

SO, YOU WANT
(SOMEONE ELSE)
TO LEARN TO
CODE!?





“

PROGRAMMERS ARE NOW BUILDING THE
WORLD. ANYONE IN THE WORLD WILL LIVE IN
THE WORLD WE BUILD. THE SYSTEMS THAT
GOVERN US. THE SYSTEMS THAT GOVERN OUR
RELATIONS. THE WAY WE ARE EDUCATED. THE
WAY WE ARE FORMED. PROGRAMMERS ARE
QUITE IMPORTANT.

— *Daniel Procida*

”

What Kids Are Doing Now

CODING, GAMING
& EXPLORING
EMERGING TRENDS



Coding

Arranged by Topic

“

“Learning how to program changes the way you think about, debug, and interact with the world.”

“You learn a set of rules to build software, ... then you learn that you can change the rules.”

“Programmers master a system they know they can change.”

“We take for granted that changing something to make it better is just a thing you do when you need to.”

“This can and should carry over to the rest of your life.”

— *Jessica McKellar*

”

徐行



繩手巾學校

VOCABULARY

variable

class

cryptography

instance

agile

abend

boolean

hash table

instantiate

concurrency

brute force

stack

big O

VOCABULARY

variable

class

polymorphism

cryptography

P vs NP

parallelism

instance

api

agile

abend

boolean

semantic versioning hash table

instantiate

waterfall

parameter

brute force

concurrency

recursion

stack

big O

abstract base class

heap

algorithm

pure virtual function

allocate

root kit

徐行



綏遠中學校


```
#include <iostream.h>

void main(int)
{
    int length, width;
    int perimeter, area;
    cout << "Length = ";
    cin >> length;
    cout << "Width = ";
    cin >> width;
    perimeter = 2*(length+width);
    area = length*width;
    cout << endl << "Perimeter is " << perimeter;
    cout << endl << "Area is " << area
        << endl;
}
```

