Blazor

C# running in the browser via WebAssembly

Scott Sauber

scottsauber

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Audience

- Mostly targeted for .NET developers
- JS Developers interested in WebAssembly

Agenda

- What is WebAssembly?
- What is Blazor?
- How does Blazor work?
- Demos
- Questions

Purpose

- Differentiate what is Blazor vs WebAssembly
- Get excited for the future

Who am I?

- Lead Software Developer at Iowa Bankers
- Primarily .NET Developer
- React fanboy
- Actually enjoys JavaScript
- Blog primarily on ASP.NET Core on scottsauber.com

Current State of the SPA Front End

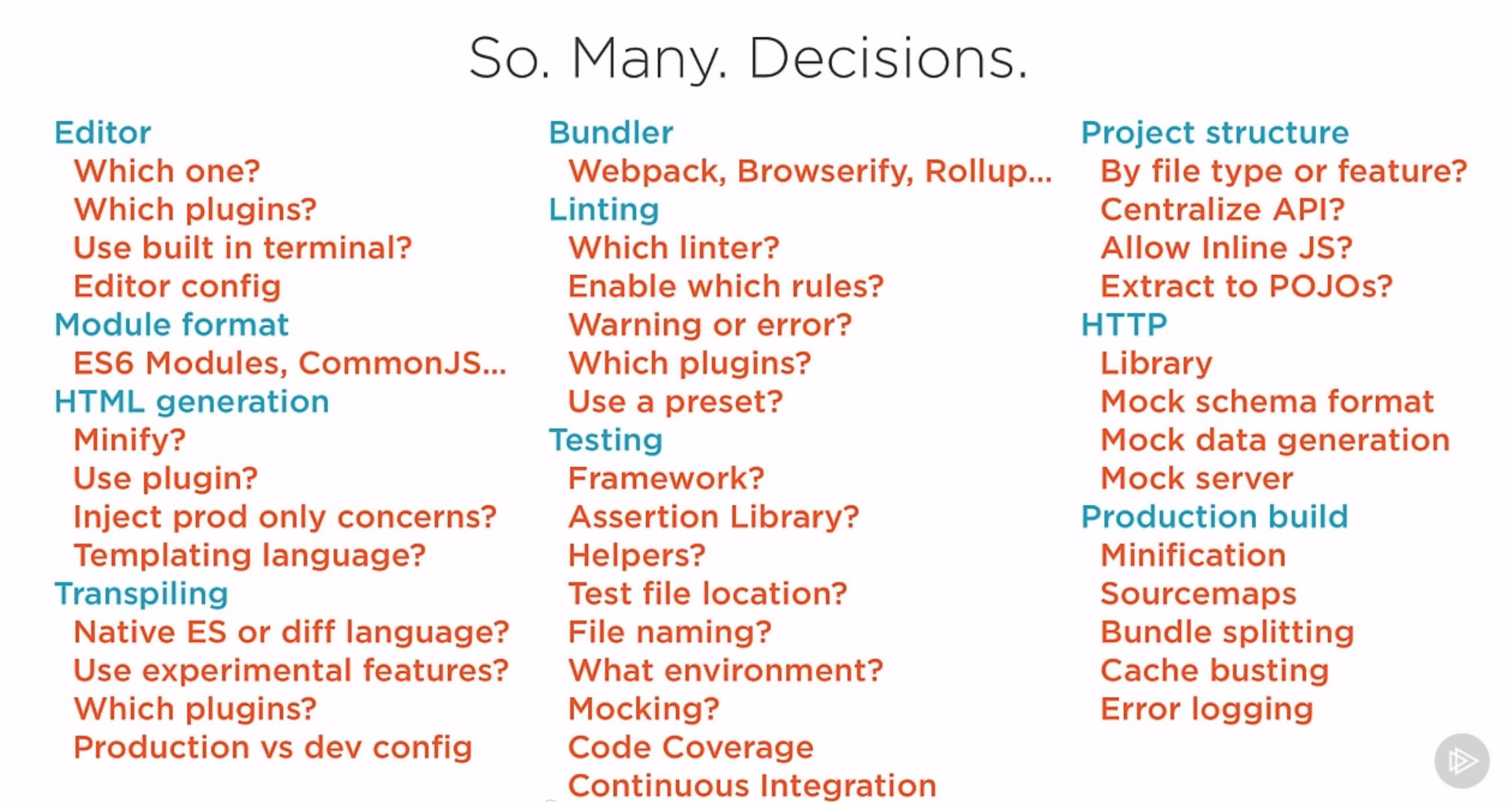
Pick a Language:

ES6
TS
flow
RE
cljs

Pick a Framework:

Pick your tools:

Gulp
BABEL
ESLint
Common
airbnb
standard JS
Google



So. Many. Decisions.

