



# Build 2020에서 나온 JavaScript & TypeScript 이야기

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# (JavaScript is Everywhere 2019)



Microsoft

## Microsoft Build

May 6–8, 2019

지난 5월, 미국에서 개최된 Build 행사에서 여러 TypeScript 관련 발표가 있었습니다. 놓치지 마세요!

BRK 3023 [What's new in TypeScript](#)

CFS 2022 [One Language to Rule Them All: TypeScript](#)

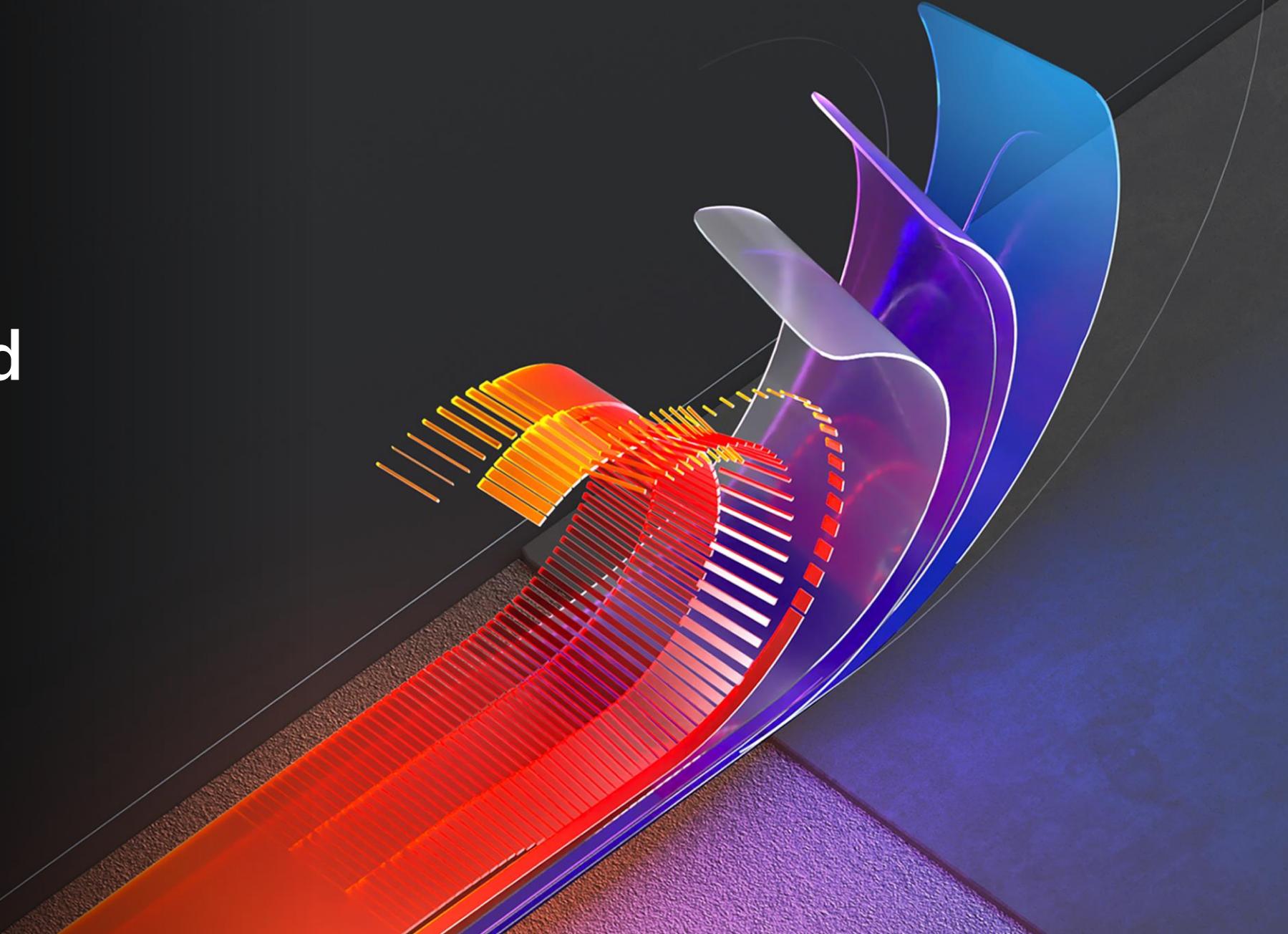
BDL 2011 [Inside TypeScript with Anders Hejlsberg](#)

