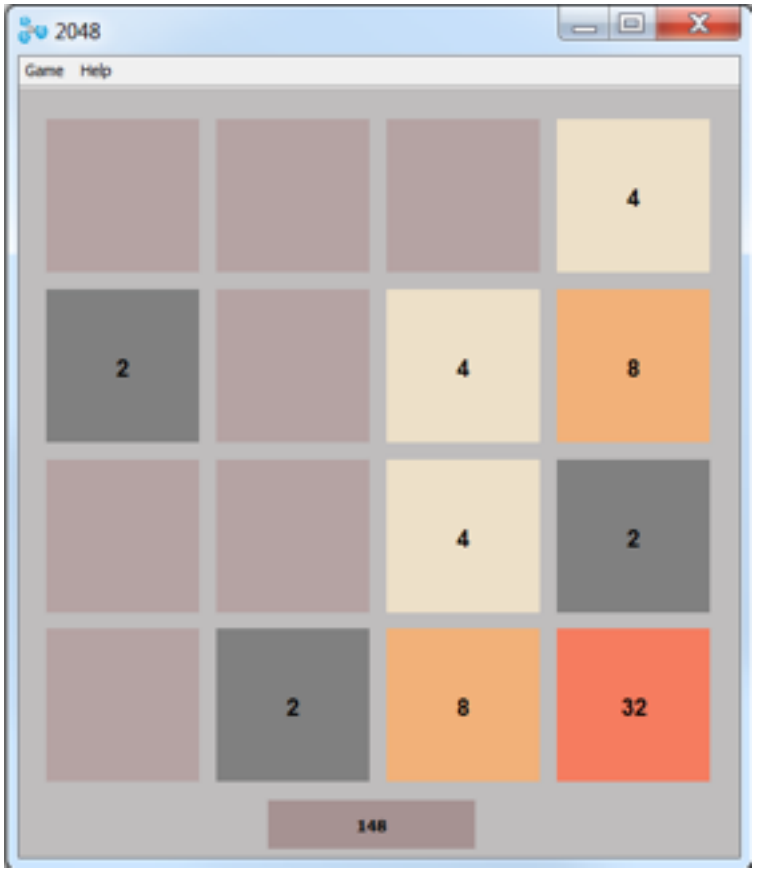
Honorable Mention

Cincom.

Honorable Mention

Alexander Varghese Raj (Entry 5)

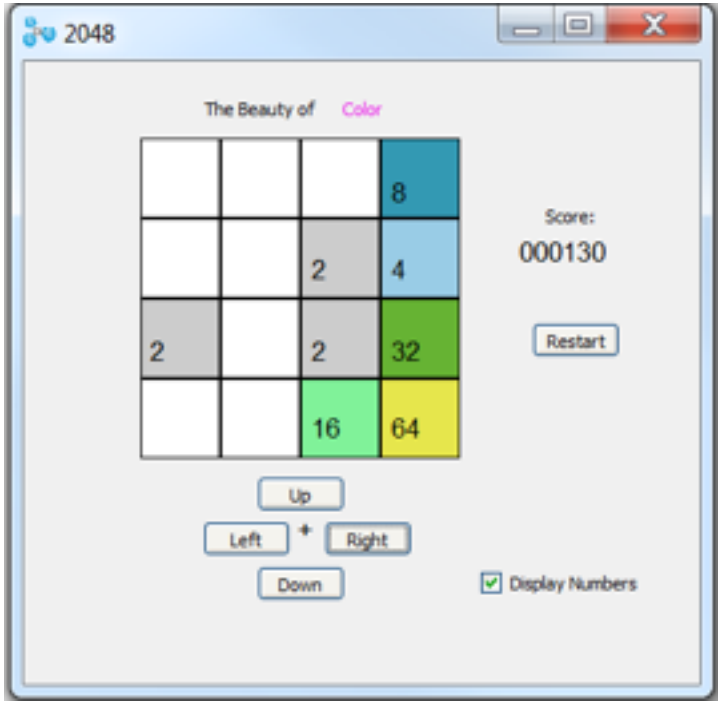
- Unlimited undo
- Nice layout and colors



Honorable Mention

Arkadiusz Baranowski
(Entry 4)

- New to Smalltalk!
- Moves reduced to two operations
  - Shift left
  - Rotate board
- Color scheme (with/without numbers)



Winners!!!

