Personal Info

- http://www.magenic.com
- http://www.jasonbock.net
- https://www.twitter.com/jasonbock
- https://www.github.com/jasonbock
- jasonb@magenic.com

Downloads

https://github.com/JasonBock/Presentations/blob/master/Assembling%20the%20Web%20–%20A%20Tour%20of%20WebAssembly.pptx

https://github.com/JasonBock/AssemblingTheWeb

Overview

- History
- Details
- Conclusion

Remember….

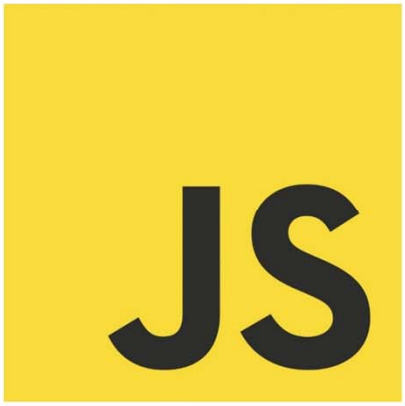
https://github.com/JasonBock/Presentations/blob/master/Assembling%20the%20Web%20–%20A%20Tour%20of%20WebAssembly.pptx

https://github.com/JasonBock/AssemblingTheWeb

History

http://foodnetwork.sndimg.com/content/dam/images/food/fullset/2008/3/5/0/NY0100_BBQ-Spaghetti.jpg#Spaghetti%20811x608

History



ES3 (1999) => ES5 (2009) => ES6 (2015) => ES7 (2016) => ES8 (2017)

History

History

History

TIOBE Index for January 2015

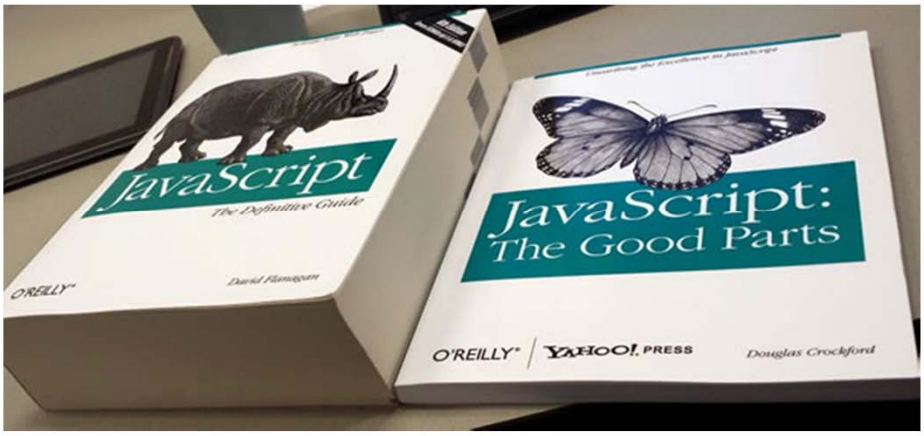
January Headline: JavaScript programming language of 2014!

After all these years, JavaScript has finally become TIOBE's language of the year. It was a close finish. Swift and R appeared to be the main candidates for the title but due to a deep fall of Objective-C this month, a lot of other languages took advantage of this and surpassed these two candidates at the last moment.

JavaScript has won the award because it appeared to be the biggest mover of 2014. JavaScript won 1.70% in one year time, followed by PL/SQL (+1.38%) and Perl (+1.33%). The JavaScript programming language has a long history and is always considered as the "ugly duckling" from a language design point of view. Nevertheless, JavaScript has become the standard browser language through the years. Boosted by the successes of JavaScript libraries and frameworks JQuery, Bootstrap, Node.js and GWT, JavaScript really deserves this award.

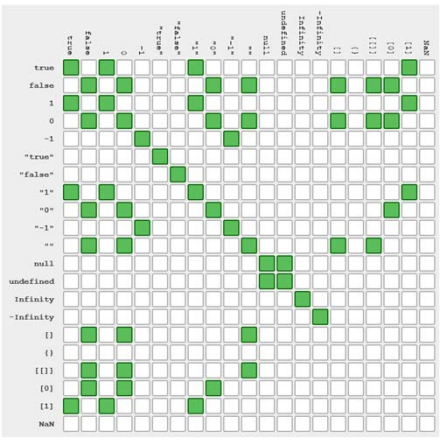
http://www.tiobe.com

History

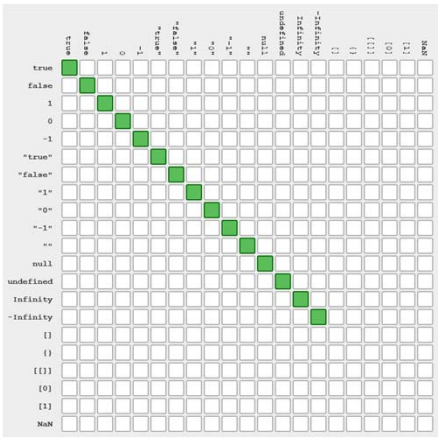


http://www.globalnerdy.com/wordpress/wp-content/uploads/2014/08/javascript-and-the-good-parts.jpg

History



true == "1" => TRUE



true === "1" => NOT TRUE

http://dorey.github.io/JavaScript-Equality-Table/

History

```
1 == "1"
null == undefined
[0] == false
0 == ""
```

History

```
console.log('4' - 4);
console.log('4' + 4);
```

```
0
44
```

History

Why is the method called `includes` and not `contains`?