TS //build



# Microsoft Build

May 19-20 | Digital Event







## Developer activity

↑17%

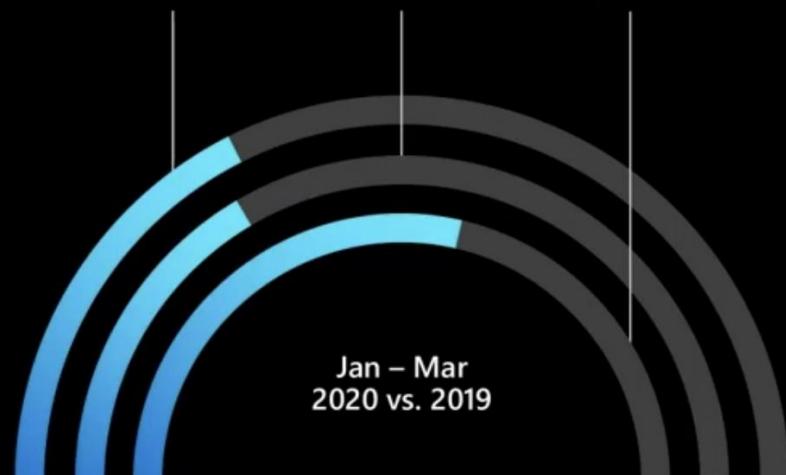
pull request  
creation

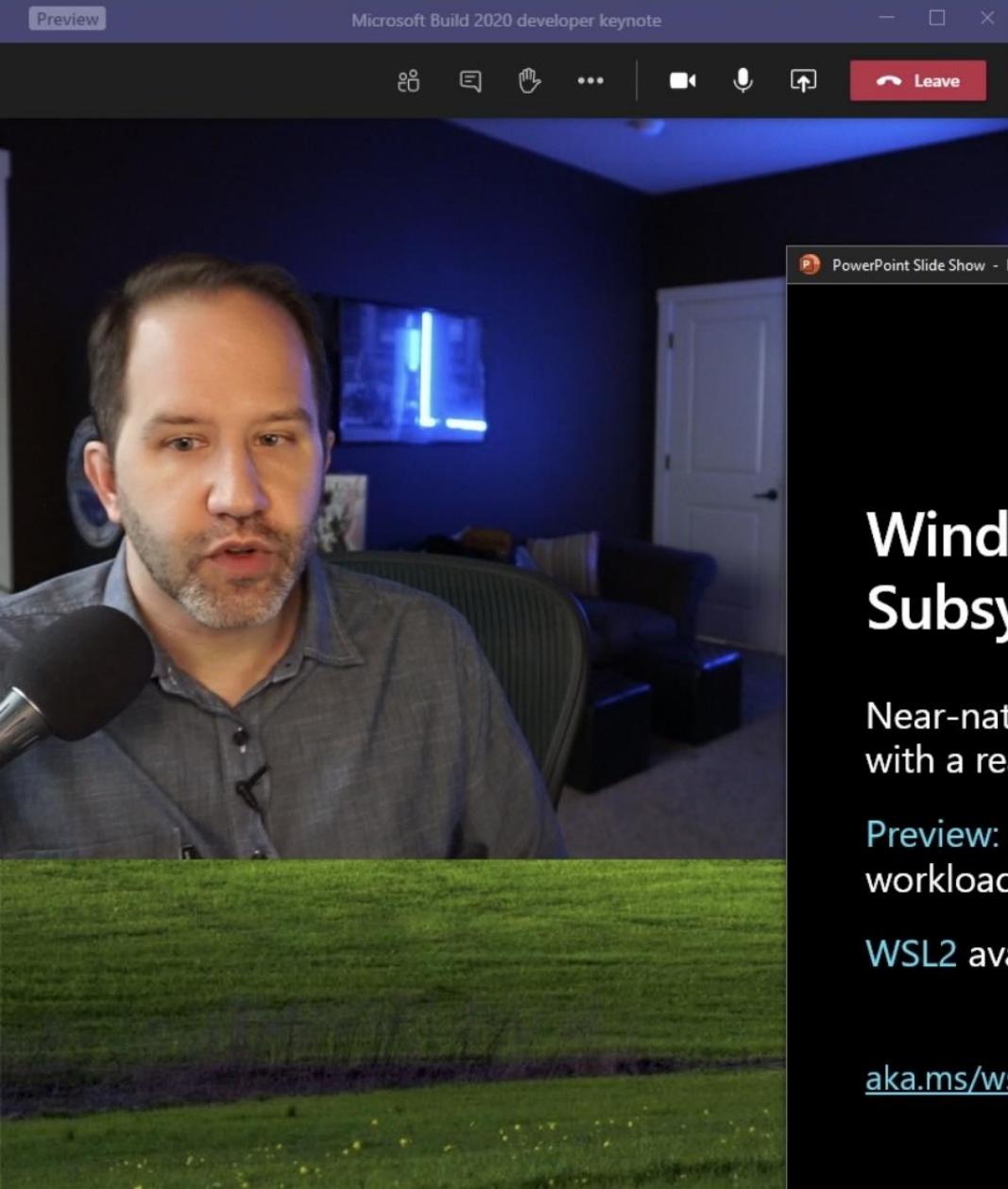
↑16%

push  
volume

↑27%

open source  
projects created





Microsoft Build 2020 developer keynote

Leave

PowerPoint Slide Show - Build 2020 ScottHa Keynote Deck.pptx - PowerPoint

# Windows Subsystem for Linux

Near-native Linux performance with a real Linux kernel

Preview: Hardware accelerated workloads via GPU

WSL2 available today

[aka.ms/wsl](http://aka.ms/wsl)

A laptop screen displaying three terminal windows side-by-side. Each window shows a different Linux distribution: Debian, openSUSE, and Ubuntu. The terminals are running on the Windows Subsystem for Linux (WSL2). The screens show command-line interfaces with various commands and system information. The background of the laptop screen shows a blue sky with clouds.

# JavaScript is Everywhere at Build 2020!

JavaScript

Refine results JavaScript Clear all

11 sessions Relevance On demand sessions

The screenshot shows a search results page for 'JavaScript' on the Microsoft Build 2020 website. At the top, there's a search bar with 'JavaScript' typed in, a magnifying glass icon, and a 'Refine results' button. Below the search bar are buttons for 'JavaScript' and 'Clear all'. Underneath these are filters for '11 sessions', 'Relevance', and 'On demand sessions'. The main area displays 11 session cards arranged in two rows of five. Each card includes a thumbnail image, the session ID, title, speakers, and date.

Session ID	Title	Speakers	Date
COM135	Focus Group: TypeScript/JavaScript Tooling	Gabrielle Crevecoeur	Thursday, May 21, 5:15 AM - 6:15 AM KST
COM227B	Microsoft MakeCode Arcade JavaScript	Sambhav Bhurtel, Microsoft Student Partners	Thursday, May 21, 8:45 PM - 9:15 PM KST
COM227A	Microsoft MakeCode Arcade JavaScript	Peli de Halleux, Microsoft; Joey Wunderlich, Microsoft	Thursday, May 21, 12:15 AM - 12:45 AM KST
COM225	Introduction to Web Programming with JavaScript	Jen Looper, Jen Looper	Wednesday, May 20, 10:45 PM - 11:15 PM KST
COM32	Build a Virtual Reality Game with JavaScript!	Cassie Breviu, Microsoft	Thursday, May 21, 7:00 PM - 7:30 PM KST
COM155	Learn Studio Session: Create interactive bots for Teams	Ojasvi Choudhary	Thursday, May 21, 8:30 AM - 9:45 AM KST
COM208	"Hello, World!" in 3 Languages	Shana Matthews, Microsoft	Wednesday, May 20, 1:00 PM - 1:30 PM KST
COM156	Learn Studio Session: Create interactive bots for Teams	Ojasvi Choudhary	Thursday, May 21, 8:00 PM - 9:15 PM KST

# What's New in TypeScript

Speakers Daniel Rosenwasser

Session code  
BOD101

Session type  
Pre-recorded Session

Level  
Intermediate (200)

Related Links  
[Microsoft Learn](#)  
[Microsoft Docs](#)  
[Channel 9](#)

## What's New in TypeScript?



Daniel Rosenwasser  
Program Manager



TypeScript has gone through a year of adding richer functionality, new standards feature, smarter checking, and faster compiles. We'll talk about what's here and what's next in the TypeScript language.