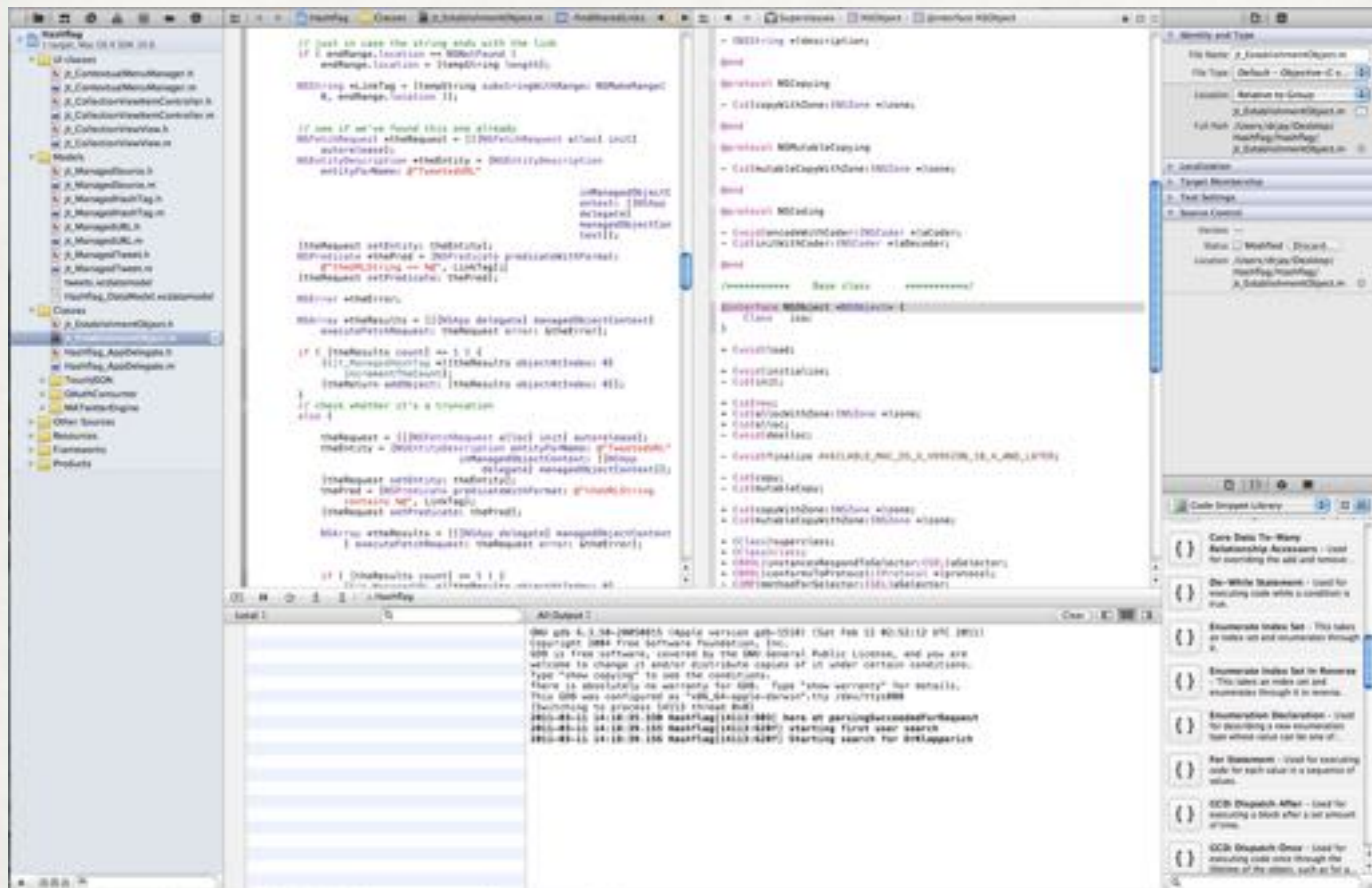
File Edit View Search Tools Documents Help

```
1
2 #include <iostream.h>
3
4 void main(int)
5 {
6     int length, width;
7     int perimeter, area;
8     cout << "Length = ";
9     cin >> length;
10    cout << "Width = ";
11    cin >> width;
12    perimeter = 2*( length+width);
13    area = length*width;
14    cout << endl << "Perimeter is " << perimeter;
15    cout << endl << "Area is " << area
16         << endl;
17 }
```



```
File Edit View Search Tools Documents Help
hrT.cpp
1
2 #include <iostream.h>
3
4 void main(int)
5 {
6     int length;
7     int width;
8     int perimeter;
9     int area;
10
11     cout << "Length = ";
12     cin >> length;
13     cout << "Width = ";
14     cin >> width;
15     perimeter = 2 * (length + width);
16     area = length * width;
17     cout << endl << "Perimeter is " << perimeter;
18     cout << endl << "Area is " << area << endl;
19 }
```

C++ Tab Width: 4 Ln 11, Col 6 INS



platformio.ini - wiring-blink - [~/Downloads/wiring-blink]

Project: wiring-blink

PlatformIO Build menu:

- PLATFORMIO_BUILD
- Edit Configurations
- Build All
- PLATFORMIO_BUILD
- PLATFORMIO_CLEAN
- PLATFORMIO_UPLOAD

Run PIO Tasks (Build, Upload, Clean, ...)

DO NOT USE THIS BUTTON

```
#ifndef ENERGIA
...
#else
#include "Arduino.h"
#endif

#ifndef LED_PIN
// Most Arduino boards already have a LED attached
#define LED_PIN 13
#endif

void setup() {
  pinMode(LED_PIN, OUTPUT); // set pin as output
}

void loop() {
  digitalWrite(LED_PIN, HIGH); // set the LED on
  delay(1000); // wait for a second
  digitalWrite(LED_PIN, LOW); // set the LED off
  delay(1000); // wait for a second
}
```

Messages Build

[Fri Sep 4 14:21:32 2015] Processing **uno** (platform: atmelavr, board: uno, framework: arduino)

scons: '.pioenvs/uno/firmware.hex' is up to date.
"avr-size" --mcu=atmega328p -C -d .pioenvs/uno/firmware.elf
AVR Memory Usage

Device: atmega328p
Program: 998 bytes (3.8% Full)
(.text + .data + .bootloader)
Data: 0 bytes (0.4% Full)
(.data + .bss + .noinit)

