

# Computational Thinking and Agent Models

(The Power and the Peril)

**Robert M. Panoff, Ph.D., D.Sc.**  
**Shodor Education Foundation, Inc.**  
**and**

**National Computational Science Institute**

**<http://www.shodor.org/talks/ctam>**

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- Past month
- Past year

**Petascale : Petascale Education Program - Shodor**

[www.shodor.org/petascale/](http://www.shodor.org/petascale/)

This image (generated by Tom Peterka, Rob Ross of Argonne National Laboratory and Hongfeng Yu, Kwan-Liu Ma of the University of California at Davis) ...

Internships

The internships awarded through this program may be to students

Undergraduate Petascale

Undergraduate Petascale Modules  
Shodor > Petascale

Blue Waters Student Internship ...

Blue Waters Student Internship Program NSF support for

Interns & Mentors

... travel to The Blue Waters Symposium 2016 Current

More results from shodor.org »

NCSI: Call For Participation

[www.computationalscience.org/upep](http://www.computationalscience.org/upep)

The NCSA Blue Waters petascale computing facility funded by NSF will support this effort. The Blue Waters education emphasis is intended to prepare the next.

Blue Waters Undergraduate Petascale Internship Program

[icics.uiuc.edu/~751-blue-waters-undergraduate-petascale-internship-program](http://icics.uiuc.edu/~751-blue-waters-undergraduate-petascale-internship-program), ntm

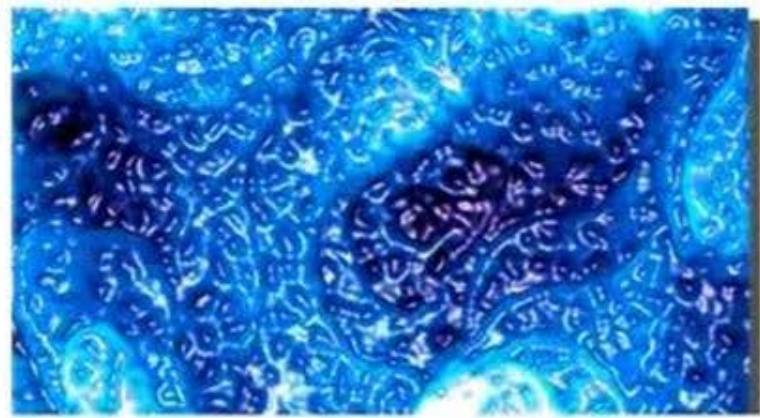


# Petascale Education Program

Results from studies at the nanoscale. An atomic force micrograph of a self-assembled mono-layer of molecules composed of two different materials on a gold surface. (from Argonne National Lab)



# Petascale Education Program



Results from studies at the nanoscale. An atomic force micrograph of a self-assembled mono-layer of molecules composed of two different materials on a gold surface. (from Argonne National Lab)

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# Computational Thinking and Agent Models

(The Power and the Peril)

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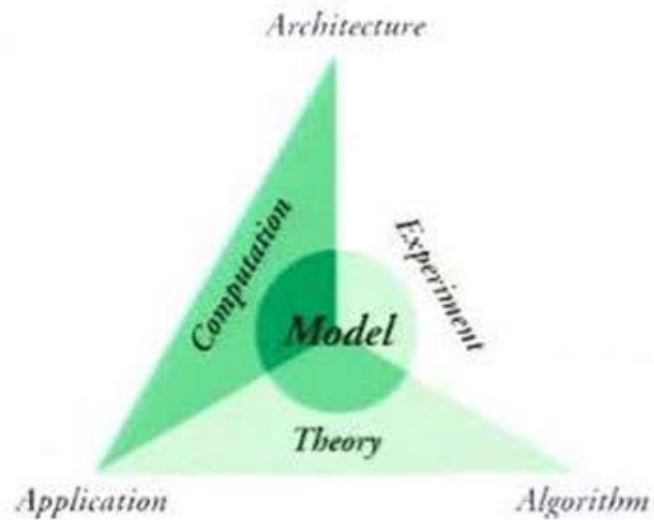
**<http://www.shodor.org/talks/ctam>**

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# What is Computational Science Education?

## Computational (Science Education)



## (Computational Science) Education





## Computational Thinking

# Computational Thinking Supports:

Authentic Science

Authentic Inquiry

[Previous](#) [Next](#)



**Can We Reformulate The Scientific Method?**  
**In "Inquiry-based Learning," why aren't we asking more questions?**  
**Is there a simplified, question-based formulation of "knowledge acquisition"?**

What can I observe? What do I observe?

What is observable directly without "help"?

What is observable with "help"?

Is what I observe changed by the "help"?

Am I using the "help" in such a way that it is "helpful"?

What is observable indirectly (by inference or deduction)?

Are my observations:

accurately recorded?

honestly reported?

Address bar: <http://shodor.org/talks/ctam/thinking.html>

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Tab 1: Computational Thinking

Tab 2: Interactivate: Multi-Function Data...



## Computational Thinking

# Computational Thinking Supports:

[Authentic Science](#)

[Authentic Inquiry](#)

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# Computational Thinking

## Computational Thinking enables any explorer to

- manipulate, build/modify as needed, a dynamic computational model with
- sufficient power to re-compute and re-visualize the model with
- access to expertise to help interpret and understand the model.

[Function Variation](#)

[Data Visualization](#)

- "The purpose of computing is insight, not numbers." --R. Hamming
- "If you can't trust the numbers, you won't get much insight." --R. Panoff





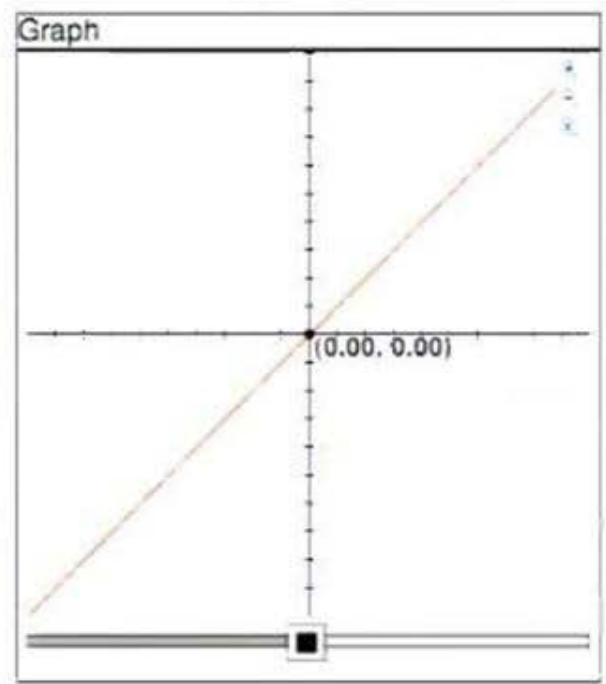
# Multi-Function Data Flyer



Shodor > interactivate > Activities > Multi-Function Data Flyer

Learner **Activity** Help Instructor

SHOW DEVIATIONS Sum of Squares of Deviations: 0



Data

Plot Data

Clear Data

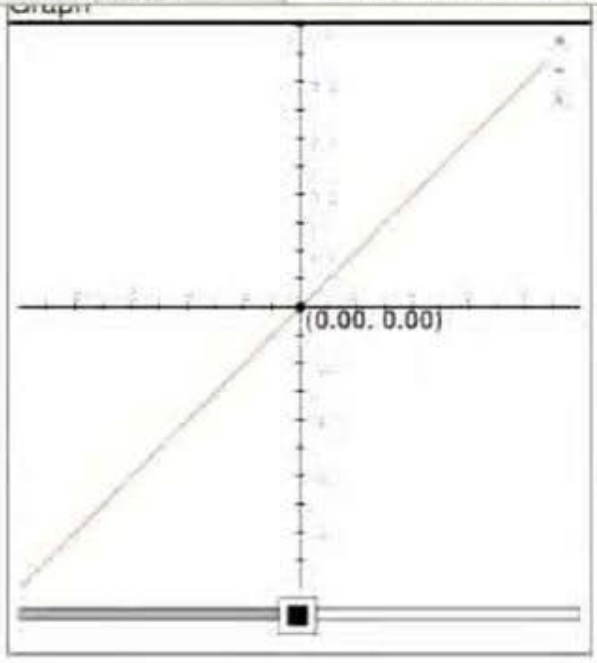
Auto-scale

Gridlines

- No Grid
- Light Grid
- Dark Grid

Settings

- Set Window
- Show Tabular Data
- Show Squares
- Show Asymptotes
- Show Trace
- Clear Trace



