Module 13

Wrap-up

CS 106 Winter 2018

Module 01

Processing Recap

- Types
- Variables
- Control flow
- Functions
- Classes

Module 02

Arrays and Strings

- Array operations
- Arrays as values
- Functions on arrays
- Special characters
- Concatenating strings
- String equality
- Outputting text

Module 03

Input/Output

- Reading and writing images
- Reading and writing illustrations
- Reading and writing text
- `splitTokens()`

Module 04

Advanced Shapes

- `beginShape() / vertex() / endShape()`
- **Using `PVector` to represent points**
- **Angles**
- **Polar coordinates**

Module 05

User Interfaces

- Model-View-Controller paradigm
- Direct Manipulation
- Hit testing
- UI Toolkits
- ControlP5

Module 06

Geometric Context

- `translate()`, `rotate()`, `scale()`
- `pushMatrix()`, `popMatrix()`
- Order of operations
- Building up complex transformations
- Hierarchical modelling

Module 07

Recursion

- Recursion in recursivedrawing.com
- Anatomy of recursion (base case / recursive case / making progress)
- Writing simple recursive functions

Module 08

Randomness

- The `random()` function
- Generating random integers
- Flipping a coin
- Bias
- Pseudorandomness
- Using `randomSeed()`

Module 09

Noise

- Using the `noise()` function
- How `noise()` works in 1D, 2D and 3D
- How `noise()` is different from `random()`

Module 10

Data Processing and Text

- Shapes of data: text, sequence, dictionary, table, tree, graph
- Working with text in external files
- Using `join()`, `trim()`
- Working with Dictionaries
- Regular expressions—what are they?

Module 11

Tables

- Rows and columns (records and fields)
- CSV files
- Loading tables
- Reading data out of tables
- Sorting by column values

Module 12

Tree-Structured Data

- JSON files
- Types in JSON
- Loading JSON files
- Reading values out of JSON objects

The final exam

- Friday, April 20th
  12:30pm–3:00pm
  PAC 7, 8
- Similar in style to the midterm
- Covers entire course, weighted towards post-midterm material
- Memorization is *not* the key

Review sessions

- TBD — preferences?
- Watch Piazza for announcements about office hours

Study aids

- The midterm
- Assignment and lab questions
- Assignment and lab questions from previous offerings
- Practice programming exercises (updated!)
- Clicker questions
- Final exam review, midterm review
- Reviews from previous offerings
- Your imagination

Practice on paper, not just in Processing

Marking scheme reminder

- Assignment mark based on best 8 of 9 assignments, plus project
- Participation mark based on best 75% of clicker responses
- Must pass exam portion of course

Not appearing

- 3D
- Physics and Animation
- Sound
- Video, live camera input
- Idioms, software engineering
- Testing and debugging

Issues with Processing

- Geared more towards artistic practice than teaching
- Java is becoming a bit problematic

- But still a fun, practical tool, and useful for designers

Where to go from here

- More Processing
- Java
- Python
- Javascript

- C++, Swift
- Max/MSP
- Haxe/OpenFL

```
void setup()
{
  size( 400, 760 );
  rectMode( CENTER );
  noFill();
  background( 255 );

  for ( int y = 0; y < 24; ++y ) {
    float r_amt = map( y, 0, 23, 0, 1 );
    for ( int x = 0; x < 12; ++x ) {
      pushMatrix();
      translate( r_amt * random( -5, 5 ), r_amt * random( -5, 5 ) );
      translate( 20 + (x+0.5)*30, 20 + (y+0.5)*30 );
      rotate( radians( random( -45, 45 ) ) * r_amt );
      rect( 0, 0, 30, 30 );
      popMatrix();
    }
  }
}
```