- Editor
  - Which one?
  - Which plugins?
  - Use built in terminal?
  - Editor config
- Module format
  - ES6 Modules, CommonJS…
- HTML generation
  - Minify?
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  - Inject prod only concerns?
  - Templating language?
- Transpiling
  - Native ES or diff language?
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- Bundler
  - Webpack, Browserify, Rollup…
- Linting
  - Which linter?
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- Testing
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  - Helpers?
  - Test file location?
  - File naming?
  - What environment?
  - Mocking?
  - Code Coverage
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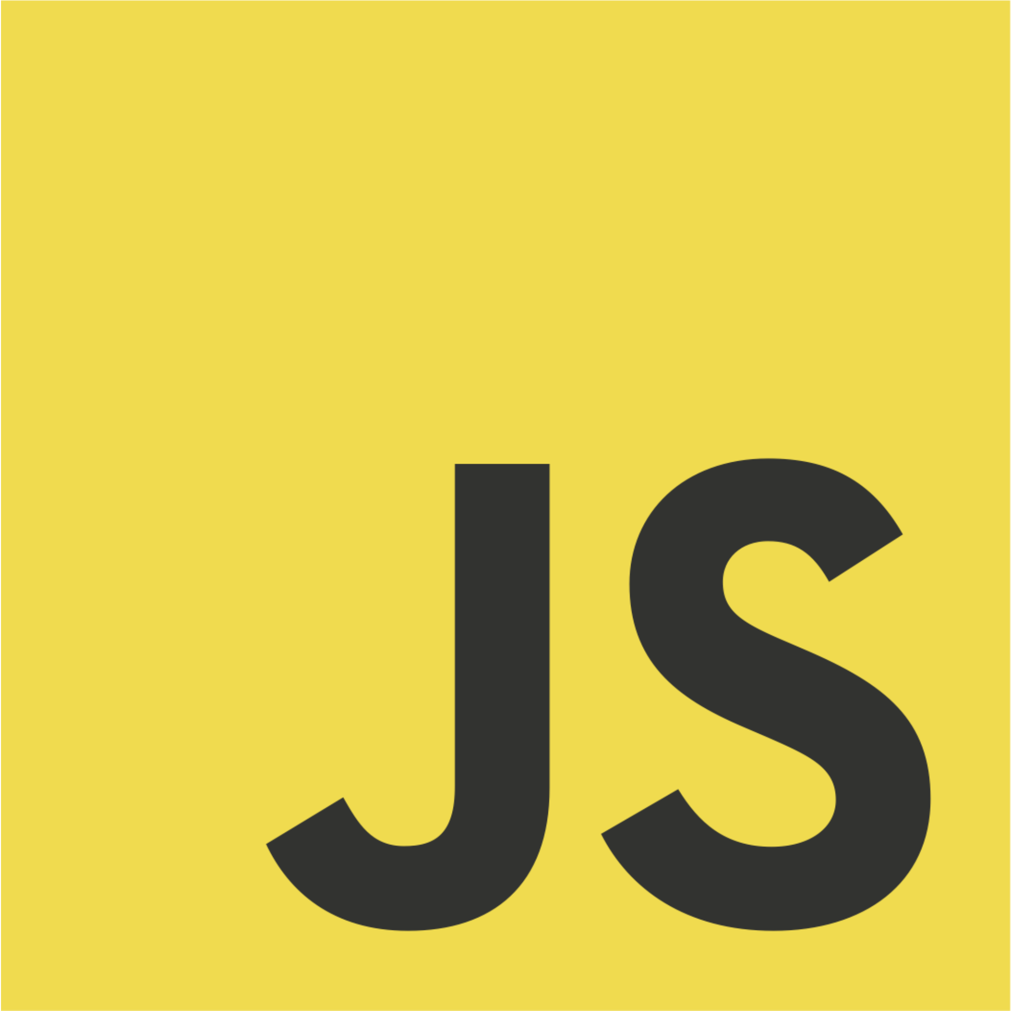
Source: Cory House's Building a JavaScript Development Environment Pluralsight course

At the end of the day….