Plot Data

Clear Data

Auto-scale

No Grid

Light Grid

Dark Grid

Settings

Set Window

Show Tabular Data

Show Squares

Show Asymptotes

Show Trace

Clear Trace

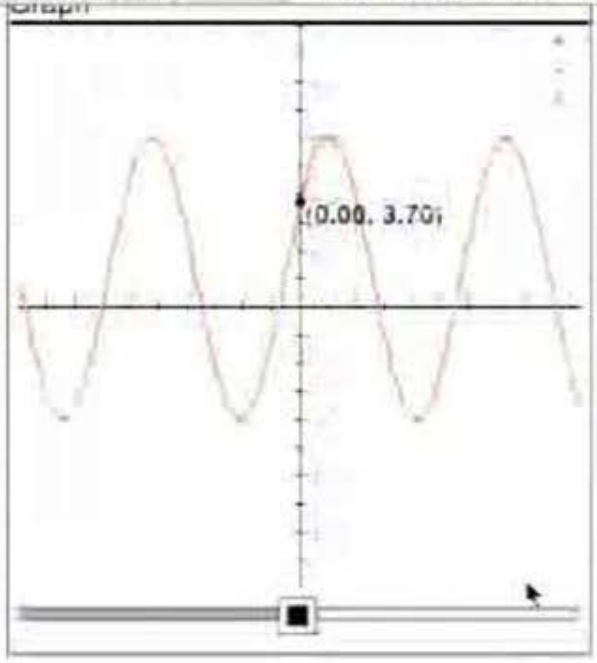
$f(x) = a$   [Set Function](#)

[Preset Functions](#)

- Exponents Change
- Use Multi-letter Variables
- Unlink Variables

© shodor





Plot Data

Clear Data

Auto-scale

No Grid

Light Grid

Dark Grid

---

Settings

Set Window

---

Show Tabular Data

Show Squares

Show Asymptotes

Show Trace

---

Clear Trace

Original function is:

$f(x) = 3 \cdot \cos(1 \cdot (x - 1)) + 1$

Show original

$f(x) = 3 \cdot \cos(1 \cdot (x - 1)) + 1$

New Function

Change Function

Reset Sliders

Slider Limits



Preset Functions

Functions

ax+b

$$ax+b$$



ax^2+bx+c

$$ax^2+bx+c$$



a\*(x-h)^2+k

$$a*(x-h)^2+k$$



ax^3+bx^2+cx+d

$$ax^3+bx^2+cx+d$$



a^(bx+c)+d



a\*ln(bx+c)+d



a/(bx+c)+d



a\*sqrt(bx+c)+d



a\*abs(bx+c)+d



a\*sin(bx+c)+d



a\*cos(bx+c)+d



x^n/(4.5+x^n)



a\*exp(-(b/x)^5)+c



-4\*e\*((s/x)^6-(s/x)^12)



a\*exp(-(x-b)^2/(2c^2))+d a\*exp(-b\*x)+c







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[Function Variation](#)

[Data Visualization](#)

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Excel ribbon with tabs: Home, Layout, Tables, Charts, SmartArt, Formulas, Data, Review. The ribbon includes options for font (Verdana, size 10), alignment (abc, Wrap Text), general, number, format, conditional formatting, styles, insert, delete, format, and themes.

	A	B	C	E	F	G	H	I
1								
2	run	0						
3	time	0						
4	pulse	10						
5								
6								
7								
8								
9								

Home Layout Tables Charts SmartArt Formulas Data Review

Font: Verdana 10 Alignment: abc Wrap Text General

Number: % 0.00

Format: Conditional Formatting Styles

Cells: Insert Delete Format Themes

D3 : fx =(E3+D4-C3+D2)/4

1																				
2	run	0																		
3	time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	pulse	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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20																				

Home Layout Tables Charts SmartArt Formulas Data Review

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Alignment: Left, Center, Right, Justify, Wrap Text, Merge

Number: General, Percentage, Decimals, Fractions

Format: Conditional Formatting, Styles

Cells: Insert, Delete, Format

Themes: Aa

D3 : fx 20

A B C E F G H I J K L M N O P Q R S

1																			
2	run	0																	
3	time	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	pulse	10	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17			20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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19																			
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Font: Verdana, 10, abc, Wrap Text, Bold, Italic, Underline, Color, Background Color

Alignment: General, 0%

Number: 0%

Format: Conditional Formatting, Styles

Cells: Insert, Delete, Format

Themes: Themes

Row numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Column letters: A, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S

1		
2	run	0
3	time	0
4	pulse	10

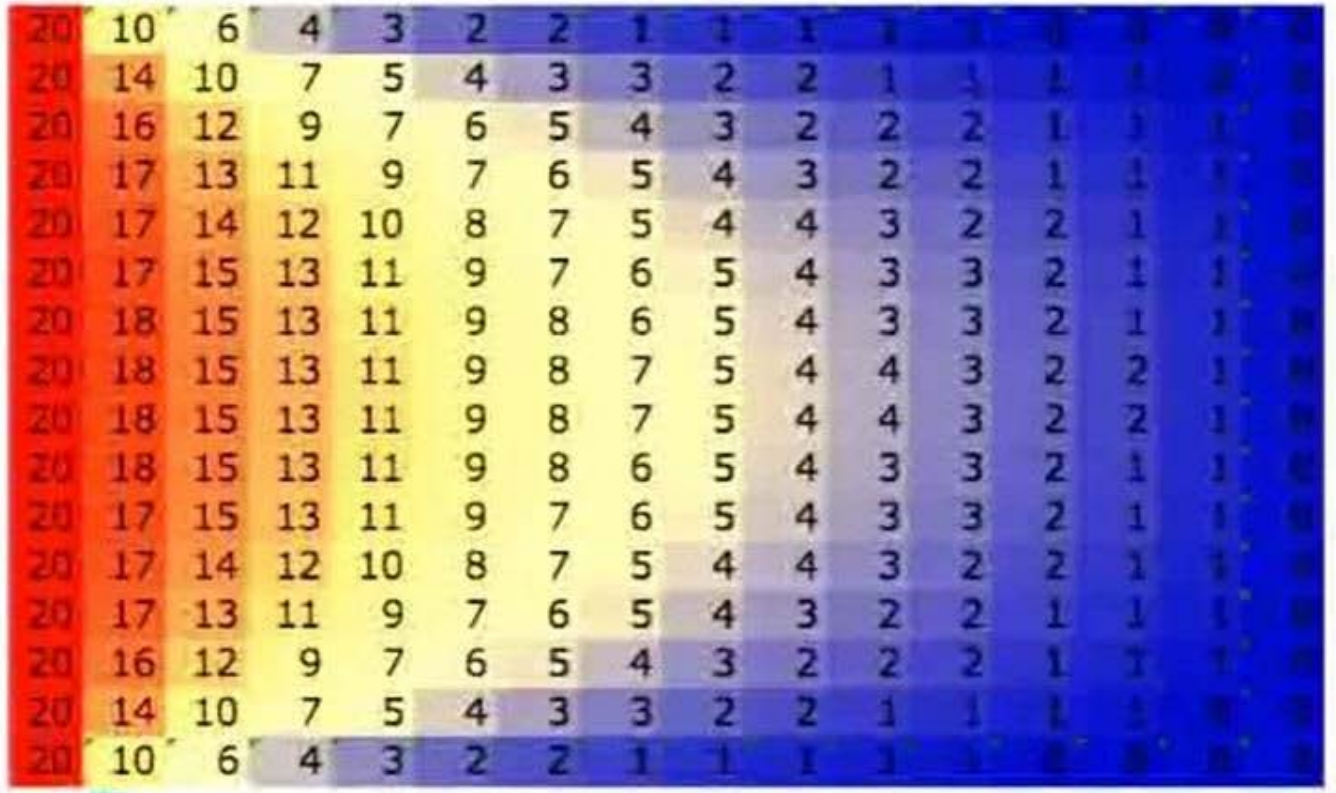
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0





37 ; f/x  
A C D E F G H I J K L M N O P Q R S

1		
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3	time	0
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# Computation

# Computa

- 
- 
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### DEVICES

- Macintosh HD
- Untitled
- iDisk

### SHARED

- alex-vaio
- bakytzhan-home
- denkbrett
- dhammapada
- europa
- fanyw-laptop
- All..