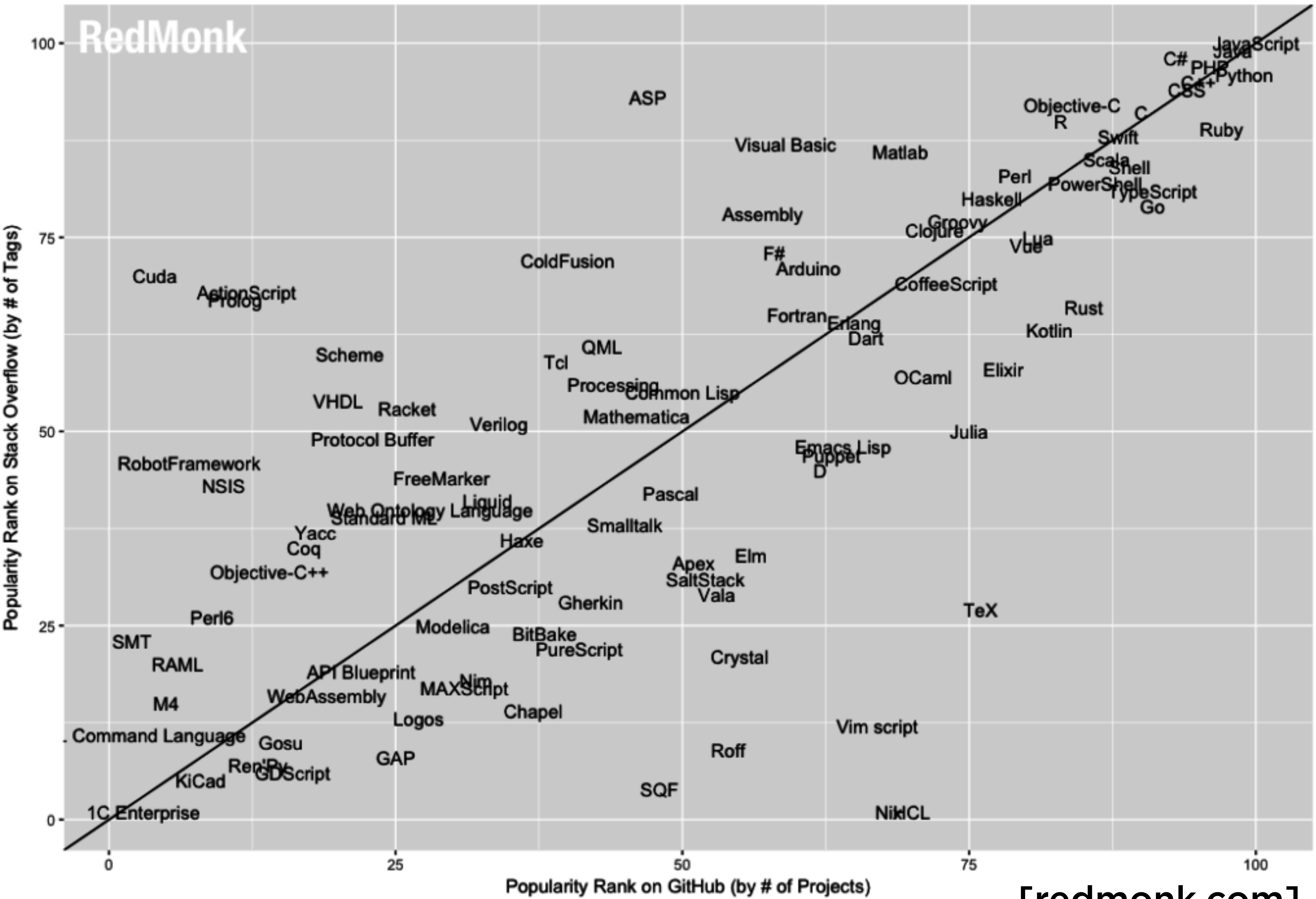
P5js mode in Processing

```
function setup()
{
  createCanvas( 400, 760 );
  rectMode( CENTER );
  noFill();
  background( 255 );

  for ( var y = 0; y < 24; ++y ) {
    var r_amt = map( y, 0, 23, 0, 1 );
    for ( var x = 0; x < 12; ++x ) {
      push();
      translate( r_amt * random( -5, 5 ), r_amt * random( -5, 5 ) );
      translate( 20 + (x+0.5)*30, 20 + (y+0.5)*30 );
      rotate( radians( random( -45, 45 ) ) * r_amt );
      rect( 0, 0, 30, 30 );
      pop();
    }
  }
}
```