[SUCCESS] Took 1.14 seconds -----

[Fri Sep 4 14:21:33 2015] Processing **teensy31** (platform: teensy, board: teensy31, framework: arduino)

arm-none-eabi-g++ -o .pioenvs/teensy31/firmware.elf -Os -Wl,--gc-sections,--relax -mthumb -mcpu=cortex-m4 -Wl,--defsym=__rtc_localtime=1441365694 -Wl,-T /usr/bin/arm-none-eabi-objcopy -O ihex -R .eeprom .pioenvs/teensy31/firmware.elf .pioenvs/teensy31/firmware.hex
"arm-none-eabi-size" -B -d .pioenvs/teensy31/firmware.elf
text data bss dec hex filename
18048 1232 2268 13548 34e4 .pioenvs/teensy31/firmware.elf

[SUCCESS] Took 1.65 seconds -----

[Fri Sep 4 14:21:35 2015] Processing **lmp430g2553** (platform: timsp430, board: lmp430g2553, framework: energia)

"arm-none-eabi-g++" -o .pioenvs/lmp430g2553/firmware.elf -Os -Wl,--gc-sections,--relax -mthumb -mcpu=cortex-m4 -Wl,--defsym=__rtc_localtime=1441365694 -Wl,-T /usr/bin/arm-none-eabi-objcopy -O ihex -R .eeprom .pioenvs/lmp430g2553/firmware.elf .pioenvs/lmp430g2553/firmware.hex
"arm-none-eabi-size" -B -d .pioenvs/lmp430g2553/firmware.elf
text data bss dec hex filename
18048 1232 2268 13548 34e4 .pioenvs/lmp430g2553/firmware.elf

[SUCCESS] Took 1.65 seconds -----

Select Application configuration 'PLATFORMIO_BUILD'

14:18 LPT UTF-8: Control + Alt + C

PlatformIO

src

blink.cpp

platformio.ini

PlatformIO: Debug

7

#include <Arduino.h>

8

9

void setup()

10

{

11

// initialize LED digital pin as an output.

12

pinMode(LED_BUILTIN, OUTPUT);

13

• int warn_unused_var;

14

• call_undefined();

15

Serial.begin

16

}

17

18

void HardwareSerial::begin(unsigned long)

19

{

20

void HardwareSerial::begin(unsigned long baudrate, _

21

// with the LED on (PUSH-UP) is the voltage level

22

digitalWrite(LED_BUILTIN, HIGH);

23

// wait for a second

C wiring_digital.c

74

void digitalWrite(uint32_t ulPin, uint32_t ulVal)

75

{

76

// Handle the case the pin isn't usable as PIO

77

if (g_APinDescription[ulPin].ulPinType == PIO_NOT_A_PIN)

78

{

79

return ;

80

}

81

82

EPortType port = g_APinDescription[ulPin].ulPort;

83

uint32_t pin = g_APinDescription[ulPin].ulPin;

84

uint32_t pinMask = (1ul << pin);

85

86

if ((PORT->Group[port].DIRSET.reg & pinMask) == 0) {

87

// the pin is not an output, disable pull-up if val is L0

88

PORT->Group[port].PINCFG[pin].bit.PULLEN = ((ulVal == L0

Intelligent Code Completion

Smart Code Linter

PIO Unified Debugger

Watch Variables

Add expression to watch:

Expression	WP	Value	
Serial		{...}	X
HardwareSerial		{...}	X
sercom		0x2000007	X
sercom		0x42005c	X
ICM		{...}	X
ICS		{...}	X
SP1		{...}	X
USART		{...}	X
rxBuffer		{...}	X
_auxBuffer		[64]	X
_head		0	X
_tail		0	X
uc_pinRX @		36 'S'	X
uc_pinTX @		36 'R'	X
uc_padRX		SERCOM_	X
uc_padTX		SERCOM_	X
LED_BU			X

Breakpoints

in loop() at blink.cpp:22 (4)

Call Stacks

Thread #1

#0 in digitalWrite() at wiring_digital.c:82

ulPin = 13

ulVal = 1

port = <optimized out>

pin = <optimized out>

pinMask = <optimized out>

#1 in loop() at blink.cpp:22

#2 in main() at main.cpp:51

Severity	Provider	Description	Line
Error	GCC	'call_undefined' was not declared in this scope	14:18
Warning	GCC	unused variable 'warn_unused_var' [-Wunused-variable]	13:7

PIO Debug

1 1 0

15:14

#0 in digitalWrite() at wiring_digital.c:82

LF

UTF-8

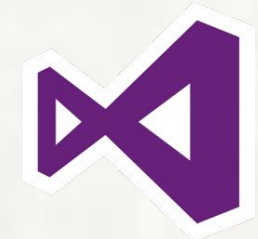
C++

IDE? EDITOR?