### PLACES

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Today

WORKING TALK

Name	Date Modified
A Simple Introduction to Agent Modeling.doc	Jun 8, 2014 8:14 PM
AgentSheetsRegistrations.docx	Jun 10, 2014 12:44 PM
An Introduction to System Modeling.doc	Jun 8, 2014 8:08 PM
CertaintyVocab.doc	Jun 8, 2014 8:06 PM
ct-intro	Today, 10:54 AM
ctam	Today, 10:55 AM
DCUexample.xls	Mar 10, 2015 5:56 PM
Epidemic	Today, 3:02 PM
EpidemicJS	Today, 11:04 AM
<b>Epidemic.html</b>	<b>Nov 12, 2013 12:10 PM</b>
Epidemic.js	Today, 3:06 PM
FireStudy.doc	Jun 8, 2014 8:05 PM
NCSI - Main Talk	Today, 10:55 AM
straws.doc	Jun 8, 2014 8:06 PM
strawsshort.doc	Oct 4, 2003 12:39 AM
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Timex Exercise A.doc	Jun 8, 2014 8:01 PM

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Library	Today, 3:00 PM	--	Folder
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Sites	Sep 11, 2007 8:35 AM	--	Folder

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http://fshodor.org/talk  
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# Computation

## Computa

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  - IDisk
- SHARED
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  - All
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  - Today

epidemic

Name	Date Modified	Size	Kind
Epidemic8new.adj.oak	Today, 3:02 PM	8 KB	TextE
Epidemic8new.adj	Today, 3:02 PM	4 KB	Agent
documentation	Today, 10:55 AM	4 KB	Folder
classes	Today, 10:55 AM	844 KB	Folder
world.vat	Mar 5, 2014 7:36 PM	8 KB	VAT F
healthyperson.vat	Nov 4, 2012 3:07 PM	12 KB	VAT F

DEVICES

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- Untitled
- IDisk

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- bakytzhan-home
- denkorett
- dhammadada
- europa
- fanyw-laptop
- All

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- Yesterday
- Past Week
- All Images
- All Movies
- All Documents

1 of 5 selected 1.84 GB available

2 of 23 selected 3.84 GB available

Previous Next





Gallery: Epidemic8new

Healthyp...

Healthperson

Sickperson

Wand

Wand



Kind

TextE

Agent

Folder

Folder

VAT F

VAT F

New Agent   Edit Behavior

New Depiction   Edit Depiction

Previous Next

P

S

Show

Fast



Gallery: Epidemic8new

HealthyPerson

- HealthyPerson
- SickPerson

World

- World

New Agent Edit Behavior New Decision

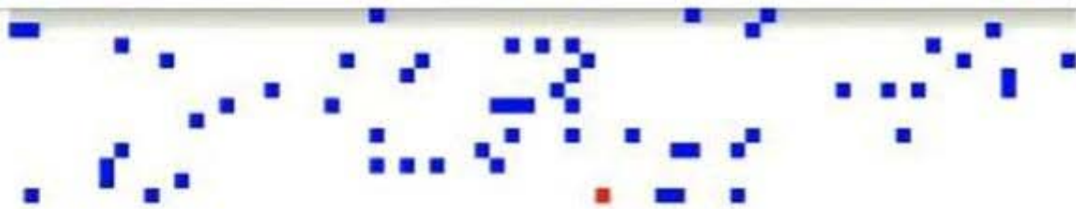
Edit Decision

Put text here to explain what this method does!

```

See HealthyPerson
  Next to: 0
  % chance: InfectiousRate
  Then:
    Change SickPerson
    Set sickclock to 0
    Set virus to 100
  Then:
    Move random on World
  Then:
    % chance: Immunity
  
```

New Method Duplicate Explain Test Apply OK



Previous Next

Slow Fast Reset Clear





Simulation Properties

infectionrate 0.5

Behavior: Healthyperson

While running

Put text here to explain what this method does!

New

If

- See [agent]
- Next to [agent] [distance]
- % chance [infectionrate]

Then

- Change [agent]
- Set sickclock to [0]
- Set virus to [100]

If

- See [agent]
- % chance [mobility]

Then

- Move random on [agent]

New Rule

New Method

Duplicate

Explain

Test

Apply

OK



Simulation Properties

infectionrate 0.5

Behavior: Healthyperson

While running

Put text here to explain what this method does!

If

- See [ ]
- Next to [ ] > [ ]
- % chance [infectionrate]

Then

- Change [ ]
- Set sickclock to [ ]
- Set virus to [100]

If

- See [ ]
- % chance [mobility]

Then

- Move random on [ ]