- Open source and open development
- Closely track ECMAScript standard
- Innovate in type system
- Best of breed tooling
- Continuously lower barrier to entry
- Community, community, community



File Edit Selection View Go Run Terminal Help

• index.ts - demo - Visual Studio Code

EXPLORER

OPEN EDITOR... 1 UNSAVED

● TS index.ts bigint 1

DEMO

> assertions

> bigint

TS index.ts 1

tsconfig.json

> blur-image

> optional-chaining

> private

❖ .gitignore

{ package.json

OUTLINE

TIMELINE

NPM SCRIPTS

master\* 0 1 61 1 0 0

Ln 1, Col 29 Spaces: 4 UTF-8 CRL

VS Code icon

DEV icon

TS index.ts

bigint > TS index.ts > [x] x

1 | let x = 1123581321345589144n;

BigInt literals are not available when targeting lower than ES2020. ts(2737)

Peek Problem (Alt+F8) No quick fixes available



```
tional-chaining > ts sample.ts > ⚒ getDisplayName
```

```
1 interface Session {  
2   user?: User;  
3 }  
4  
5 interface User {  
6   name: string;  
7 }  
8  
9 function getDisplay [property] Session.user?: User | undefined  
10  return session.user && session.user.name.toUpperCase();  
11 }
```



```
9 function getDisplayName(session: Session) {  
10  return session.user?.name.toUpperCase() || "[NO USER LOGGED IN]";  
11 }
```



```
8  
9 function getDisplayName(session: Session) {  
10  return session.user?.name.toUpperCase() ?? "[NO USER LOGGED IN]";  
11 }
```

Normative: Add Optional Chaining #1646

Merged ljharb merged 1 commit into tc39:master from DanielRosenwasser:optional-chaining on Dec 11, 2019

Conversation 45 Commits 1 Checks 0 Files changed 1



DanielRosenwasser commented on Jul 25, 2019 • edited

This change adds the relevant updates for the stage 3 Optional Chaining proposal. The intended changes can be viewed at <https://tc39.es/proposal-optional-chaining/>.  
The Test262 PR is available at tc39/test262#262

26 9 7 00 1

Normative: Add Nullish Coalescing #1644

Merged ljharb merged 1 commit into tc39:master from DanielRosenwasser:nullish-coalescing on Dec 11, 2019

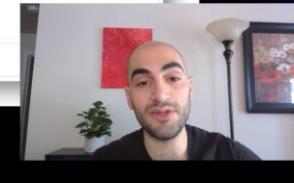
Conversation 11 Commits 1 Checks 0 Files changed 1



DanielRosenwasser commented on Jul 24, 2019 • edited

This change adds the relevant updates for the stage 3 Nullish Coalescing proposal. The intended changes can be viewed at <https://tc39.es/proposal-nullish-coalescing/>.  
The Test262 PR is available at tc39/test262#2402

13 11



```
interface User {  
    isAdministrator(): boolean;  
}
```

```
function eraseAllData(user: User) {  
    if (user.isAdministrator) {  
        ~~~~~~  
        This condition will always return true since the function is always defined.  
        Did you mean to call it instead?  
  
        console.log("Destroying all your files!");  
    }  
    else {  
        console.error("Sorry, no dice!");  
    }  
}
```



```
interface User {  
    isAdministrator(): boolean;  
}
```

```
function eraseAllData(user: User) {  
    if (user.isAdministrator()) {  
        console.log("Destroying all your files!");  
    }  
    else {  
        console.error("Sorry, no dice!");  
    }  
}
```

```
import * as fs from "fs";  
import { promisify } from "util";  
  
const stat = promisify(fs.stat);  
  
async function doStuff(path: string) {  
    const result = await stat(path);  
    if (result.isDirectory) {  
        ~~~~~~  
        This condition will always return true since the function is always defined.  
        Did you mean to call it instead?  
  
        // ...  
    }  
}
```

```
async function doStuff(path: string) {  
    const result = await stat(path);  
    if (result.isDirectory()) {  
        // ...  
    }  
}
```

Go Run Terminal Help index.ts - demo - Visual Studio Code

private > src > ts index.ts > Person > firstName

```
1 class Person {
2   private firstName: string;
3   private lastName: string;
4   constructor(firstName: string, lastName: string) {
5     this.firstName = firstName;
6     this.lastName = lastName;
7   }
8   get fullName(): string {
9     return `${this.firstName} ${this.lastName}`;
10  }
11 }
12 console.log(new Person("Jeff", "FizzBuzz").firstName);
13 }
14
15 console.log(new Person("Jeff", "FizzBuzz").firstName);
```

PROBLEMS 1 OUTPUT TERMINAL DEBUG CONSOLE 2: powershell + ×

```
d----- 5/9/2020 5:43 PM      src
-a---- 5/9/2020 5:43 PM      172 tsconfig.json
```

```
PS C:\Users\dan\demo\private> node .\lib\
Jeff
PS C:\Users\dan\demo\private> node .\lib\
```

VS.

```
class Person {
  #firstName: string;
  lastName: string;
  constructor(firstName: string, lastName: string) {
    Enter to Rename, Shift+Enter to Preview this.lastName = lastName;
  }
}
```

Property '#firstName' is not accessible outside class 'Person' because it has a private identifier. ts(18013)

Peek Problem (Alt+F8) No quick fixes available

```
  ", "FizzBuzz").#firstName);
```

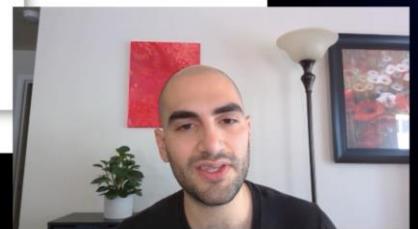
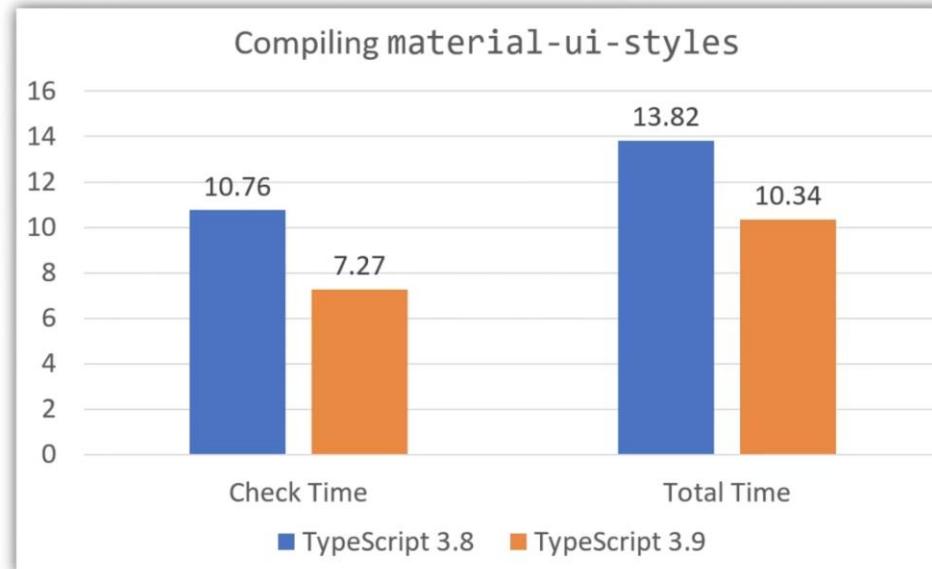
```
PS C:\Users\dan\demo\private> node .\lib\
C:\Users\dan\demo\private\lib\index.js:14
console.log(new Person("Jeff", "FizzBuzz").#firstName);
^
```

```
SyntaxError: Private field '#firstName' must be declared in an enclosing class
at Object.compileFunction (vm.js:344:18)
at wrapSafe (internal/modules/cjs/loader.js:1106:15)
```

## Build Improvements

- Optimizations for project references
- `--incremental` mode improvements
- Type-checking improvements

## Improved Check Times



A photograph of a large, chaotic cluster of many traffic lights, all showing different colors (red, yellow, green) simultaneously, symbolizing TypeScript's error message about forgetting a required property on an object.