Cincom.

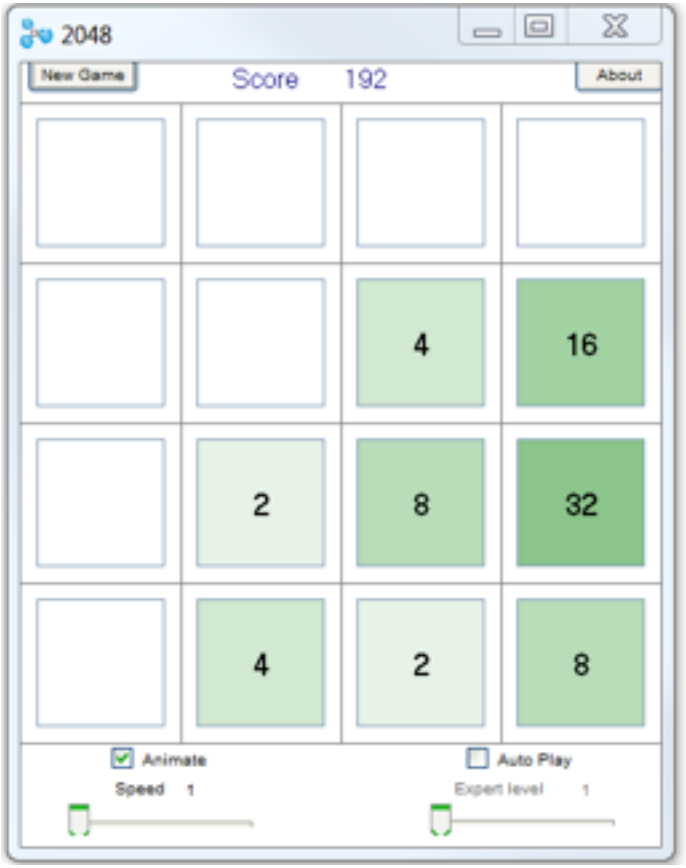
Winners!!!

Cincom.

Second and Third place tie:

Norbert Fortelny
(Entry 3) Hi score “Beast”

- **Best** scores with adaptive depth tree searches
- Good tile animation
- Clean simple interface