- ❖ syntax highlighting
- ❖ auto indent
- ❖ autocomplete
- ❖ debugging
- ❖ linting
- ❖ code execution
- ❖ project organization
- ❖ snippets

IDE? EDITOR?

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Or You're
WRONG

徐行



繩手中学校

Swift

```
println("Hello World")
```

LOL Code

```
HAI
CAN HAS STDIO?
VISIBLE "HAI WORLD!"
KTHXBYE
```

BrainF**d

```
>+++++++[<+++++>-]<.>+
+++++[<++++>-]<+.+++++..
+++ [-]>+++++++[<+++
+>-]<.>+++++++[<++++
+>-]<. >+++++++[<+++>-]<.
+++ .----- .----- .[-]>++++
++++[<++++>-]<+. [-]+++++
+++.
```

```
>+++++++[<+++++>-]<.>+
+++++[<++++>-]<+.+++++..
+++ [-]>+++++++[<+++
+>-]<.#>+++++++[<++++
+>-]<. >+++++++[<+++>-]<.
+++ .----- .----- .[-]>++++
++++[<++++>-]<+. [-]+++++
+++.
```

Python3

```
print('Hello World')
```

Go

```
package main

import "fmt"

func main() {
    fmt.Printf("Hello, World\n")
}
```

C++

```
#include <iostream>

int main()
{
    std::cout << "Hello, World.";
}

return 0;
```

Java

```
public class Hello {
    public static void main(String []args) {
        System.out.println("Hello World");
    }
}
```

Python2

```
print 'Hello World'
```

AppleScript

```
on helloWorld()
    display dialog "Hello
World!" buttons {"OK"}
end helloWorld

helloWorld()
```