 **Kitze** @thekitzie [Follow](#) ▾

# how can you not \*love\* TypeScript when the error messages are so clean and readable

```
TS2345: Argument of type '{ isDefault: true; active: boolean; id: string; name: string; os: OS; type: DeviceType; width: number; height: number; userAgent: string; inputType: InputType; } | { isDefault: true; active: boolean; ... 7 more ...; inputType: InputType; } | { ... }' is not assignable to parameter of type 'ModelCreationType<ExtractCFromProps<{ name: ISimpleType<string>; width: ISimpleType<number>; height: ISimpleType<number>; id: IOptionalType<ISimpleType<string>; [undefined]>; settings: IOptionalType<IModelType<{ global: IOptionalType<ISimpleType<boolean>; [...]>; zoom: IOptionalType<...>; showSizes: IOptionalTy...>; settings: ModelCreationType<ExtractCFromProps<{ global: IOptionalType<ISimpleType<boolean>; [...]>; zoom: IOptionalType<...>; showSizes: IOptionalTy...>; orientation: IOptionalType<...>; >>>; ... 7 more ...; deleted: ...>; settings, tags, deleted }>; width: number; height: number; userAgent: string; inputType: InputType; }' is missing the following properties from type '{ id: string; name: string; os: OS; type: DeviceType; width: number; height: number; userAgent: string; inputType: InputType; }': settings, tags, deleted
```