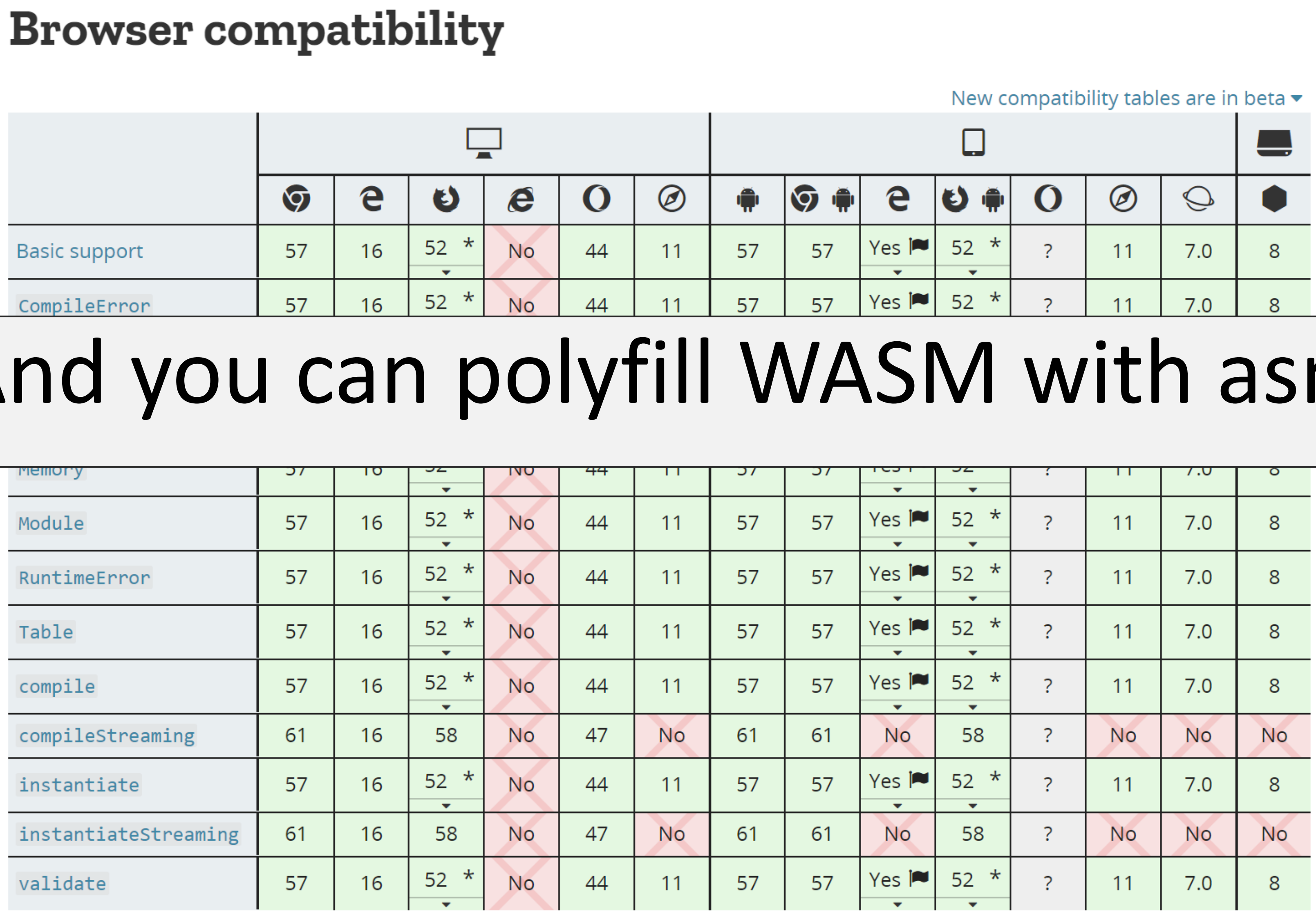
Problems

- Whole host of people don’t like JS
  - Dynamically typed
  - Less integration, more stitching
  - Browser support
  - Moves too fast, lots of choice, intimidating
  - node_modules
- SPA’s are more expensive to maintain
  - Front-end + Back-end team
  - Training up full stack to be great at both (very difficult)
- When using a different language than JS on the backend…
  - Duplicate Business Logic (like validation)
    - Or just have server
    - Plz don’t just have client…plz
  - No IDE/compiler help between backend models + front end making AJAX calls
    - Unless bringing in yet another tool

What is Web Assembly (WASM)?

- WebAssembly (WASM) is a low-level binary format language that can be run in modern web browsers that runs at near-native speeds.
- Compilation Target for other languages
- Browser standard
- No more JS monopoly

Is WASM Ready?