徐行




```
name = input('What is your name? >')
age = input('What is your age? >')

days = int(age) * 365
hours = days * 24
minutes = hours * 60
seconds = minutes * 60

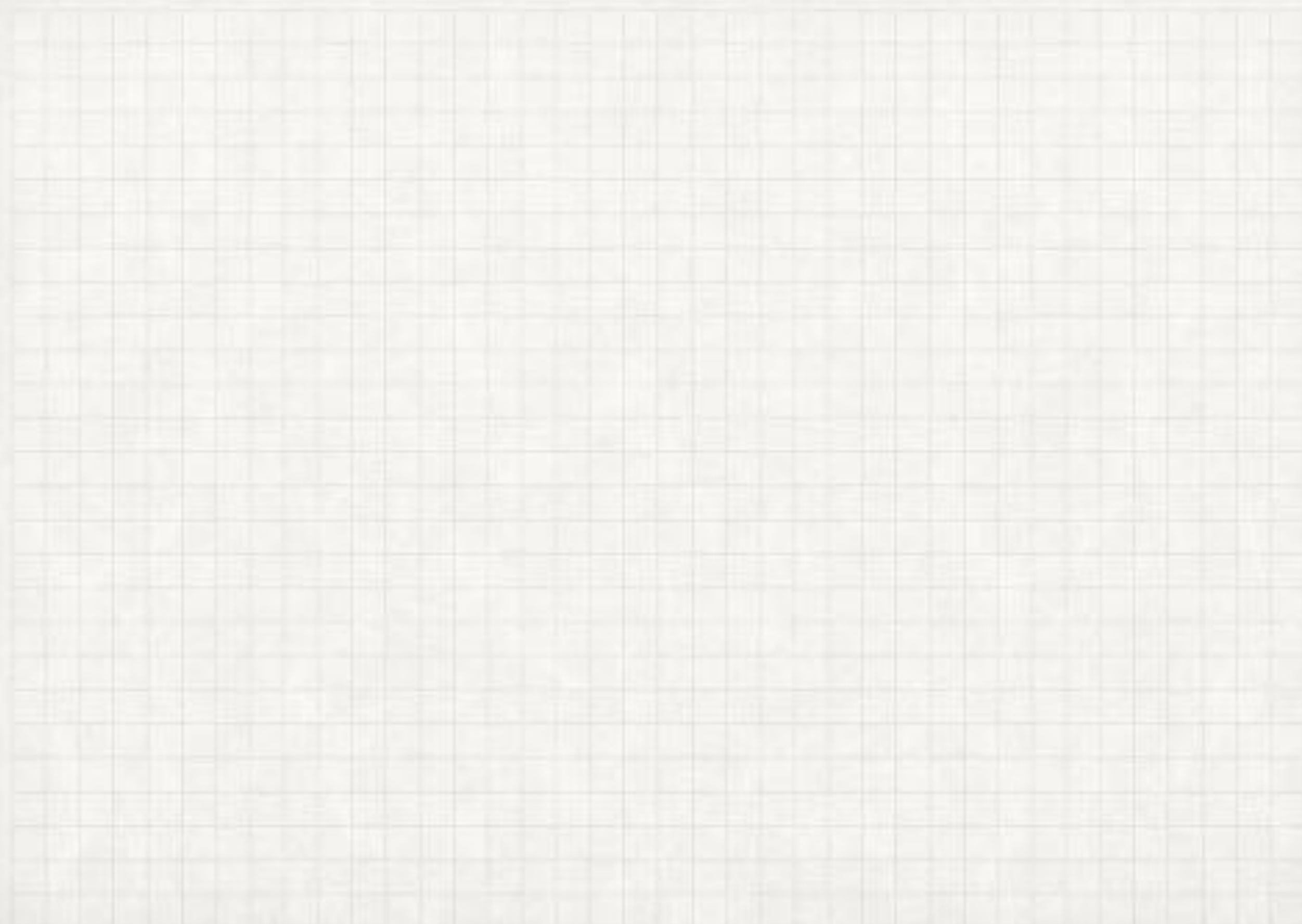
print(name + ' you are: ')
print(f'{days} days old')
print(f'{hours} hours old')
print(f'{minutes} minutes old')
print(f'{seconds} seconds old')
```

```
name = input('What is your name? >')
age = input('What is your age? >')

days = int(age) * 365
hours = days * 24
minutes = hours * 60
seconds = minutes * 60

print(name + ' you are: ')
print(f'{days} days old')
print(f'{hours} hours old')
print(f'{minutes} minutes old')
print(f'{seconds} seconds old')
```

```
—> python my_first_codez.py
What is your name? >Jonny
What is your age? >25
Jonny you are:
9125 days old
219000 hours old
13140000 minutes old
788400000 seconds old
```

```
(/private/tmp)  
➤ python my_first_codez.py
```

```
What is your name? >Johnny
```

```
What is your age? >25
```