3:14 AM - 12 Jul 2019

---

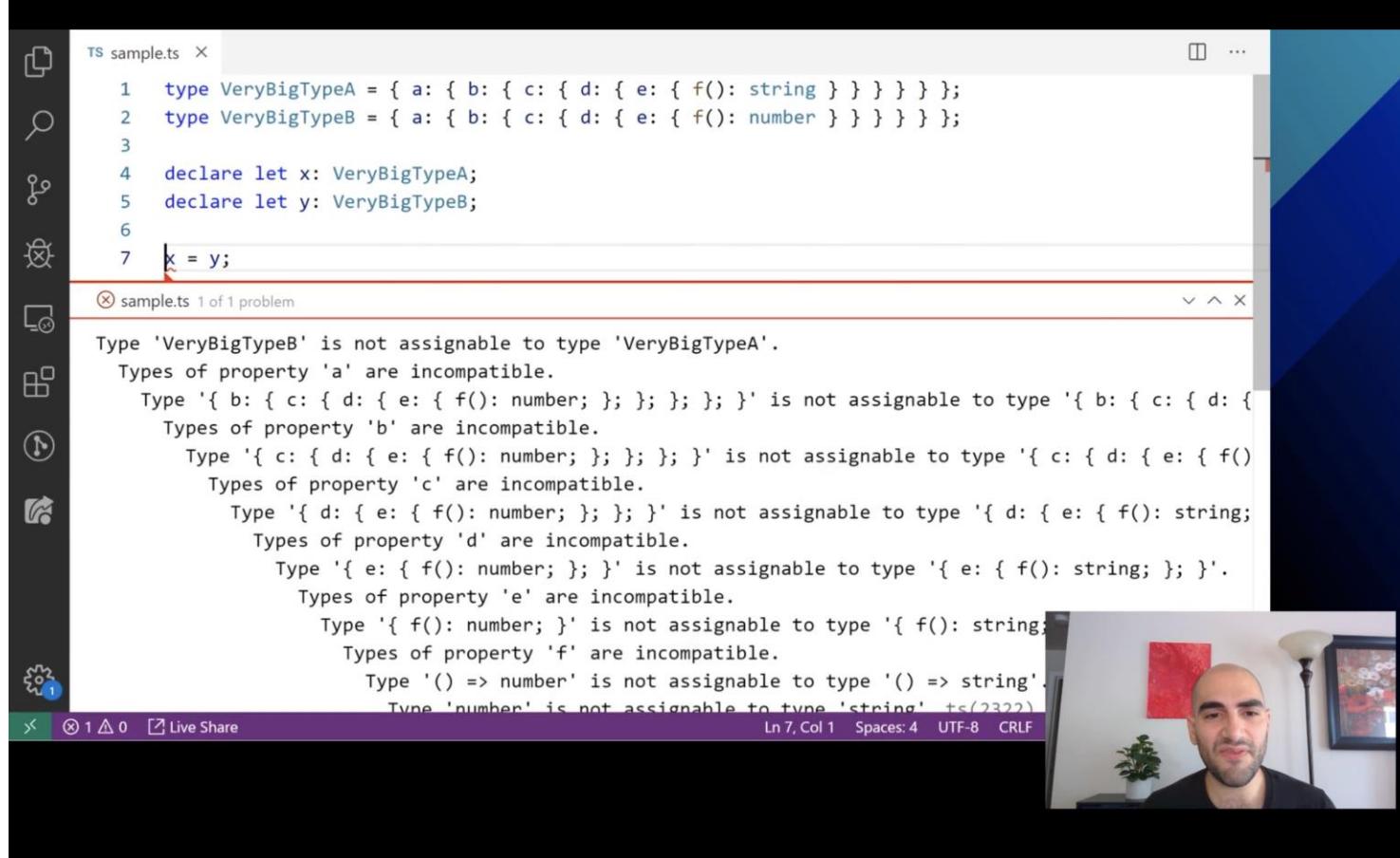
9 Retweets 90 Likes



---

6  9  90





sample.ts

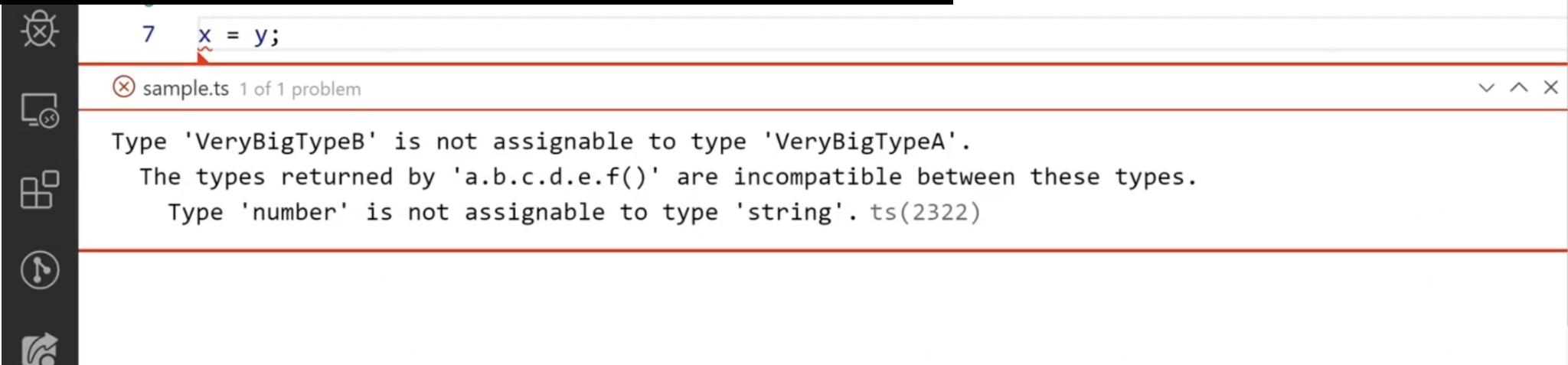
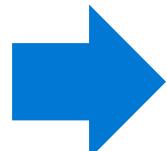
```
1 type VeryBigTypeA = { a: { b: { c: { d: { e: { f(): string } } } } } };
2 type VeryBigTypeB = { a: { b: { c: { d: { e: { f(): number } } } } } };
3
4 declare let x: VeryBigTypeA;
5 declare let y: VeryBigTypeB;
6
7 x = y;
```

sample.ts 1 of 1 problem

Type 'VeryBigTypeB' is not assignable to type 'VeryBigTypeA'.  
Types of property 'a' are incompatible.  
  Type '{ b: { c: { d: { e: { f(): number; } }; }; }; }' is not assignable to type '{ b: { c: { d: { e: { f(): string } } } } }';  
    Types of property 'b' are incompatible.  
      Type '{ c: { d: { e: { f(): number; } }; }; }' is not assignable to type '{ c: { d: { e: { f(): string } } } }';  
        Types of property 'c' are incompatible.  
          Type '{ d: { e: { f(): number; } }; }' is not assignable to type '{ d: { e: { f(): string } } }';  
            Types of property 'd' are incompatible.  
              Type '{ e: { f(): number; } }' is not assignable to type '{ e: { f(): string } }';  
                Types of property 'e' are incompatible.  
                  Type '{ f(): number; }' is not assignable to type '{ f(): string }';  
                    Types of property 'f' are incompatible.  
                      Type '() => number' is not assignable to type '() => string'. ts(2322)  
                      Type 'number' is not assignable to type 'string'. ts(2322)

① 1 △ 0 Live Share

Ln 7, Col 1 Spaces: 4 UTF-8 CRLF



sample.ts

```
7 x = y;
```

sample.ts 1 of 1 problem

Type 'VeryBigTypeB' is not assignable to type 'VeryBigTypeA'.  
The types returned by 'a.b.c.d.e.f()' are incompatible between these types.  
Type 'number' is not assignable to type 'string'. ts(2322)

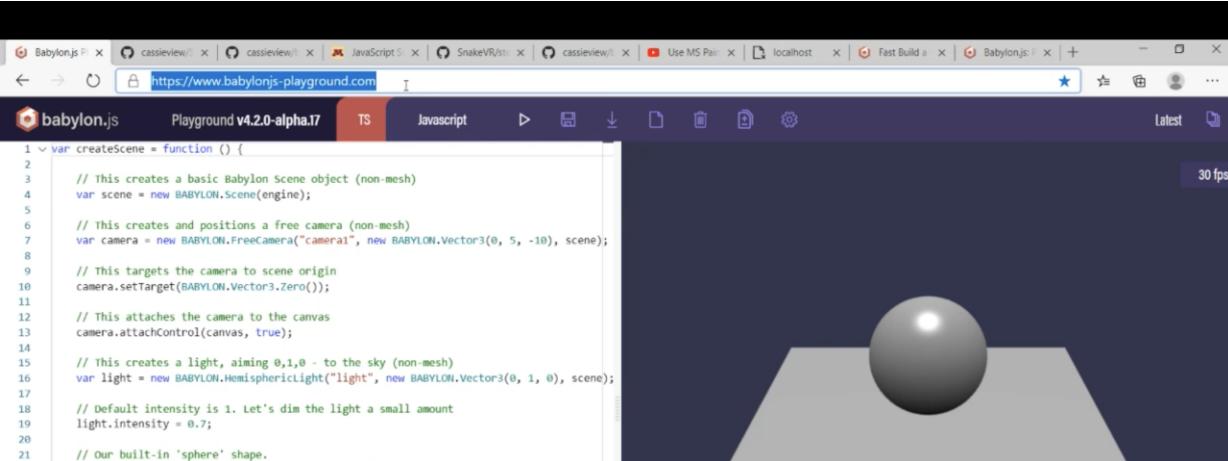




## BUILD A VIRTUAL REALITY GAME WITH JAVASCRIPT! 🐍🎮

Cassie Breviu  
**Cloud Advocate**  
@cassieview

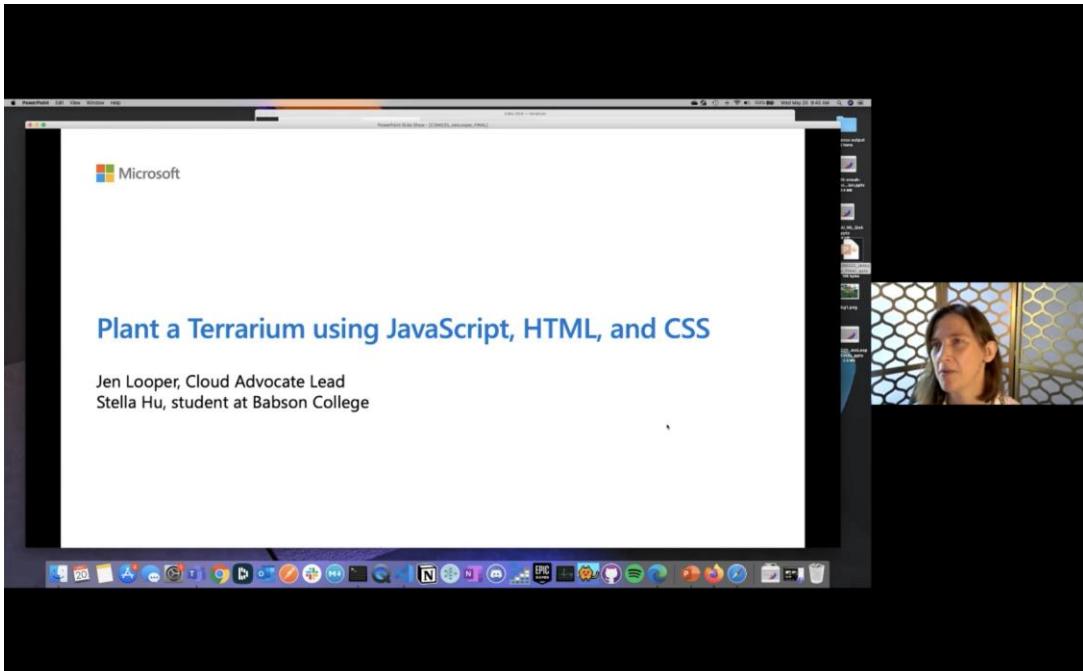
EDITORS AND LANGUAGES	
WebXR	BabylonJS
JavaScript	AR.js
Unity and Visual Studio	C#
	MRTK
Unreal Engine	Blueprints
	C++