Python mode in Processing

```
def setup():
  size( 400, 760 )
  rectMode( CENTER )
  noFill()
  background( 255 )

  for y in range( 24 ):
    r_amt = map( y, 0, 23, 0, 1 )
    for x in range( 12 ):
      pushMatrix()
      translate( r_amt * random( -5, 5 ), r_amt * random( -5, 5 ) )
      translate( 20 + (x+0.5)*30, 20 + (y+0.5)*30 )
      rotate( radians( random( -45, 45 ) ) * r_amt )
      rect( 0, 0, 30, 30 )
      popMatrix()
```

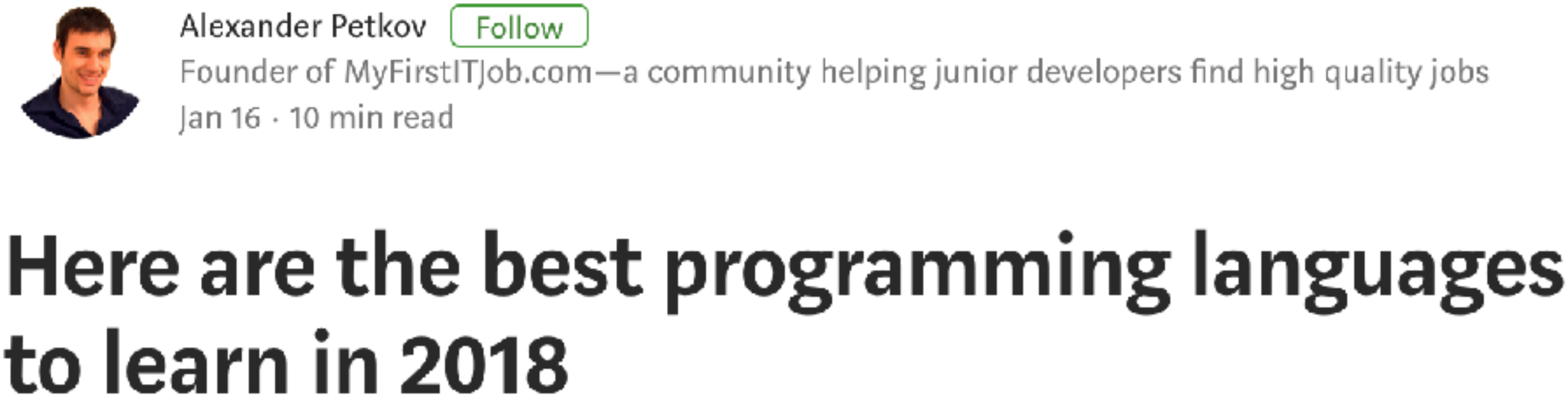
RedMonk Q118 Programming Language Rankings



[redmonk.com]

1	JavaScript
2	Java
3	Python
4	PHP
5	C#
6	C++
7	CSS
8	Ruby
9	C
10	Swift
10	Objective-C

Redmonk rankings for Q1 2018



Alexander Petkov Follow

Founder of MyFirstITJob.com—a community helping junior developers find high quality jobs

Jan 16 · 10 min read

Here are the best programming languages to learn in 2018

1	JavaScript
2	Swift
3	Python
4	Java
5	C++

[freecodecamp.org]