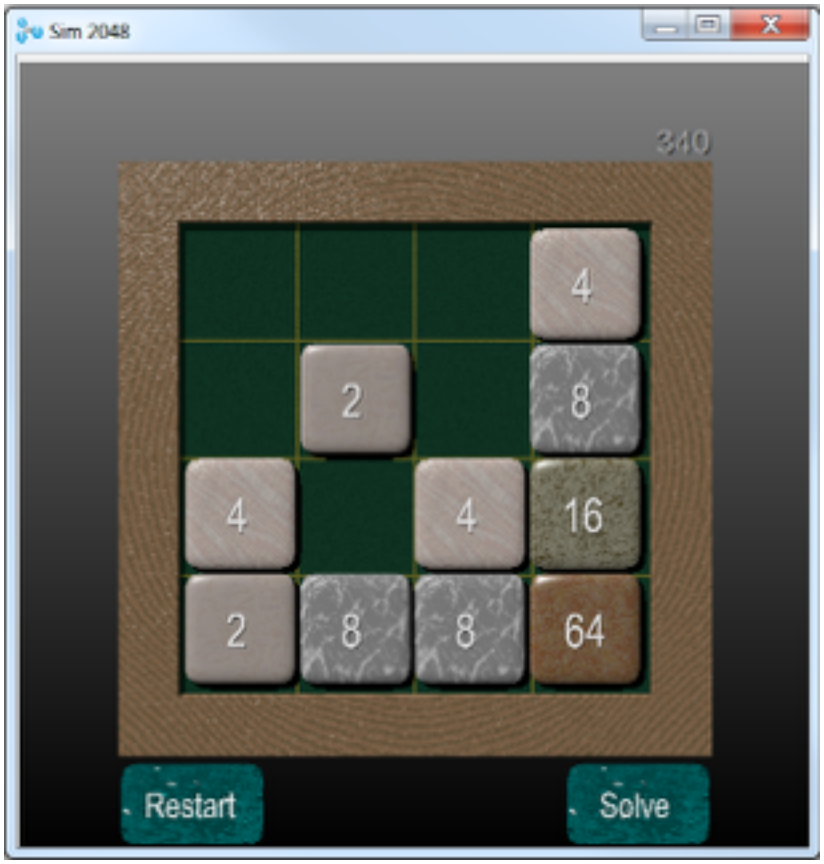


Cincom

Second and Third place tie:

David Buck
(Entry 2) “Beauty”

- Raytracing used to render tiles
- Concurrent tile animation, multiple speeds
- “fireworks” animation on tile combination



Cincom.

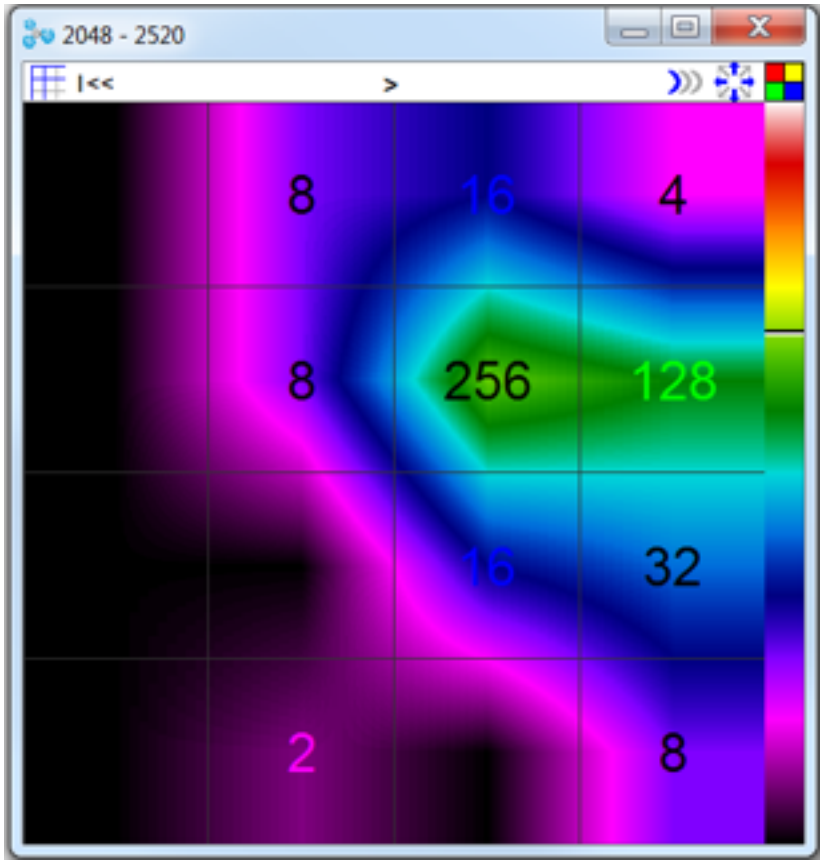
1st place and Grand Overall 2048 Winner

- Innovative heat map display with morphing heat map
- Concurrent tile animation, multiple speeds
- Animation on new tile
- Highlighted number on combination
- Best low depth heuristic
- Diagonal moves option!
- Additional grid sizes
- Multiple color palettes
- Good control layout and hover-help

1st place and Grand Overall 2048 Winner

Ivo Vollrath (Entry 1)

“Innovation tour-de-force”



Cincom

Contact Information

Star Team (Smalltalk Strategic Resources)

- **Suzanne Fortman** (sfortman@cincom.com)
  Cincom Smalltalk Program Director
- **Arden Thomas** (athomas@cincom.com)
  Cincom Smalltalk Product Manager
- **Jeremy Jordan** (jjordan@cincom.com)
  Cincom Smalltalk Marketing Manager

http://www.cincomsmalltalk.com

Cincom