The screenshot shows a Babylon.js playground interface. The code editor contains the following JavaScript code:

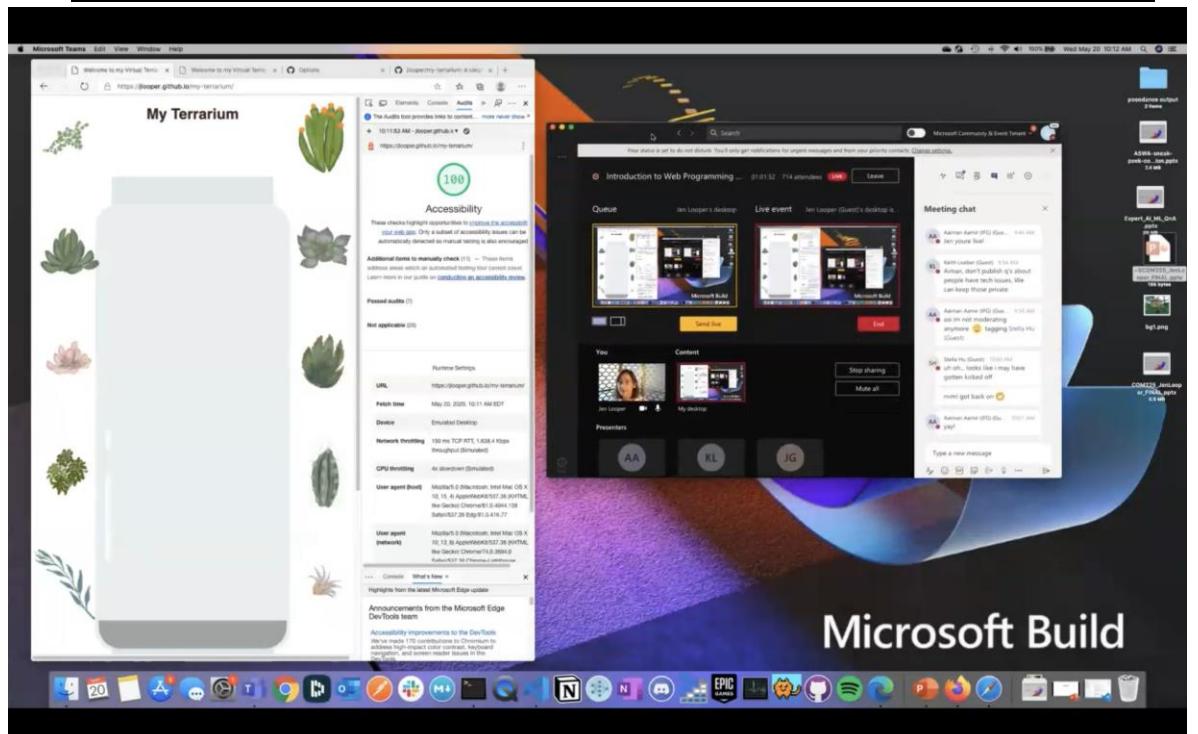
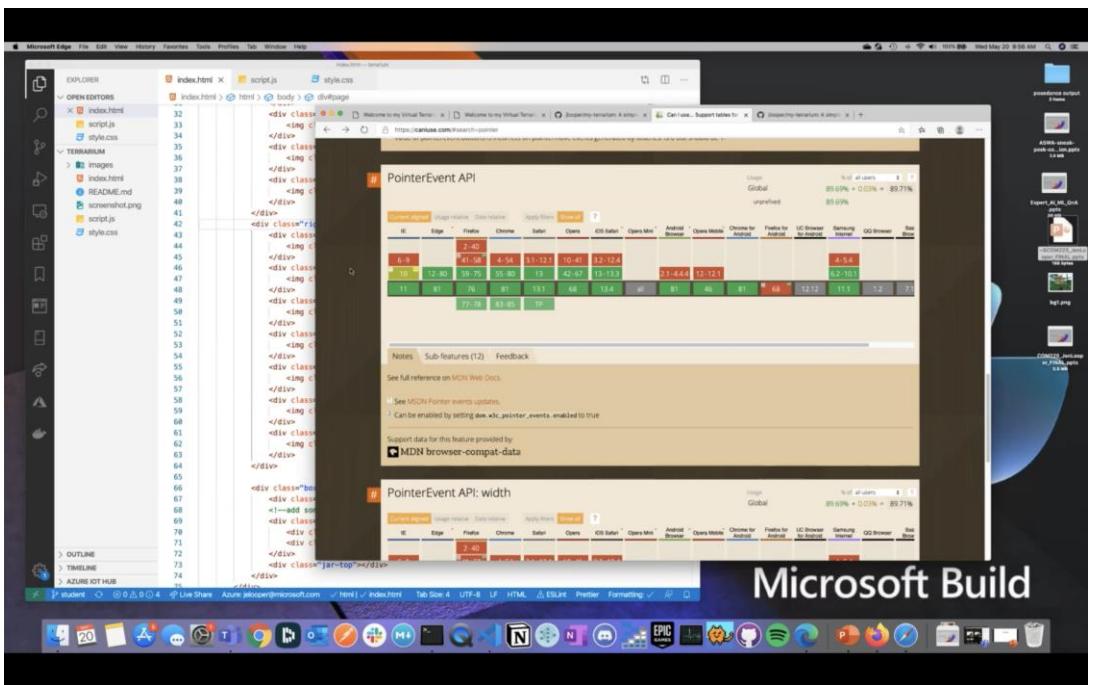
```
1 // var createScene = function () {
2 //   // This creates a basic Babylon Scene object (non-mesh)
3 //   var scene = new BABYLON.Scene(engine);
4 //
5 //   // This creates and positions a free camera (non-mesh)
6 //   var camera = new BABYLON.FreeCamera("camera", new BABYLON.Vector3(0, 5, -10), scene);
7 //
8 //   // This targets the camera to scene origin
9 //   camera.setTarget(BABYLON.Vector3.Zero());
10 //
11 //   // This attaches the camera to the canvas
12 camera.attachControl(canvas, true);
13 //
14 // This creates a light, aiming 0,1,0 - to the sky (non-mesh)
15 var light = new BABYLON.HemisphericLight("light", new BABYLON.Vector3(0, 1, 0), scene);
16 //
17 // Default intensity is 1. Let's dim the light a small amount
18 light.intensity = 0.7;
19 //
20 // Our built-in 'sphere' shape.
21 var sphere = BABYLON.MeshBuilder.CreateSphere("sphere", {diameter: 2, segments: 32}, scene);
22 //
23 // Move the sphere upward 1/2 its height
24 sphere.position.y = 1;
25 //
26 // Our built-in 'ground' shape.
27 var ground = BABYLON.MeshBuilder.CreateGround("ground", {width: 6, height: 6}, scene);
28 //
29 return scene;
30 };
31 //
32 };
```