Java

- Good all-purpose programming language
- Natural successor to Processing

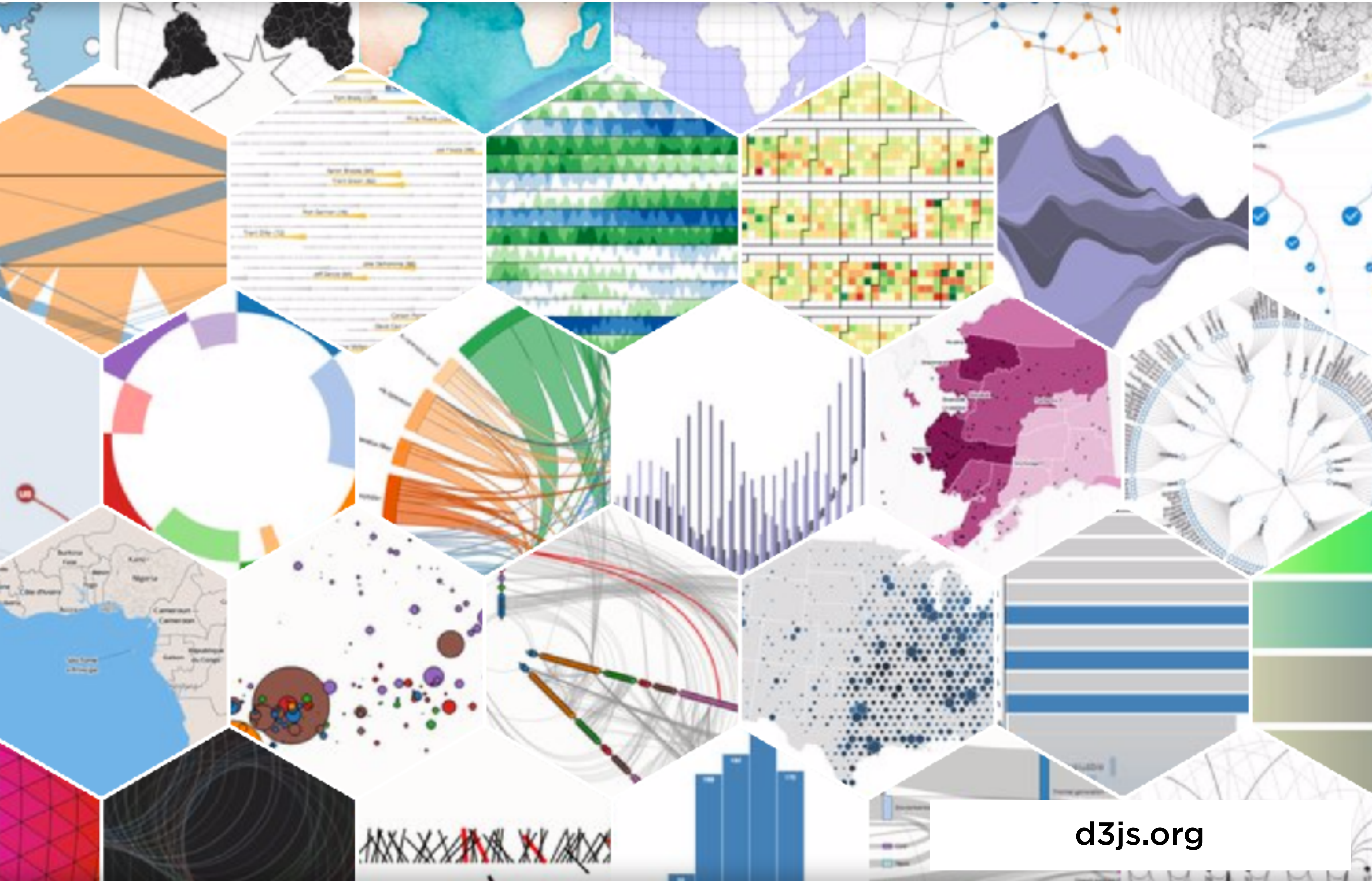
Javascript

- Best choice for client-side web apps
- Probably easiest to deploy