New Rule

New Method

Duplicate

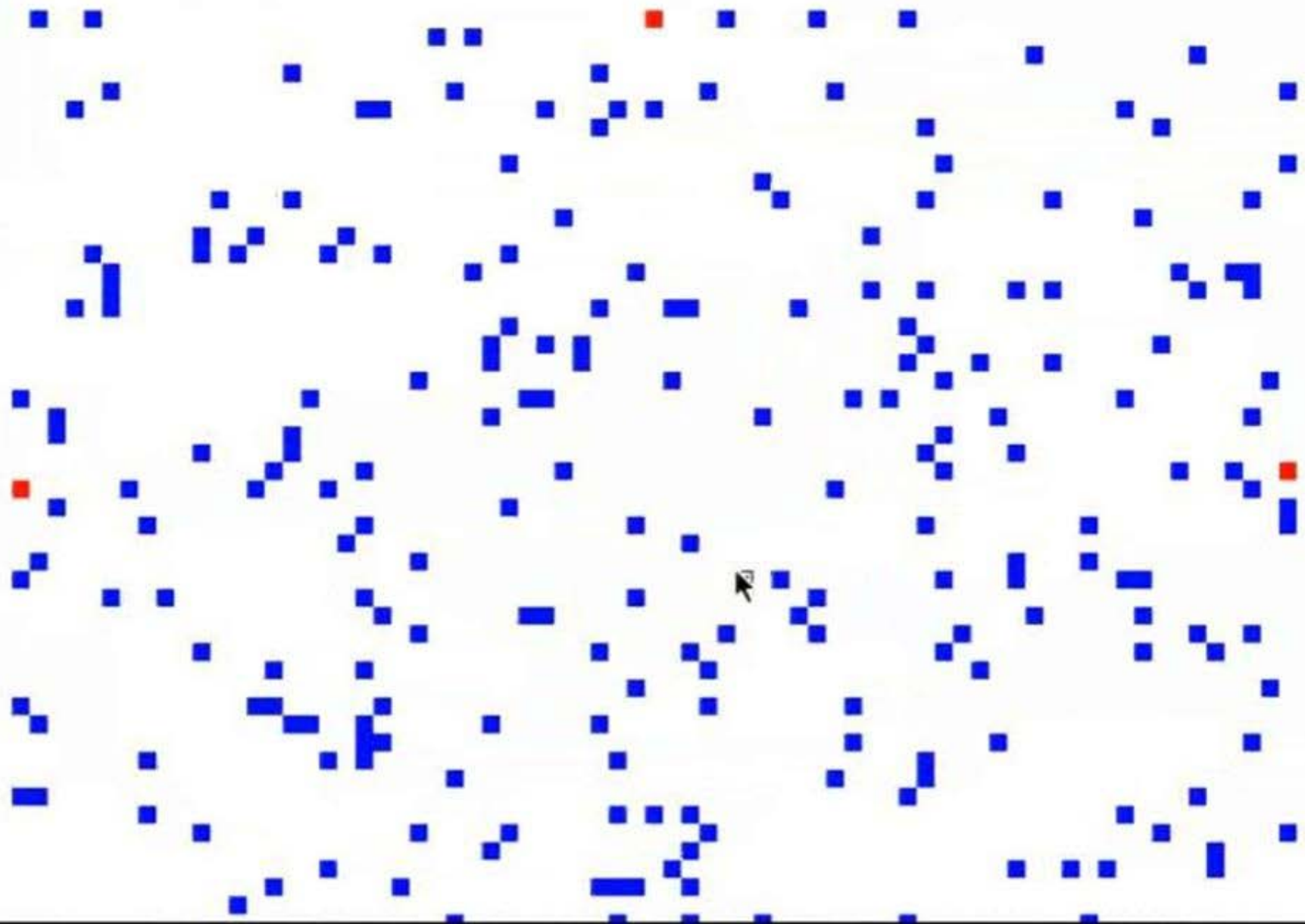
Explain

Test

Apply

OK







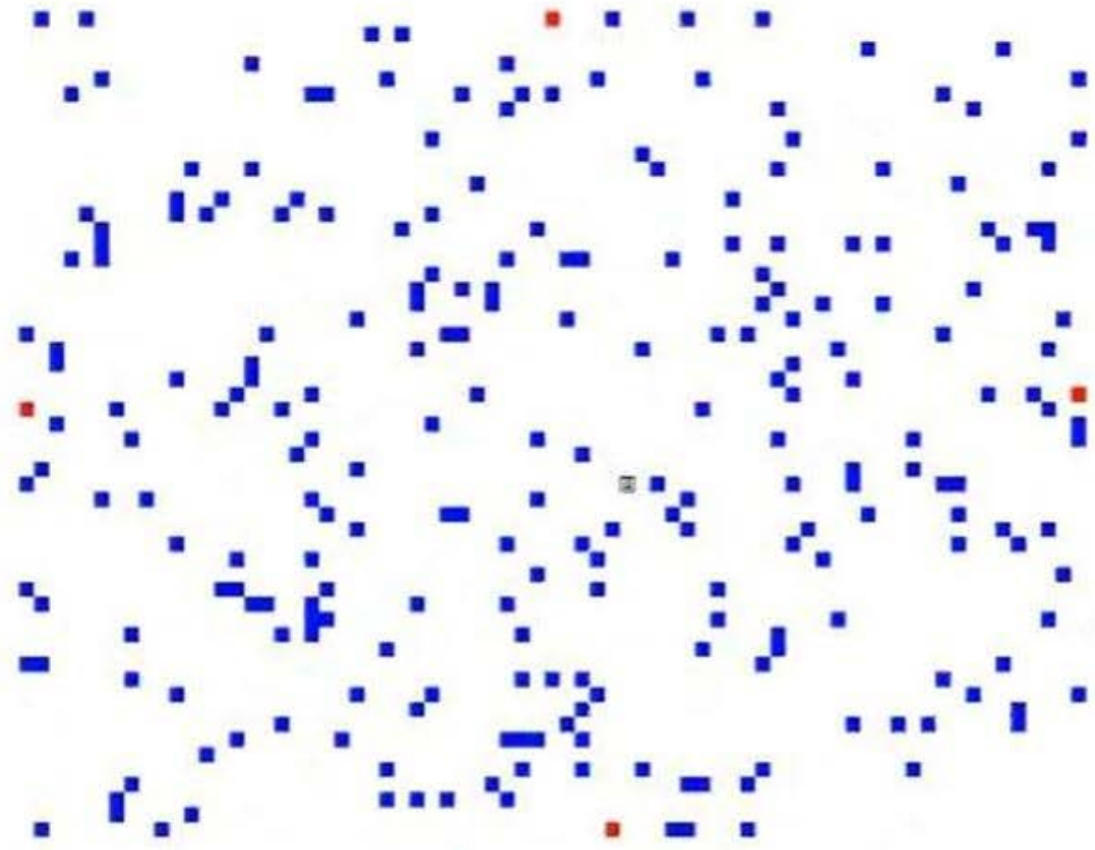
Gallery: Epidemic88

Healthy...

- Healthy person
- Sick person

World

- World



- Kind
- TextE
- Agent
- Folder
- Folder
- VAT F
- VAT F

New Agent Edit Behavior New Di  
 Edit Depiction

Previous Next

TextEdit

Slow Fast

Reset Clear



Selection: Ellipse (100%)

Administrator  
 Director

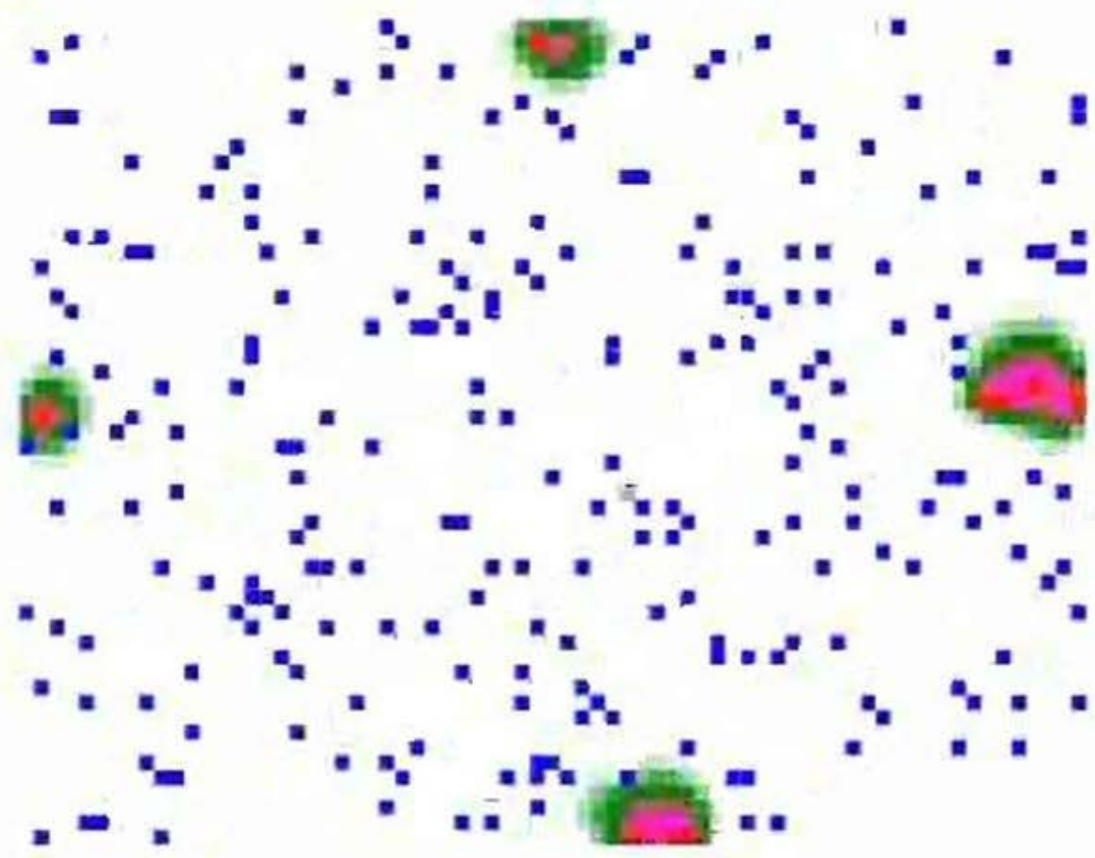
Agent

Work

New Agent Edit Behavior New D

Agent Database

Previous Next



- Kind
- TextE
- Agent
- Folder
- Folder
- VAT F
- VAT F

Reset Clear



Worksheet: new place 2

Gallery: Epistemic88

Heatmap...