Browser compatibility

New compatibility tables are in beta ▾

	🖥						📱							
Basic support	57	16	52 *	No	44	11	57	57	Yes ⚑	52 *	?	11	7.0	8
CompileError	57	16	52 *	No	44	11	57	57	Yes ⚑	52 *	?	11	7.0	8
Memory	57	16	52	No	44	11	57	57	Yes	52	?	11	7.0	8
Module	57	16	52 *	No	44	11	57	57	Yes ⚑	52 *	?	11	7.0	8
RuntimeError	57	16	52 *	No	44	11	57	57	Yes ⚑	52 *	?	11	7.0	8
Table	57	16	52 *	No	44	11	57	57	Yes ⚑	52 *	?	11	7.0	8
compile	57	16	52 *	No	44	11	57	57	Yes ⚑	52 *	?	11	7.0	8
compileStreaming	61	16	58	No	47	No	61	61	No	58	?	No	No	No
instantiate	57	16	52 *	No	44	11	57	57	Yes ⚑	52 *	?	11	7.0	8
instantiateStreaming	61	16	58	No	47	No	61	61	No	58	?	No	No	No
validate	57	16	52 *	No	44	11	57	57	Yes ⚑	52 *	?	11	7.0	8

And you can polyfill WASM with asm.js!

What is Blazor?

- Blazor is an ***experimental*** .NET SPA framework maintained by Microsoft using C# and HTML that runs *in the browser* via WebAssembly….

Wait a second….

Microsoft®
Silverlight™

It’s a Standard, not a plugin!

What is Blazor?

- Blazor is an ***experimental*** .NET SPA framework maintained by Microsoft using C# and HTML that runs *in the browser* via WebAssembly….
- Uses Razor syntax
  - Browser + L + Razor = Blazor
- Uses component-based architecture
- Runs on top of Mono
  - Blazor == UI Framework == MVC or Web Forms
  - Mono == Runtime == .NET Framework or .NET Core
- Development led by Steve Sanderson, of KnockoutJS fame

So I can write C# in the Browser!?!

- Blazor is .NET Standard 2 compliant
- However, not all .NET Standard 2 API’s are implemented running in browser make sense
  - Examples
    - System.Net.Mail
    - System.IO
  - These throw Platform Not Supported exceptions
- But a lot do make sense
  - HttpClient => AJAX

Blazor Provides Calling C# from JS + vice versa

- C# Wrappers on top of JS API’s
  - LocalStorage
  - PaymentRequest
  - Or any npm library
- C# maps to JS pretty well
  - async/await
  - Task => Promise
- Future: automatically read TSD’s and generate C# bindings

Why would you be interested in this?

- C# is a fantastic language
  - …not that JavaScript isn’t
  - …but statically typed languages are winning (see: TS, Flow, Reason, etc.)
    - Airbnb React Native blog
- Share logic with existing .NET backend
  - Validation logic
  - Models from Server when retrieve from the Client
- Get off the JS churnwagon
- Consolidate frontend and backend teams under one language

Demo #1

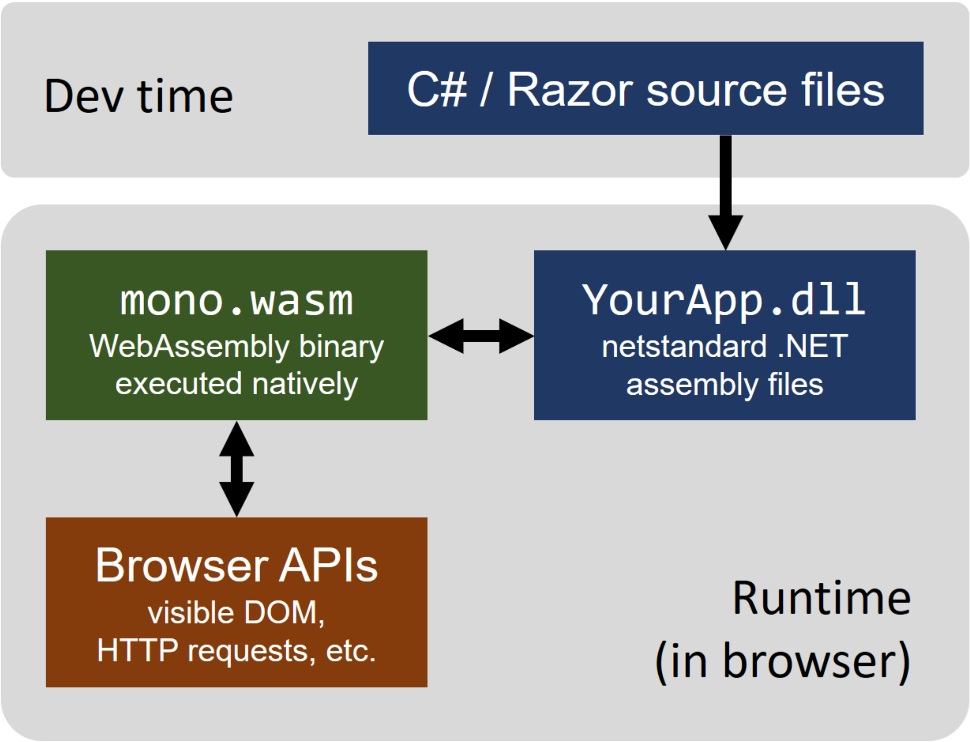
- Install VS Extension
  - Templates, Razor Tooling
- Hello World on Blazor
- Component Architecture
- Dependency Injection
- Sharing models
- Sharing validation logic