Python

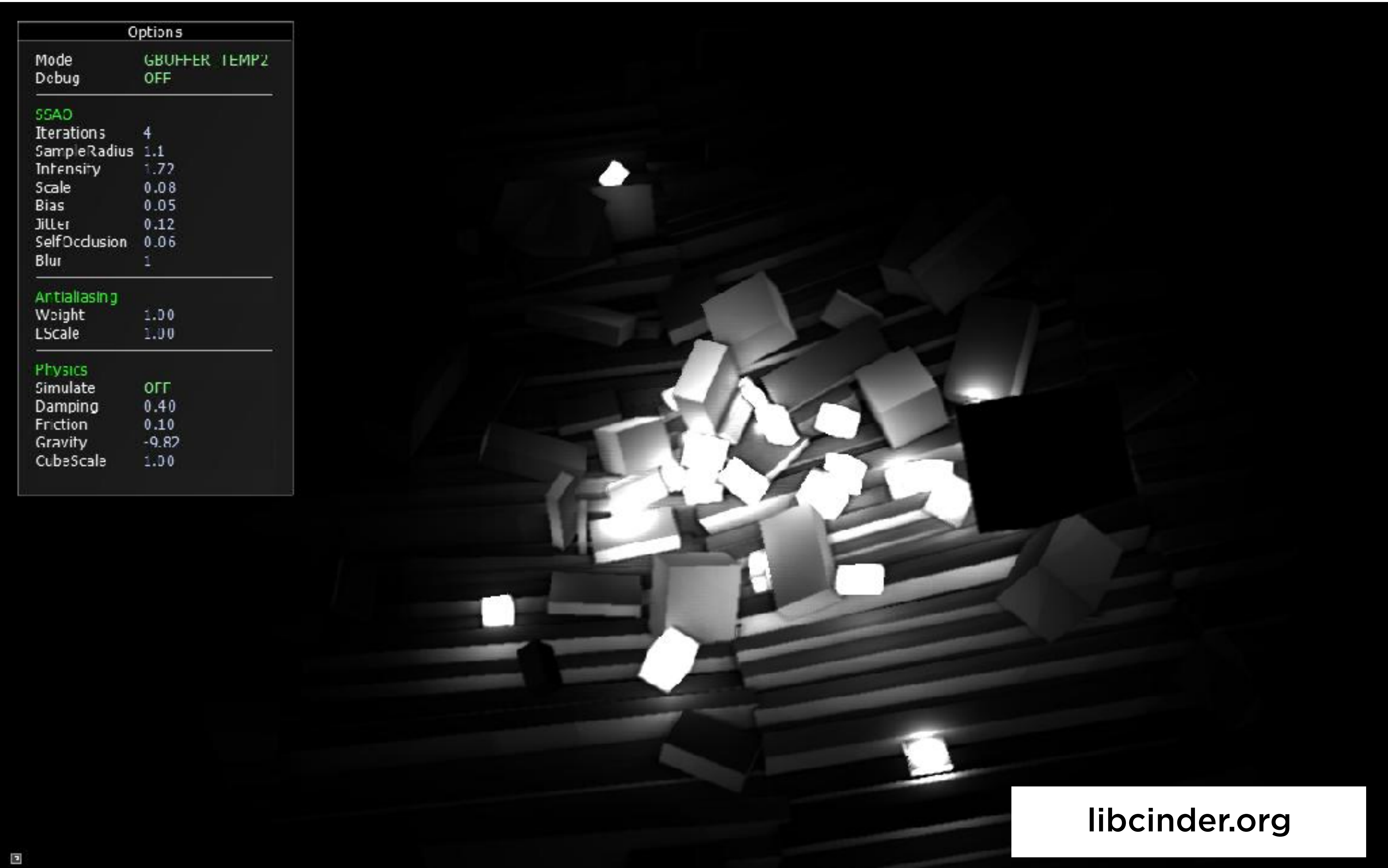
- Very practical language
- Useful for data processing, science
- Not as much support for graphics or application development

D3 (Javascript)