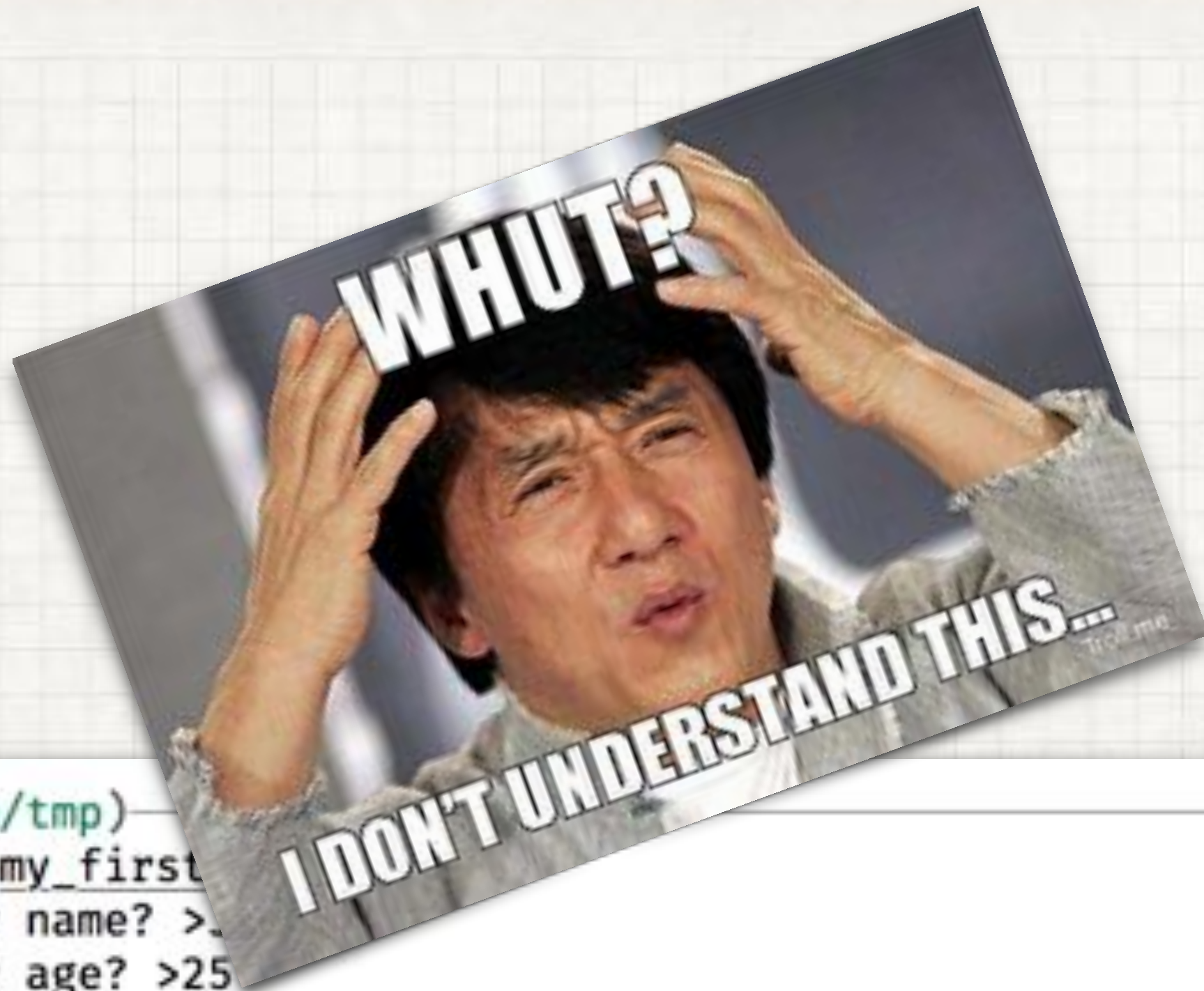
```
Johnny you are:
```

```
Traceback (most recent call last):
```

```
  File "my_first_codez.py", line 15, in <module>
```

```
    raise SomeVagueException(err_msg)
```

```
__main__.SomeVagueException: Whoopsie, Error: Something Happen
```

```
(/private/tmp)
➤ python my_first
What is your name? >
What is your age? >25
Johnny you are:
Traceback (most recent call last):
  File "my_first_codez.py", line 15, in <module>
    raise SomeVagueException(err_msg)
__main__.SomeVagueException: Whoopsie, Error: Something Happen
```


Software can be chaotic, but we make it work



Expert

Trying Stuff Until it Works

O RLY?

*The Practical Developer
@ThePracticalDev*

The internet will make those bad words go away



Essential

Googling the Error Message

O RLY?

*The Practical Developer
@ThePracticalDev*

Cutting corners to meet arbitrary management deadlines



Essential

Copying and Pasting from Stack Overflow

O'REILLY*

*The Practical Developer
@ThePracticalDev*

How to actually learn any new programming concept



Essential

Changing Stuff and Seeing What Happens

O RLY?

@ThePracticalDev

Not thinking about how much pain this is going to cause in the future



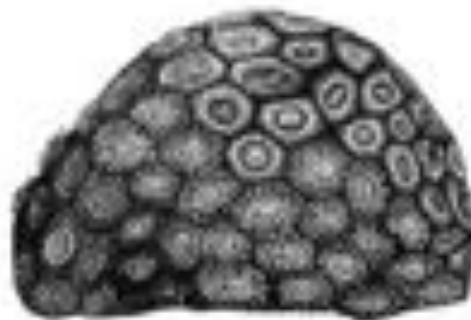
Essential

Rationalizing Your Awful Hackjob

O RLY?