Rapid Fire Questions

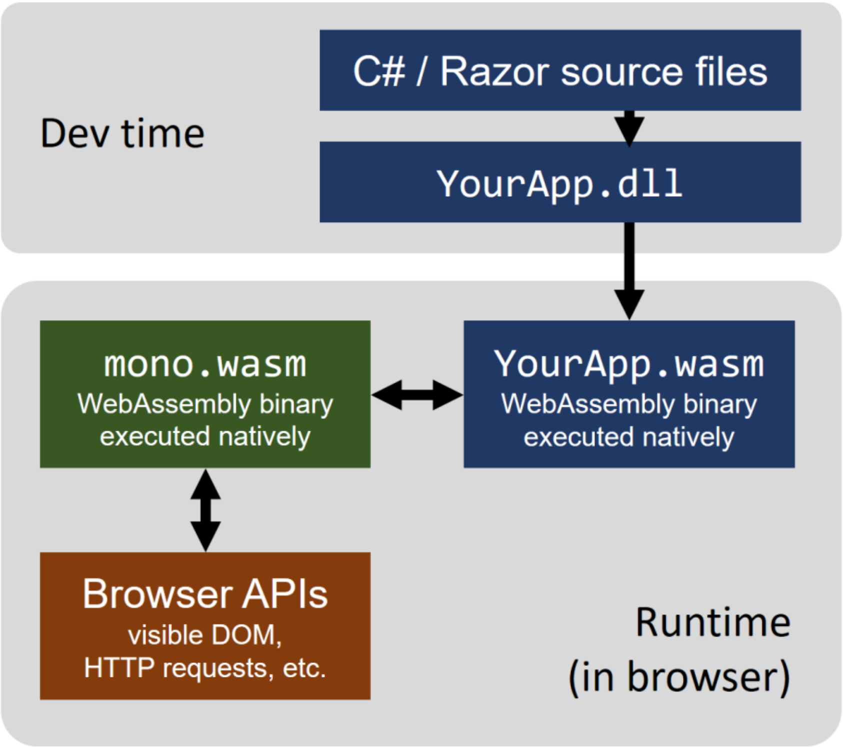
- How big is it?
  - 1.8MB in Dev, 1.3MB in Prod
  - Very little work done thus far to optimize
- Do WASM files cache like JS and CSS files?
  - Yes
- How does it work under the hood?

How does Blazor work?

Today


Dev time
C# / Razor source files
mono.wasm
WebAssembly binary executed natively
YourApp.dll
netstandard .NET assembly files
Browser APIs
visible DOM, HTTP requests, etc.
Runtime (in browser)

Future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Source

Why Mono? Why not .NET Core?

- Already Client-side-focused
  - Xamarin, Unity, etc.
  - .NET Core is Server-side-focused
- Already developed for unique platforms (iOS, watchOS, PS4, etc.)
- Already had linker (DLL trimmer/tree shaker) for Xamarin
- They got it working first
- Long term they want to consolidate on .NET Core

Demo #2

- LocalStorage C# Wrapper
- Code: https://github.com/scottsauber/BlazorToDoMVC

What else can we do?