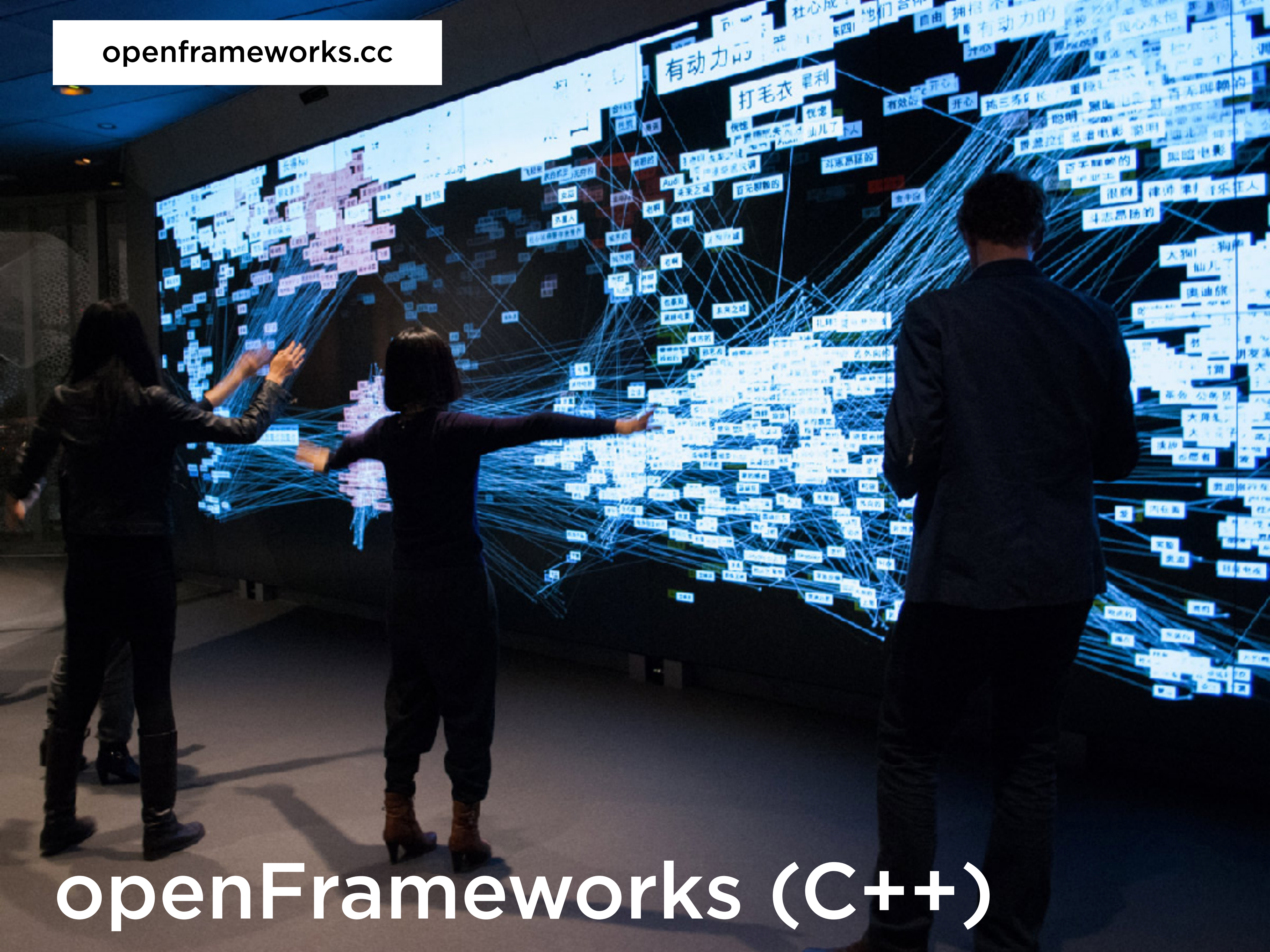
d3js.org

Cinder (C++)



```
Options
Mode            GBUFFER TEMP2
Debug           OFF

SSAO
Iterations      4
SampleRadius    1.1
Intensity       1.72
Scale           0.08
Bias            0.05
Jitter          0.12
SelfOcclusion   0.06
Blur            1

Antialiasing
Weight          1.00
LScale          1.00

Physics
Simulate        OFF
Damping         0.40
Friction        0.10
Gravity         -9.82
CubeScale       1.00
```