Heatmap color

Scales

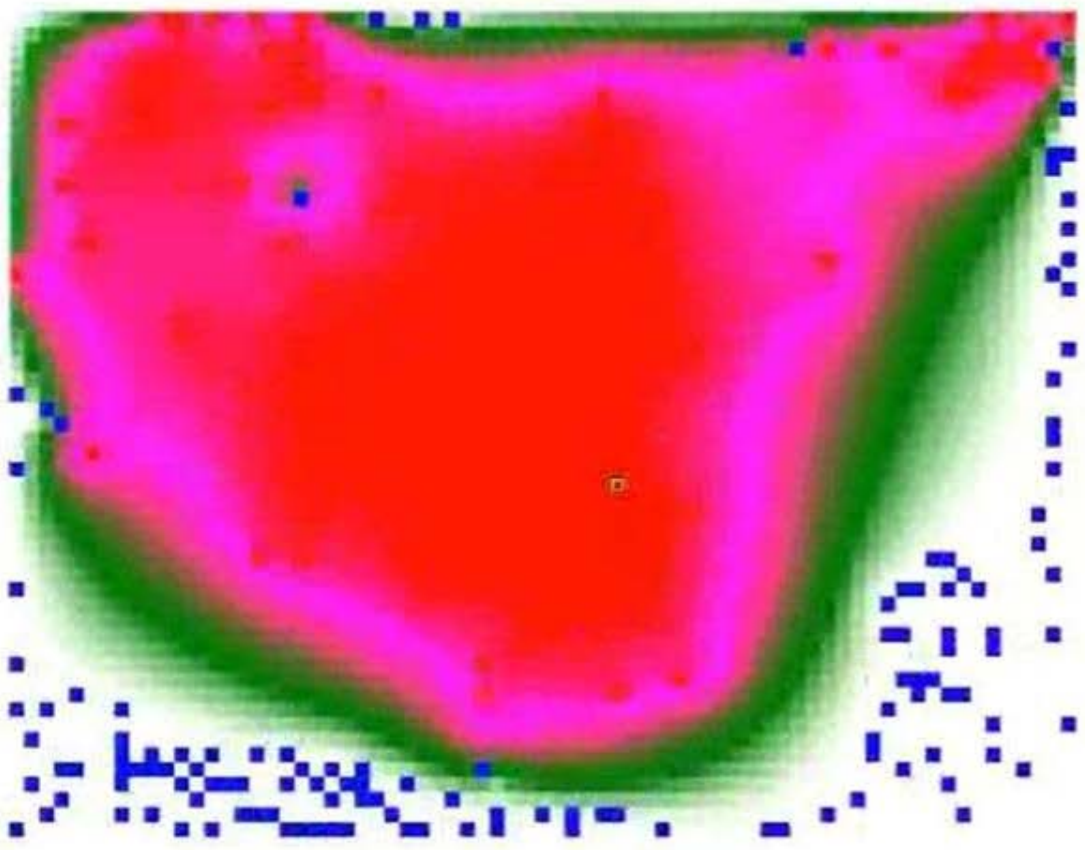
World...

World

New Agent Edit Behavior New D

Edit Decision

Previous Next



- Kind
- TextE
- Agent
- Folder
- Folder
- VAT F
- VAT F

Slow  Fast


Reset Clear




Worksheet: new place 2

Gallery: Epidemic80

Healthy...




Healthy person



Sick person

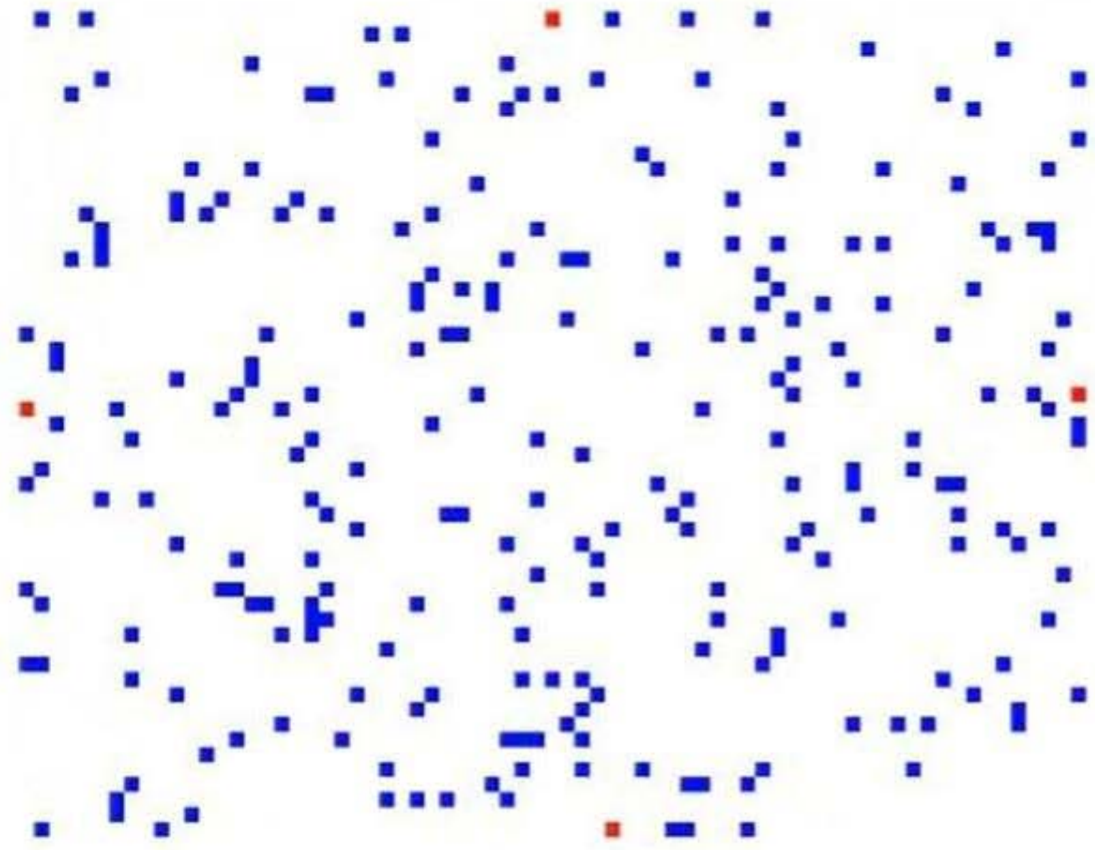
Word



Word

New Agent Edit Behavior New D  
 Edit Depiction

Previous Next



Kind  
 TextE  
 Agent  
 Folder  
 Folder  
 VAT F  
 VAT F



Slow  Fast

Reset Clear



File Path: ~/Desktop/WORKING TALK/EpidemicJS/Epidemic.js

Epidemic.js (no symbol selected)

```
1 var canvas, //This is how you declare a variable or an array
2     context,
3     people = new Array(),
4
5 //Define the initial parameters for the model
6
7     numPeople = 100,
8     personWidth = 10,
9     personHeight = 10,
10    maxDistanceMoved = 20,
11    infectionDuration = 30;
12
13 * window.onload = function () {
14     canvas = document.getElementById("canvas");
15     context = canvas.getContext("2d");
16
17     initializePeople();
18
19     setInterval("step();", 100);
```





```
var canvas, //This is now your
context,
people = new Array(),
```

```
//Define the initial parameters
```

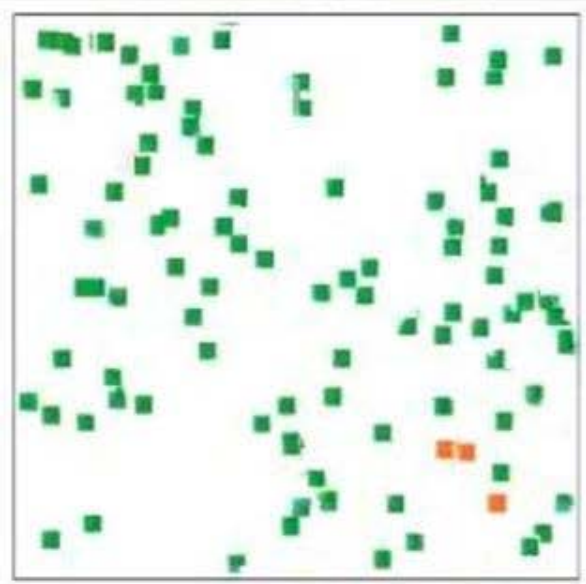
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  context = canvas.getContext("2d");
```

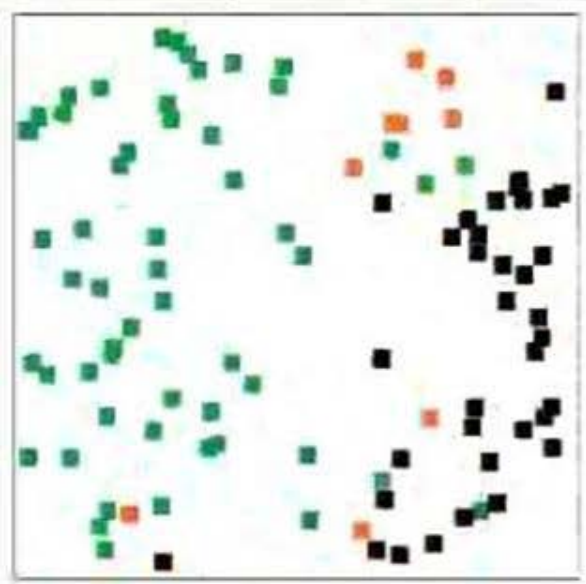
```
  initializePeople();
```