The playground preview window shows a 3D scene with a gray sphere resting on a gray rectangular plane against a dark background.



## Plant a Terrarium using JavaScript, HTML, and CSS

Jen Looper, Cloud Advocate Lead  
Stella Hu, student at Babson College





Why "Hello, world!"?

hello\_world.py    C# helloworld.cs    JS helloworld.js X

hello\_javascript > JS helloworld.js > ...

```
1 var msg = "Hello, World!"  
2 var is_build = true  
3  
4 if(is_build)  
5 {  
6     msg = "Hello, Build!"  
7 }  
8  
9 console.log(msg)  
10
```

## Language comparison

Language	Primary usage	Typing	Syntax	Key benefits
Python	<ul style="list-style-type: none"><li>• Data science</li><li>• Web backend</li><li>• DevOps</li></ul>	Dynamic (duck typing)	Whitespace matters	<ul style="list-style-type: none"><li>• Readability</li><li>• Libraries</li><li>• Community</li></ul>
C#	<ul style="list-style-type: none"><li>• Application development</li><li>• General purpose</li></ul>	Static	Strict rules & structure	<ul style="list-style-type: none"><li>• Mature and stable</li><li>• Powerful debugging</li></ul>
JavaScript	<ul style="list-style-type: none"><li>• Web frontend and backend</li></ul>	Dynamic	Quirky	<ul style="list-style-type: none"><li>• Speed</li><li>• Versatile and interoperable</li></ul>



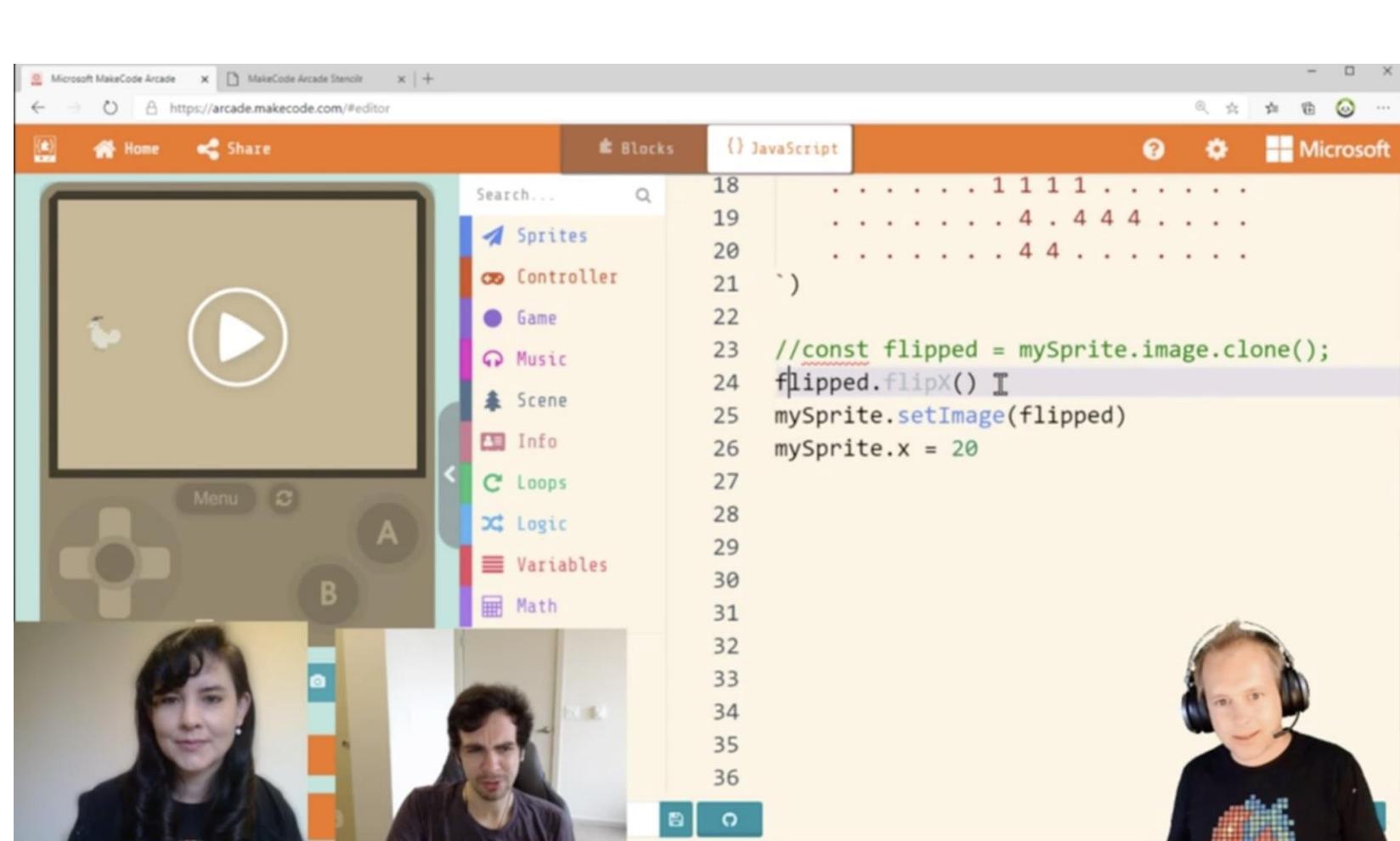
Microsoft

Microsoft MakeCode

Arcade Part 2—JavaScript

Tuesday May 20th, 2020  
7:45am PT

A woman in a black jacket is in the top right corner.



Microsoft MakeCode Arcade | MakeCode Arcade Stencil | https://arcade.makecode.com/#editor

Home Share Blocks JavaScript

Search... Q

18 . . . . . 1 1 1 1 . . . .

19 . . . . . 4 . 4 4 4 . . . .

20 . . . . . 4 4 . . . . . .