@ThePracticalDev

Maybe you should have commented



Forgetting How Your Own Code Works

//TODO: Comment

O RLY?

FunctionZero

Achievement despite ignorance



Getting it to Work

And Having No Idea How

O RLY?

@ThePracticalDev

Probably be able explain a sorting algorithm if it ever comes up



Expert

Vague Understanding of Computer Science

O RLY?

@ThePracticalDev

徐行



绥王中学校


```
(/private/tmp)  
➤ python my_first_codez.py
```

```
What is your name? >Johnny
```

```
What is your age? >25
```

```
Johnny you are:
```

```
Traceback (most recent call last):
```

```
  File "my_first_codez.py", line 15, in <module>
```

```
    raise SomeVagueException(err_msg)
```

```
__main__.SomeVagueException: Whoopsie, Error: Something Happen
```



```
(/private/tmp)  
➤ python my_first_codez.py
```

```
What is your name? >Johnny
```

```
What is your age? >25
```

```
Johnny you are:
```

```
Traceback (most recent call last):
```

```
  File "my_first_codez.py", line 15, in <module>
```

```
    raise SomeVagueException(err_msg)
```

```
__main__.SomeVagueException: Whoopsie, Error: Something Happen
```



❖ Language

- ❖ Language
- ❖ Design Patterns

- ❖ Language
- ❖ Design Patterns
- ❖ Algorithms

- ❖ Language
- ❖ Design Patterns
- ❖ Algorithms
- ❖ All the other stuff

1997: Let's make a website!
fires up vi

- ❖ Language
- ❖ Design Patterns
- ❖ Algorithms
- ❖ All the other stuff

1997: Let's make a website!
fires up vi


2007: Let's make a website!
downloads jQuery
fires up vi

- ❖ Language
- ❖ Design Patterns
- ❖ Algorithms
- ❖ All the other stuff

- ❖ Language
- ❖ Design Patterns
- ❖ Algorithms
- ❖ All the other stuff

1997: Let's make a website!
fires up vi

2007: Let's make a website!
downloads jQuery
fires up vi

2017: Let's make a website!


This is a starter boilerplate app I've put together using the following technologies:

- isomorphic [universal](#) rendering
- Both client and server make calls to load data from separate API server
- React
- React Router
- Express
- Babel for ES6 and ES7 magic
- Webpack for bundling
- Webpack Dev Middleware
- Webpack Hot Middleware
- Redux's futuristic Flux implementation
- Redux Dev Tools for next generation DX (developer experience). Watch Dan Abramov's talk.
- React Router Redux Redux/React Router bindings.
- ESLint to maintain a consistent code style
- redux-form to manage form state in Redux
- is-immutable to speed up form validation
- multireducer to combine single reducers into one key-based reducer
- style-loader, sass-loader and less-loader to allow import of stylesheets in plain css, sass and less.
- bootstrap-sass-loader and font-awesome-webpack to customize Bootstrap and FontAwesome
- react-helmet to manage title and meta tag information on both server and client
- webpack-isomorphic-tools to allow require() work for statics both on client and server
- mocha to allow writing unit tests for the project.