```
  setInterval("step();", 100);
```





Address: http://www...  
 + http://Users/fredquack/De...  
 Yousearchit Yahoo Mail Google Amazon  
 Computational Thinking Spread of Disease



File Explorer sidebar showing a list of files and folders:

- Name
- ASB
- Agent
- An It
- Certs
- ct-in
- ctam
- DCUI
- Epide
- Epidi
- E
- E
- FireS
- pt
- NCSI
- straw
- straw
- Text!
- Time

```

File Path: Desktop/WORKING TALK/EpidemicJS/Epidemic.js
Epidemic.js: The symbol selected:

var canvas, //This is how you
context,
people = new Array(),

//Define the initial parameters

numPeople = 100,
personWidth = 10,
personHeight = 10,
maxDistanceMoved = 20,
infectionDuration = 30;

window.onload = function () {
  canvas = document.getElement
  context = canvas.getContex

  initializePeople();

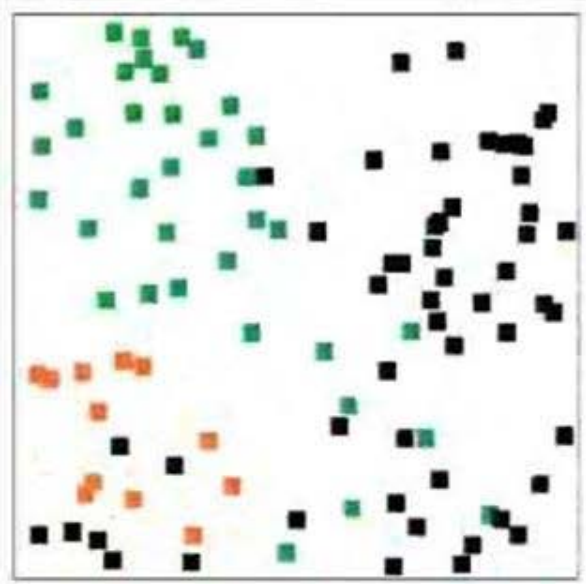
  setInterval("step()", 100
  
```

File Explorer sidebar showing a list of folders:

- ohantmapada
- fanvw-laptop
- laptop
- All
- PICTURES
- QUERIED
- Projects
- Public
- Sites



File:///Users/fredgluck/De  
 YouSendIt Yahoo Mail Google Amazon  
 Computational Thinking Spread of Disease



```

File Path: ~/Desktop/WORKING TALK/EpidemicJS/Epidemic.js
Epidemic.js (no symbol selected)

1  var canvas, //This is how you decl
2  context,
3  people = new Array(),
4
5  //Define the initial parameters for
6
7  numPeople = 100,
8  personWidth = 10,
9  personHeight = 10,
10 maxDistanceMoved = 20,
11 infectionDuration = 30;
12
13
14
15
16 window.onload = function () {
17   canvas = document.getElementById
18   context = canvas.getContext("2d")
19
20   initializePeople();
21
22   setInterval("step();", 100);
23
24
25
26

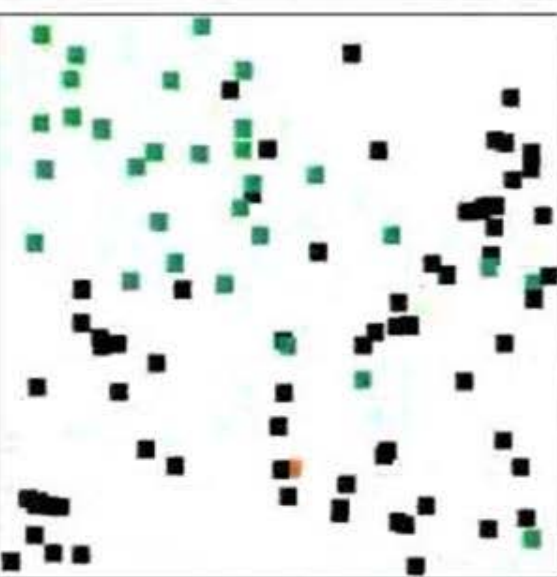
```

dharmapada  
 fanw-laptop  
 laptop  
 All...  
 Pictures  
 Projects  
 Public  
 Sites

Spread of Disease

File Path: ~/Users/fredgluck/Desktop/WORKING TALK/EpidemicJS/Epidemic.js

Computational Thinking



```

1  var canvas, //This is how you decl
2      context,
3      people = new Array(),
4
5  //Define the initial parameters for
6
7      numPeople = 100,
8      personWidth = 10,
9      personHeight = 10,
10     maxDistanceMoved = 20,
11     infectionDuration = 30;
12
13 * window.onload = function () {
14     canvas = document.getElementById
15     context = canvas.getContext("2d")
16
17     initializePeople();
18
19     setInterval("step();", 100);

```

dharmapada

fanvw-laptop

laptop

All...

PLACES

SEARCH FINDER

Today

Pictures

Projects

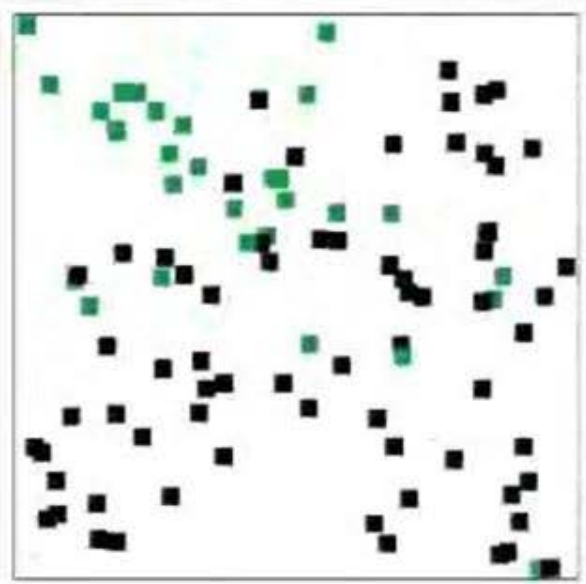
Public

Sites

Spread of Disease

File Path: file:///Users/fredquack/Desktop/WORKING TALK/EpidemicJS/Epidemic.js

Computational Thinking Spread of Disease



```

Epidemic.js
File Path: ~/Desktop/WORKING TALK/EpidemicJS/Epidemic.js
Epidemic.js (no symbol selected)