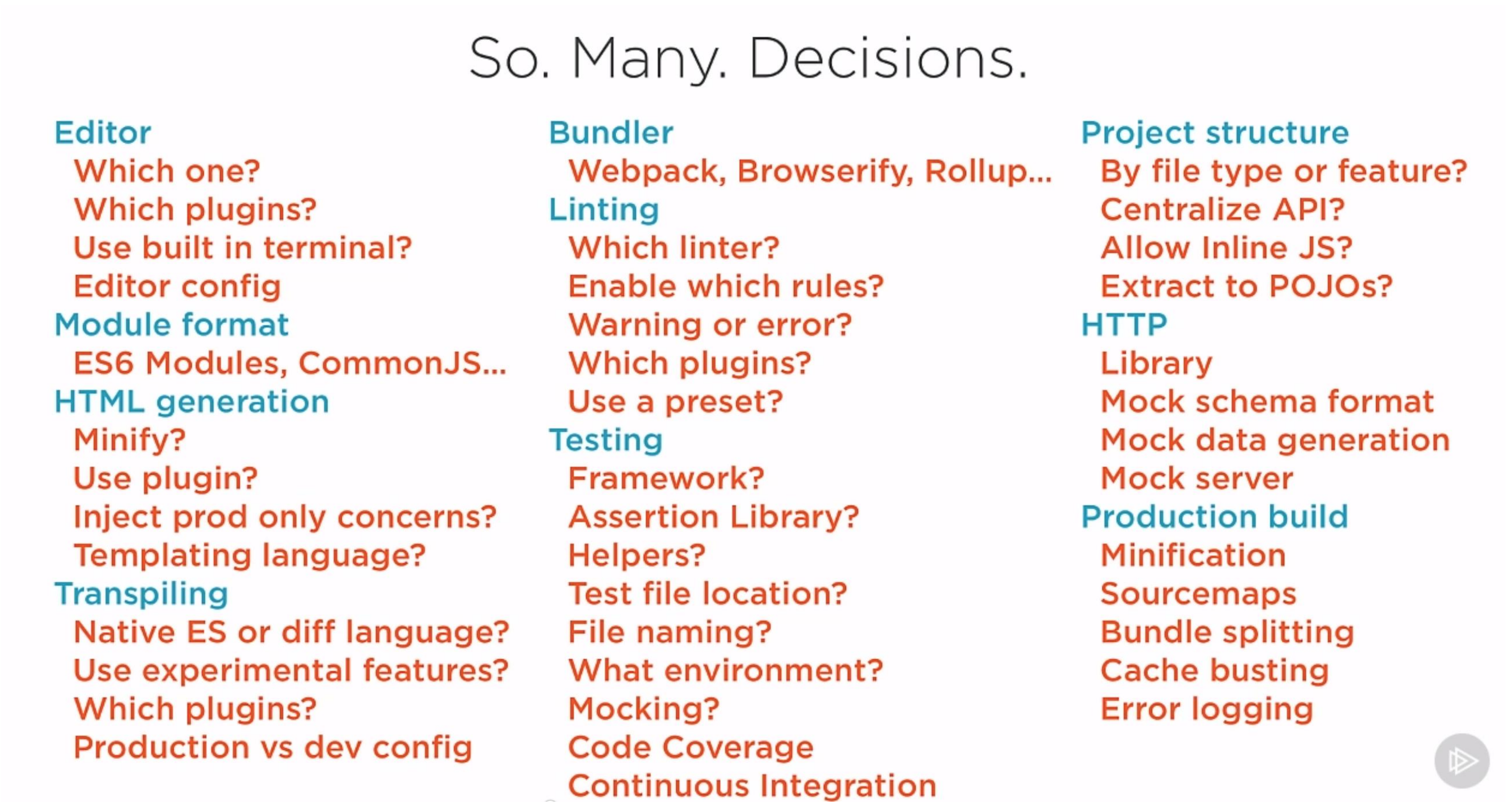
- Blazor’s component model is de-coupled from the Browser
- Blazor on…
- The Server
    - Possible Replacement for MVC/Razor Pages if you prefer component-based over MV*?
    - Changes streamed via WebSocket
- Electron
    - Cross-platform desktop framework. Write once, run anywhere.
    - Proof of Concept Running on .NET Core
    - Why?
        - Faster Code Execution
        - Full Debugger in VS
        - .NET Core instead of Mono
        - Access to Desktop API’s

Demo #3

- Blazor on Electron
  - Electron.App
- Code: https://github.com/SteveSandersonMS/BlazorElectronExperiment.Sample

What’s the hold up?