LOC

LET'S PLAY A GUESSING GAME

LOC

LET'S PLAY A GUESSING GAME

- Unreal Engine 3

LOC

LET'S PLAY A GUESSING GAME

- Unreal Engine 3
 - 2,000,000

LOC

LET'S PLAY A GUESSING GAME

- Unreal Engine 3
 - 2,000,000
- Minecraft

LOC

LET'S PLAY A GUESSING GAME

- Unreal Engine 3
 - 2,000,000
- Minecraft
 - 600,000

LOC

LET'S PLAY A GUESSING GAME

- Unreal Engine 3
 - 2,000,000
- Minecraft
 - 600,000
- Witcher 3

LOC

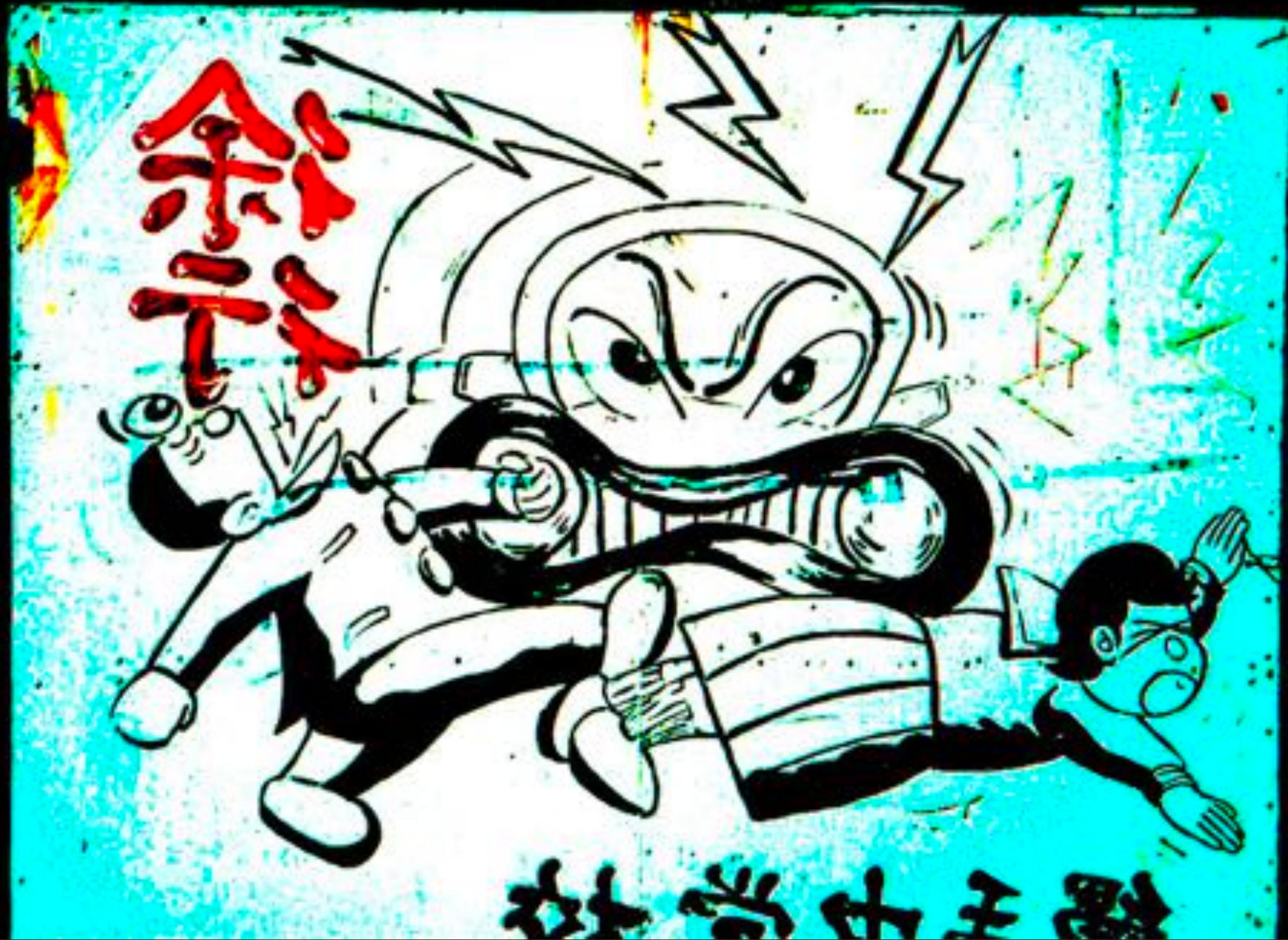
LET'S PLAY A GUESSING GAME

- Unreal Engine 3
 - 2,000,000
- Minecraft
 - 600,000
- Witcher 3
 - 1,500,000

Solving Problems

"I can guarantee you, without fear of contradiction, that no software engineer will ever have to write a binary search after they are hired. It's like choosing a contractor because they know how to forge and cast steel using coal, iron, an oven and a bellows, when they actually need to know a) the address of the nearest Home Depot b) what to do with the steel once they buy it."

-Jon Evans ([Why the new guy can't code](#))



MITOPENCOURSEWARE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY



CheckiO

coursera

codecademy



lightbot™