1  var canvas, //This is how you decl
2      context,
3      people = new Array(),
4
5      //Define the initial parameters for
6
7      numPeople = 100,
8      personWidth = 10,
9      personHeight = 10,
10     maxDistanceMoved = 20,
11     infectionDuration = 30;
12
13 * window.onload = function () {
14     canvas = document.getElementById("2d");
15     context = canvas.getContext("2d");
16
17     initializePeople();
18
19     setInterval("step()", 100);

```

dharmapada Pictures

fanvw-laptop Projects

laptop Public

All Sites

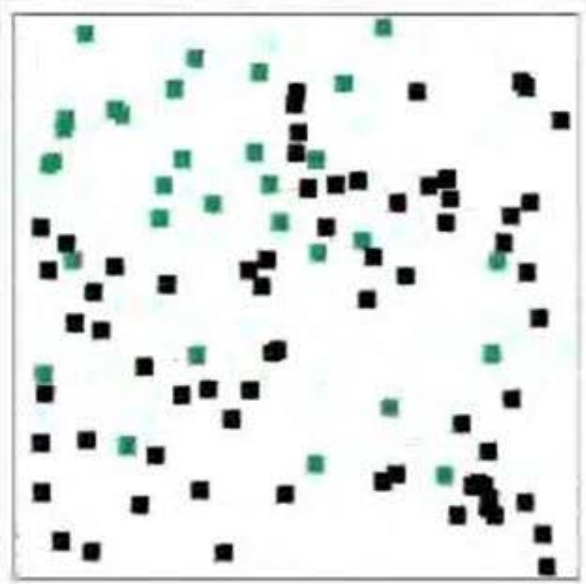
PLACES

SEARCH THE

Today

File Path: /Users/fredguck/Desktop

Computational Thinking      Spread of Disease



```

Epidemic.js
File Path: - (Desktop: WORKING TALK/EpidemicJS/Epidemic.js)
Epidemic.js (no symbol selected)

1  var canvas, //This is how you decl
2      context,
3      people = new Array(),
4
5  //Define the initial parameters for
6
7      numPeople = 500,
8      personWidth = 10,
9      personHeight = 10,
10     maxDistanceMoved = 20,
11     infectionDuration = 30;
12
13
14
15 * window.onload = function () {
16     canvas = document.getElementById
17     context = canvas.getContext("2d")
18
19     initializePeople();
20
21     setInterval("step()", 100);
22
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30
31
32
33
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37
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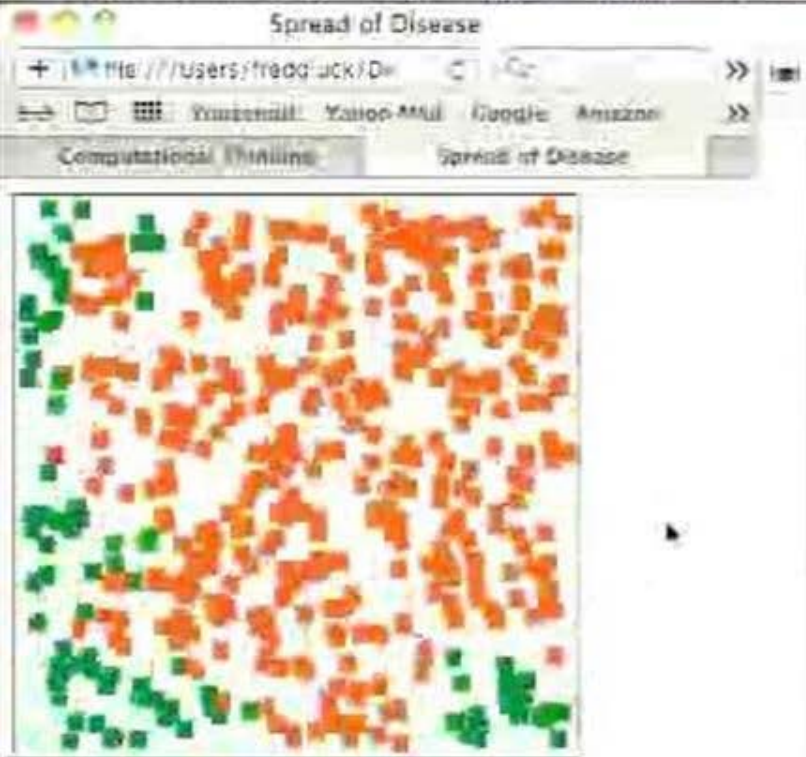
```

dharmapada      Pictures

fanvw-laptop      Projects

laptop      Public

All...      Sites



FILE PATH: /Users/fred@duck/D...  
 ADDRESS: file:///Users/fred@duck/D...

```
var canvas, //This is how you decl
    context,
    people = new Array(),

//Define the initial parameters for

    numPeople = 500,
    personWidth = 10,
    personHeight = 10,
    maxDistanceMoved = 20,
    infectionDuration = 30;
```

```
window.onload = function () {
  canvas = document.getElementById
  context = canvas.getContext("2D")

  initializePeople();

  setInterval(">step()", 100);
```





```

var canvas, //This is how you decl
    context,
    people = new Array(),

//Define the initial parameters for

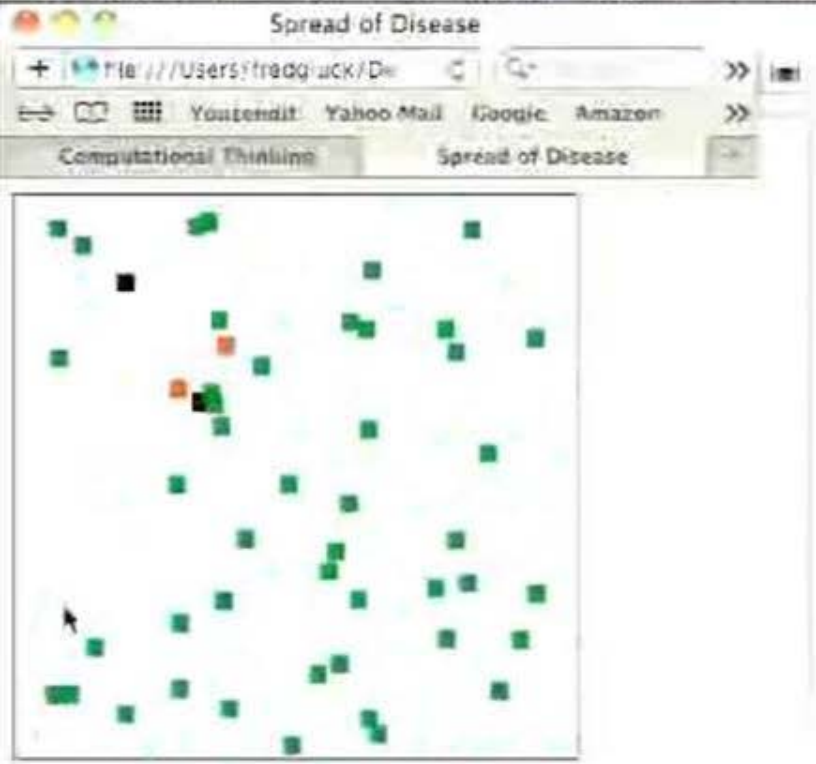
    numPeople = 500,
    personWidth = 10,
    personHeight = 10,
    maxDistanceMoved = 20,
    infectionDuration = 30;

window.onload = function () {
    canvas = document.getElementById
    context = canvas.getContext("2D")

    initializePeople();

    setInterval("step1;", 100);
  
```





```

Epidemic.js
File Path = /Users/traq/uck/De.../Epidemic.js
Building G...

var canvas, //This is how you decl
    context,
    people = new Array(),

//Define the initial parameters for

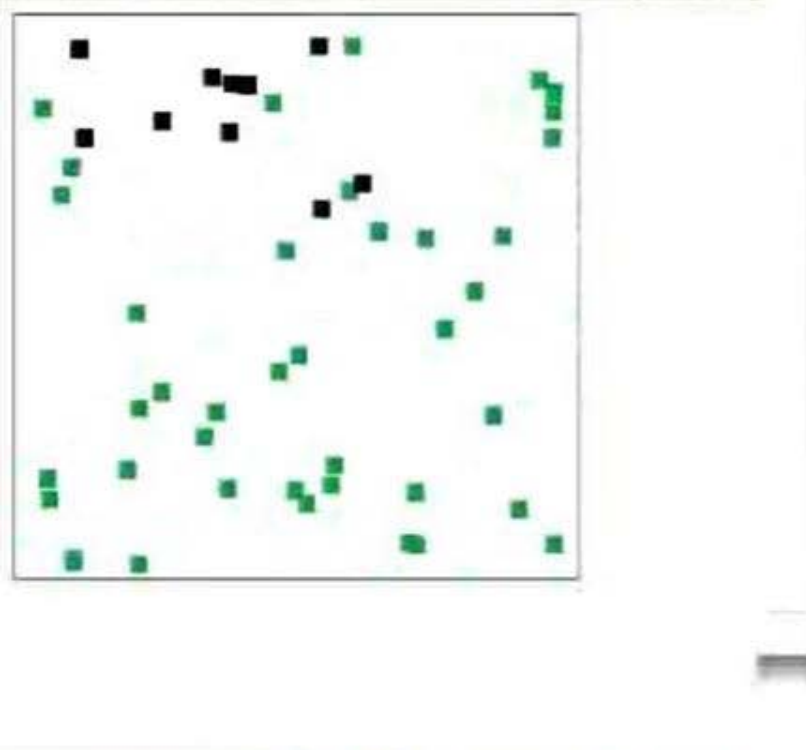
    numPeople = 50,
    personWidth = 10,
    personHeight = 10,
    maxDistanceMoved = 20,
    infectionDuration = 30;

window.onload = function () {
    canvas = document.getElementById
    context = canvas.getContext("2d")

    initializePeople();

    setInterval("step()", 100);
  
```





File Path - /Desktop/WORKING/FILES/EpidemicJS/Epidemic.js