- Currently 0.4 – won’t ship this year per Damian Edwards
- What’s there
  - Component Model
  - Routing
  - Layouts
  - Dependency Injection
  - JS interop
  - Share Components between projects
- What’s still coming
  - Better tooling
  - Forms and Validation
  - Debugging
  - Hot reloading
  - AOT
  - Better Linker Assembly Trimming



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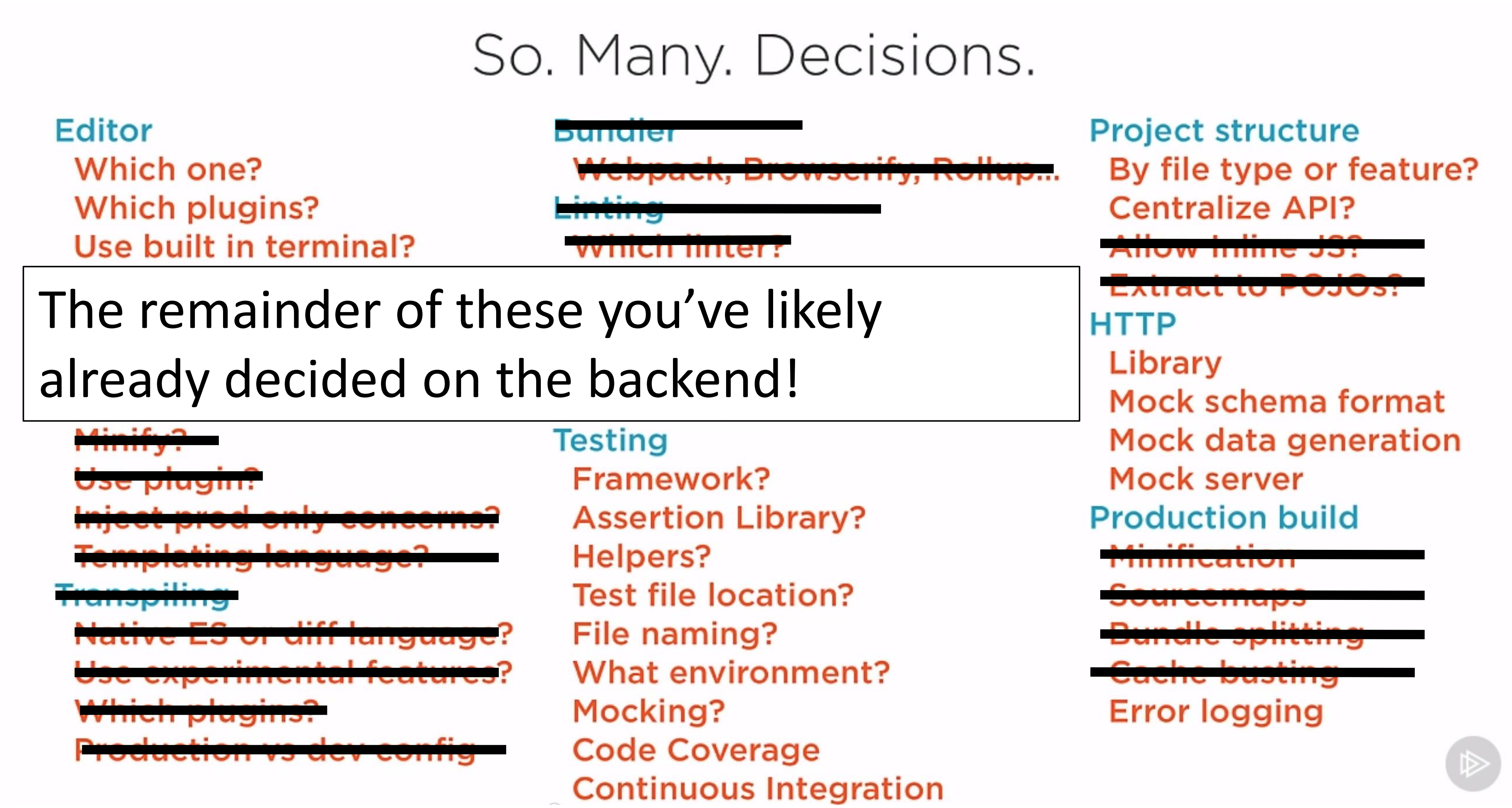

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~~Bundler~~
- ~~Webpack, Browserify, Rollup...~~

~~Linting~~
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Production build
- ~~Minification~~
- ~~Sourcemaps~~
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The remainder of these you've likely already decided on the backend!