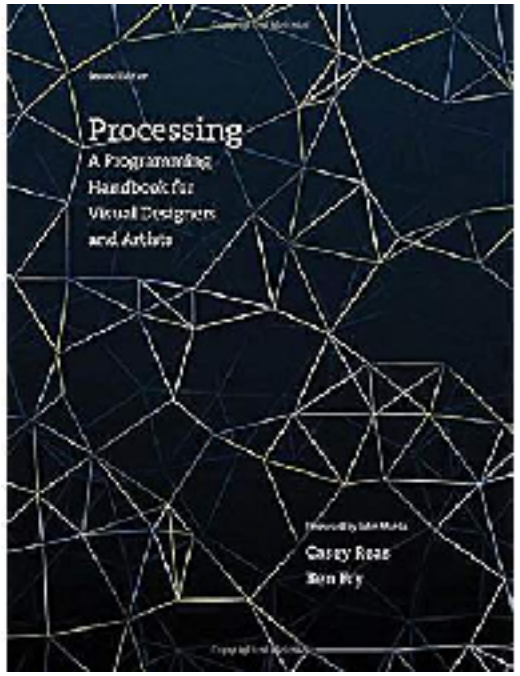
libcinder.org



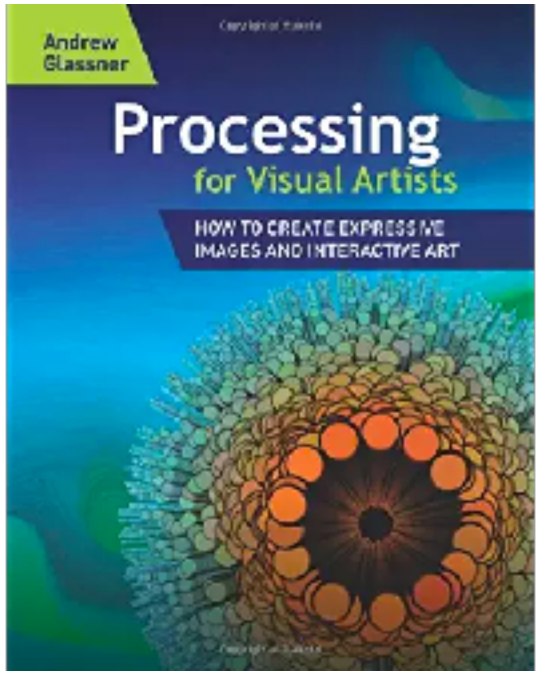
openframeworks.cc

openFrameworks (C++)

Books

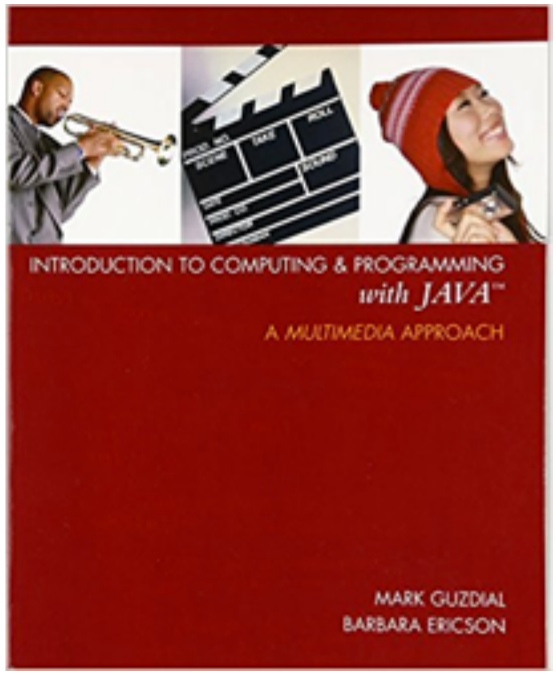


Processing: A Programming Handbook for Visual Designers and Artists
Casey Reas and Ben Fry



Processing for Visual Artists: How to Create Expressive Images and Interactive Art
Andrew Glassner