21 `)

22

23 //const flipped = mySprite.image.clone();

24 flipped.flipX() I

25 mySprite.setImage(flipped)

26 mySprite.x = 20

27

28

29

30

31

32

33

34

35

36

Sprites Controller Game Music Scene Info Loops Logic Variables Math

Menu A B

A woman and a man are in the bottom left, and a boy with headphones is in the bottom right.



Arcade hardware

Boards

BeasicPad Arcade  
BeasicPad Arcade is a handheld device that you can use to play games or learn how to code them.

BeasicPad  
BeasicPad is a handheld device that you can use to play games or learn how to code them.

BeasicPad Pygame  
The BeasicPad Pygame is a handheld device that you can use to play games or learn how to code them.

Kitsound ARCADE  
ARCADE is a programmable handheld device that you can use to play games or learn how to code them.

BeasicPad Steam  
BeasicPad Steam is a programmable handheld device that you can use to play games or learn how to code them.

BeasicPad Pygame  
The BeasicPad Pygame is a handheld device that you can use to play games or learn how to code them.

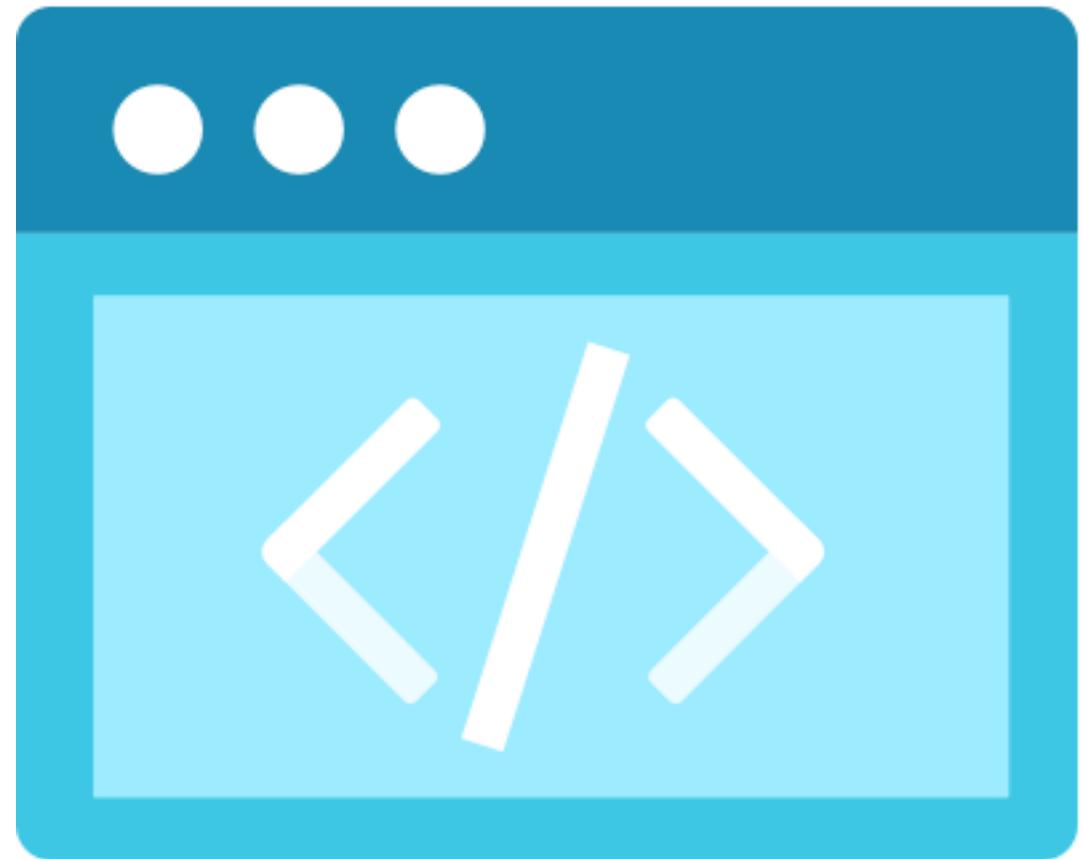
BeasicPad Pro  
Create more complex games on BeasicPad Pro than BeasicPad.

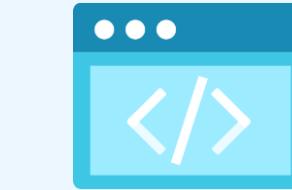
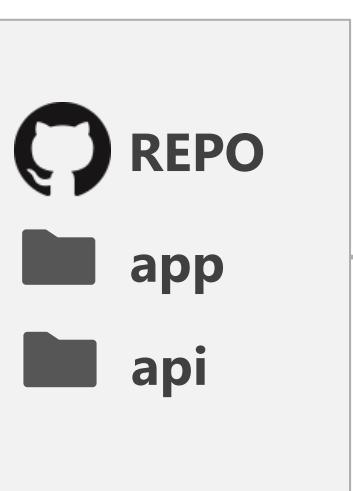
BeasicPad Pro  
Create more complex games on BeasicPad Pro than BeasicPad.

arcade.makecode.com/hardware

A woman is in the top right, and a man is in the bottom right.

# Azure Static Web Apps





**STATIC WEB APPS**

 **STATIC CONTENT**  
HTML/JavaScript/CSS

 **API**  
Azure Functions



Branch: master [stem-demo-live](#) / [src](#) /

Create new file Upload files Find file History

Daria Grigoriu demo update Latest commit e2f5bec 16 days ago

..

.vs demo 21 day Save Discard Refresh

App.css demo 21 day

App.js add scaffolding for environment fetching 20 day **Application settings**

App.test.js demo 21 day Application settings applicable to your site are encrypted at rest and transmitted over an encrypted channel. You  
your browser by using the controls below. [Learn more](#)

Authenticated.js demo 21 day

Environment.js add scaffolding for environment fetching 20 day Environment Production

Home.js demo 21 day + Add Hide values Advanced edit

Octocat.png demo 21 day Filter application setting

Name Value

ENV STEM learning demo

dariagrigoriudemo / [stem-demo-live](#) Private

Code Issues 0 Pull requests 0 Actions Projects 0 Security 0 Insights Settings

Azure Static Web Apps added workflow file for CI/CD

master Azure Static Web Apps 357ad46

Azure Static Web Apps CI/CD on: push

**Build and Deploy Job**

- Set up job
- Build Azure/static-web-apps-deploy@v0.0.1-preview
- Run actions/checkout@v1
- Build And Deploy

https://agreeable-bay-0aa5ef91e.azurestaticapps.net/environment

# Contoso STEM Learning

Admin Login Environment Home

Env Value: STEM learning demo



# 커뮤니티에 가입하세요!

커뮤니티 전문가로부터 정기적인 업데이트 및 커뮤니티 이벤트, 워크샵에 대한 안내를 받으실 수 있습니다.



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