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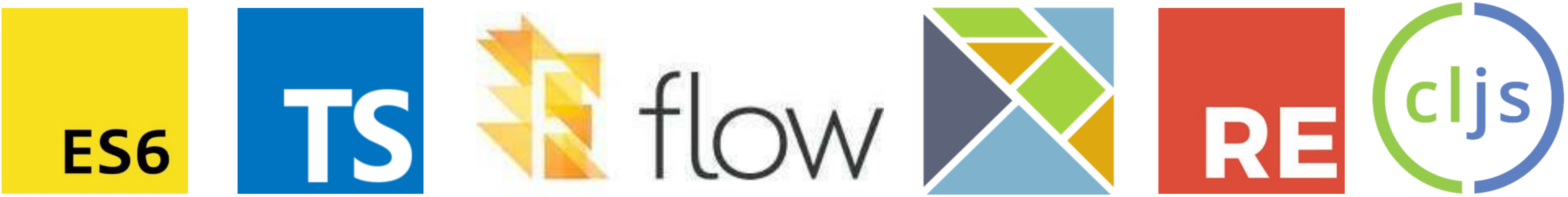
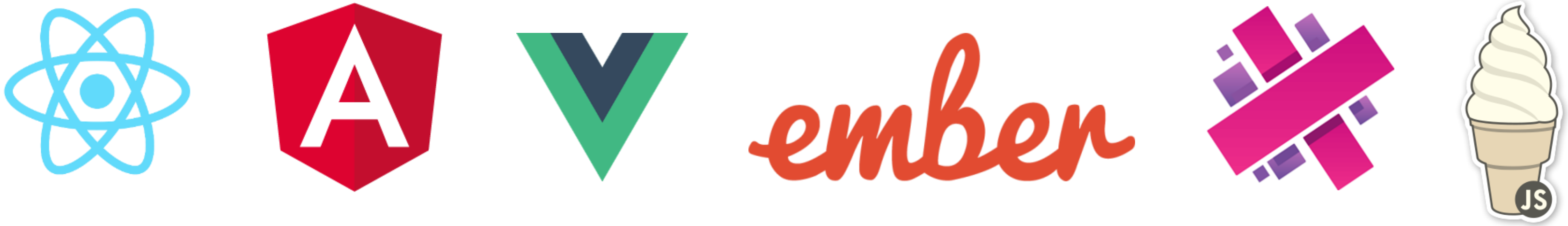
Current State of the SPA Front End

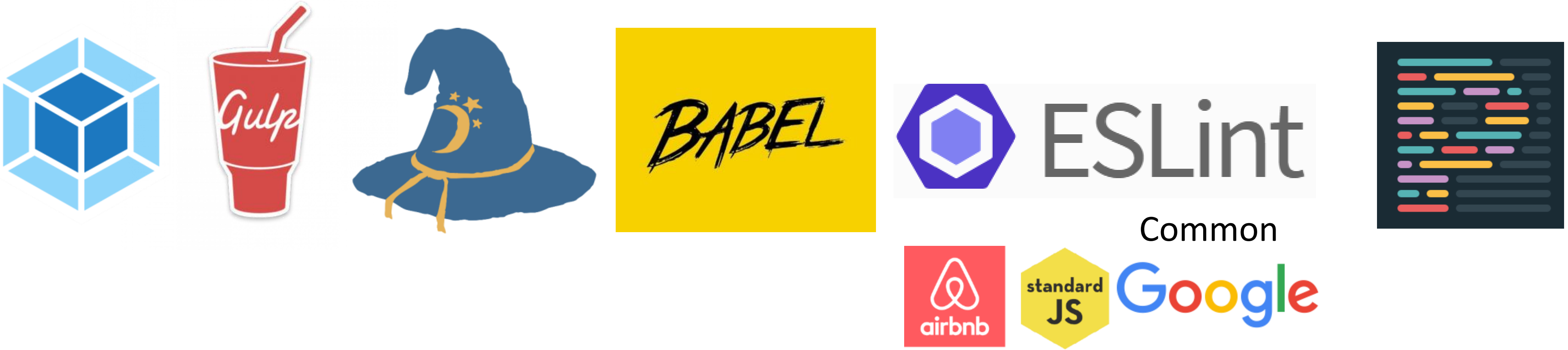
Pick a Language:



Pick a Framework:



Pick your tools:



Future State of the Front End?

Pick a Language: C# Java python R C++ COBOL

Pick a Framework: Blazor ???

Pick your tools: IJ

Future

- Blazor is still experimental…
- However… I would be pretty surprised if they don’t ship this.
- Start thinking about “would this code run ok in the browser?”
  - Separate domain + input validation
- But still do NOT commit to Blazor yet for anything remotely real
- I repeat

Takeaways

- WASM is AWSM
- Potential of Blazor
- WASM has potential to radically disrupt WebDev

Resources

- https://blazor.net
  - Microsoft Documentation
- https://learn-blazor.net
  - Community-led Documentation
- https://github.com/aspnet/blazor
  - Blazor Source Code
- https://github.com/scottsauber/BlazorToDoMVC
  - ToDoMVC Blazor example
- https://github.com/SteveSandersonMS/BlazorElectronExperiment.Sample
  - Blazor on Electron

Questions?

scottsauber

Thanks!