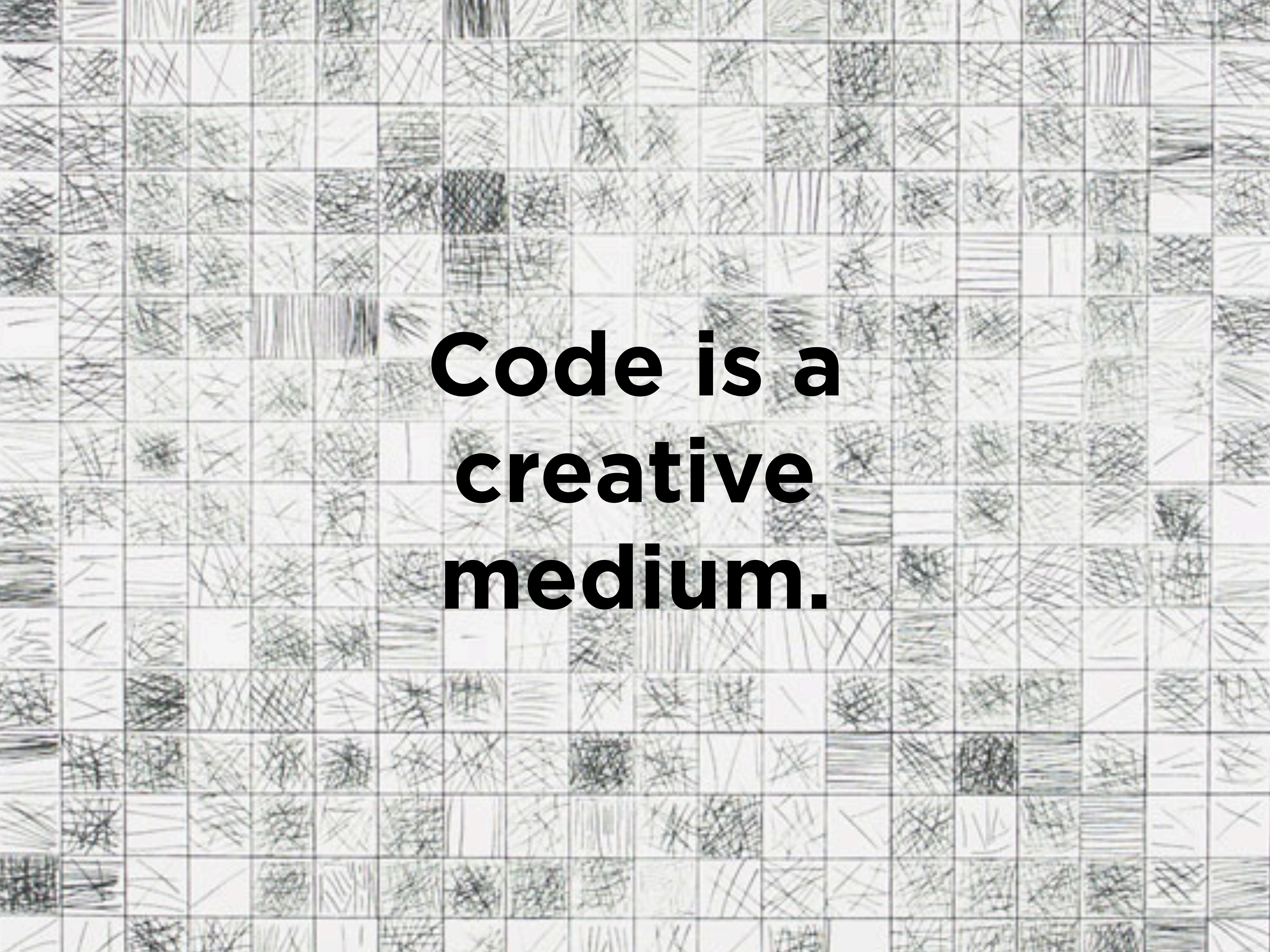
Books



Introduction to Computing and Programming with Java: a Multimedia Approach
Mark J. Guzdial and Barbara Ericson

Online resources

- Daniel Shiffman’s web page (shiffman.net): courses, videos, lots of inspiration.
- codeacademy.com, khanacademy.org, code.org
- courseware.cemc.uwaterloo.ca
- Online courses at lynda.com



Code is a creative medium.