```

var canvas, //This is how you decl
context,
people = new Array(),

//Define the initial parameters for

numPeople = 50,
personWidth = 10,
personHeight = 10,
maxDistanceMoved = 20,
infectionDuration = 30;

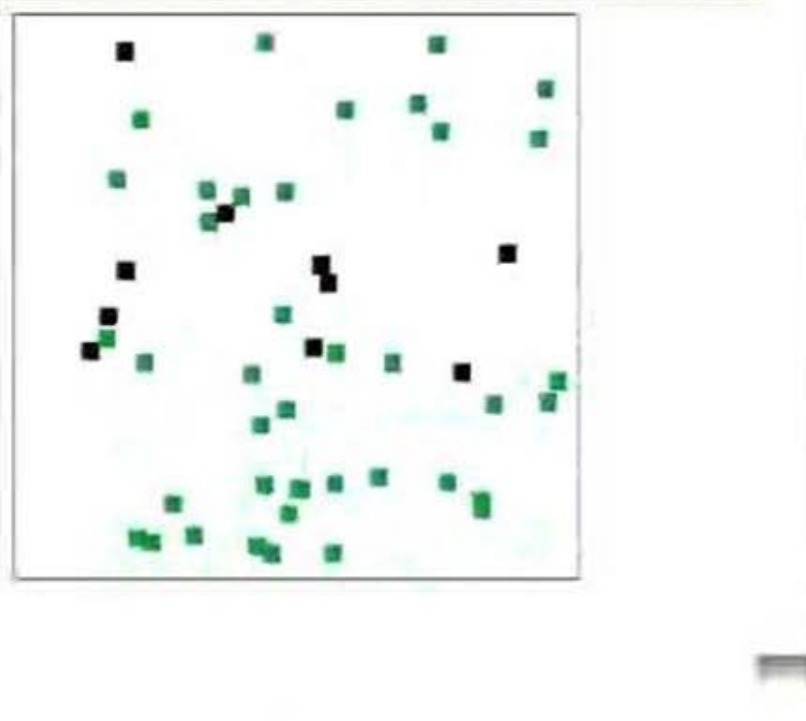
window.onload = function () {
  canvas = document.getElementById
  context = canvas.getContext("2d")

  initializePeople();

  setInterval("step();", 100);

```





File Manager sidebar showing folders: dhammasada, fanvw-laptop, laotha, All, Pictures, Projects, Public, Sites.

```

var canvas, //This is how you decl
context,
people = new Array(),

//Define the initial parameters for

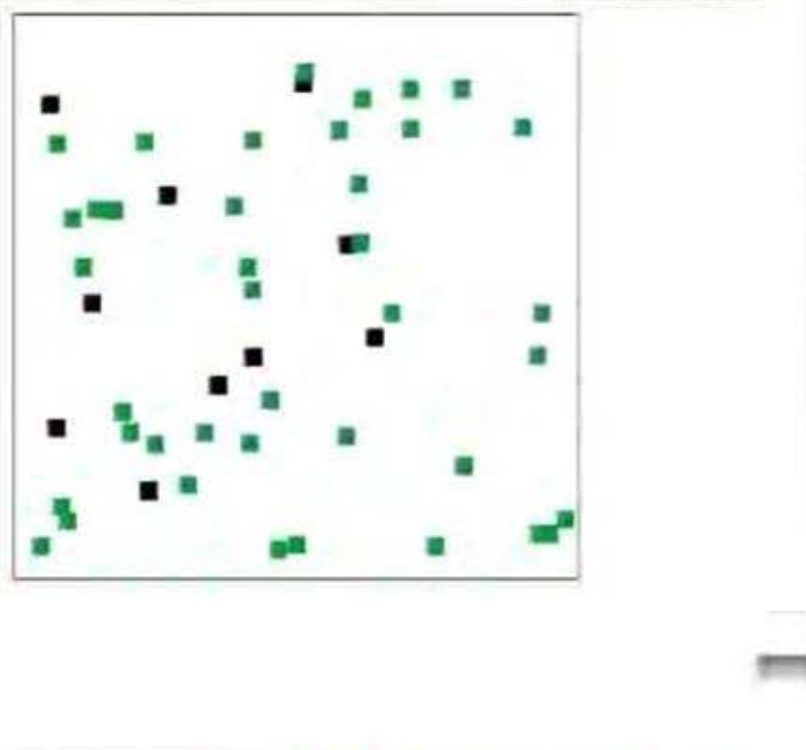
numPeople = 50,
personWidth = 10,
personHeight = 10,
maxDistanceMoved = 20,
infectionDuration = 30;

window.onload = function () {
  canvas = document.getElementById
  context = canvas.getContext("2d")

  initializePeople();

  setInterval("step()", 100);

```



```

Epidemic.js
File Path: /Desktop/WORRING TALK/ Epidemic.js - Epidemic.js
Epidemic.js 15 lines selected

var canvas, //This is how you decl
    context,
    people = new Array(),

//Define the initial parameters for

    numPeople = 50,
    personWidth = 10,
    personHeight = 10,
    maxDistanceMoved = 20,
    infectionDuration = 30;

window.onload = function () {
    canvas = document.getElementById
    context = canvas.getContext("2d")

    initializePeople();

    setInterval("step();", 100);

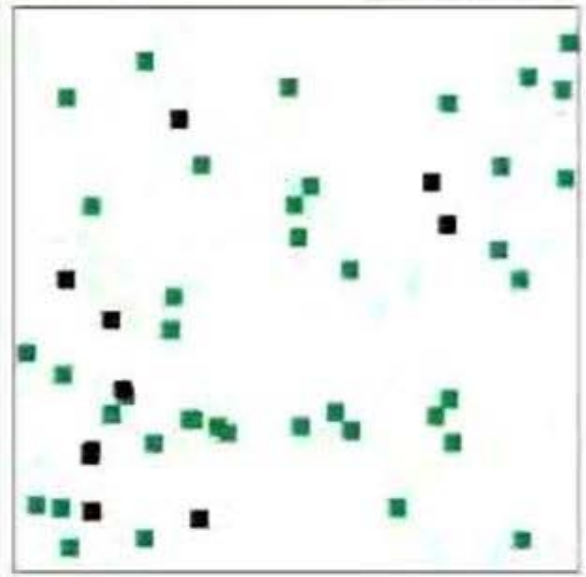
```

Spread of Disease

File Path: file:///Users/fredgluck/De

Yousendit Yahoo Mail Google Amazon

Computational Thinking Spread of Disease



dharmapada Pictures

fanvw-laptop Projects

laptop Public

All... Sites

PLACES

SEARCH BOX

```

Epidemic.js
File Path: Desktop WORKING TASKS/epidemic.js/Epidemic.js
Epidemic.js

var canvas, //This is how you decl
    context,
    people = new Array(),

//Define the initial parameters for

numPeople = 50,
personWidth = 10,
personHeight = 10,
maxDistanceMoved = 20,
infectionDuration = 30;

window.onload = function () {
    canvas = document.getElementById
    context = canvas.getContext("2d")

    initializePeople();

    setInterval("step();", 100);
  
```