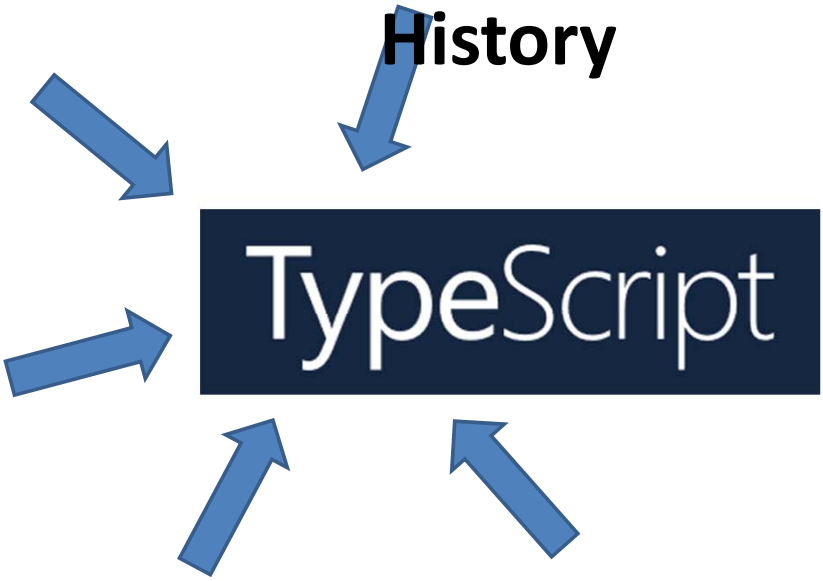
The latter was the initial choice, but that broke code on the web (MooTools adds this method to `Array.prototype`).

http://www.2ality.com/2016/02/array-prototype-includes.html

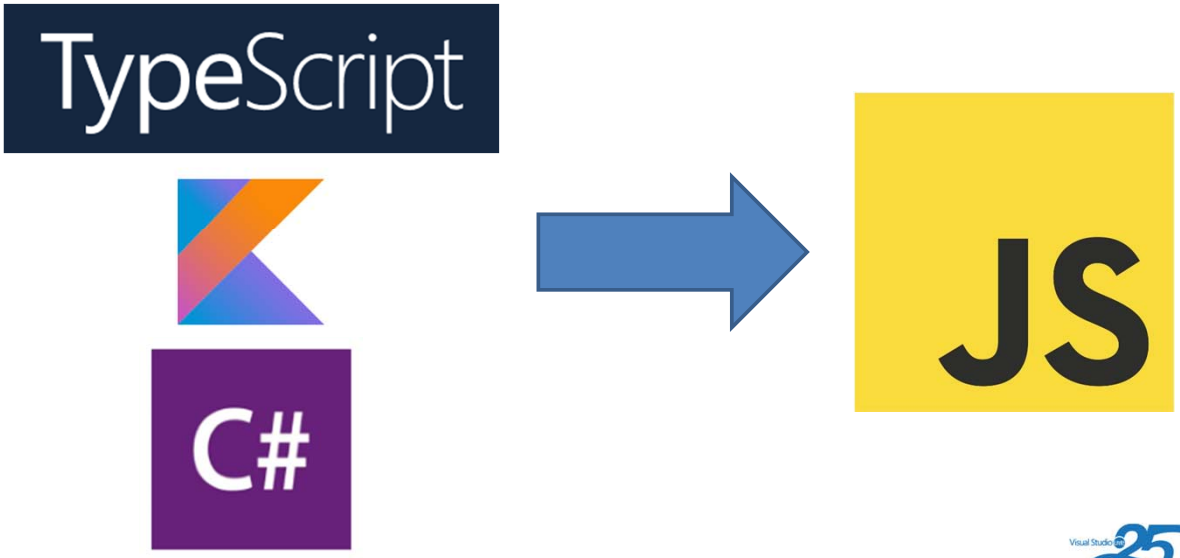
History

https://twitter.com/ThePracticalDev/status/766858028859523072/photo/1

History



History



History

Lisp: Code is data
Haskell: Data is code
Ruby: Strings are code
JavaScript: Undefined is not a function

"I'm in love with the Rust type system and going back to JavaScript/ES6 just isn't enough."

https://twitter.com/mattoflambda/status/727290638102876160
https://github.com/rust-lang/rust/issues/33205

History


```
<script typ                    </script>
<script typ                    script>
<script typ                    </script>
```

http://memegenerator.net

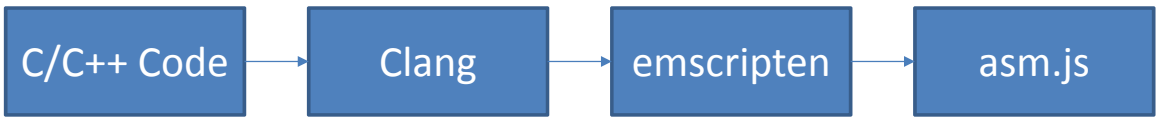
History

http://blog.cmaresources.org/wp-content/uploads/2012/05/speed2.jpg

History

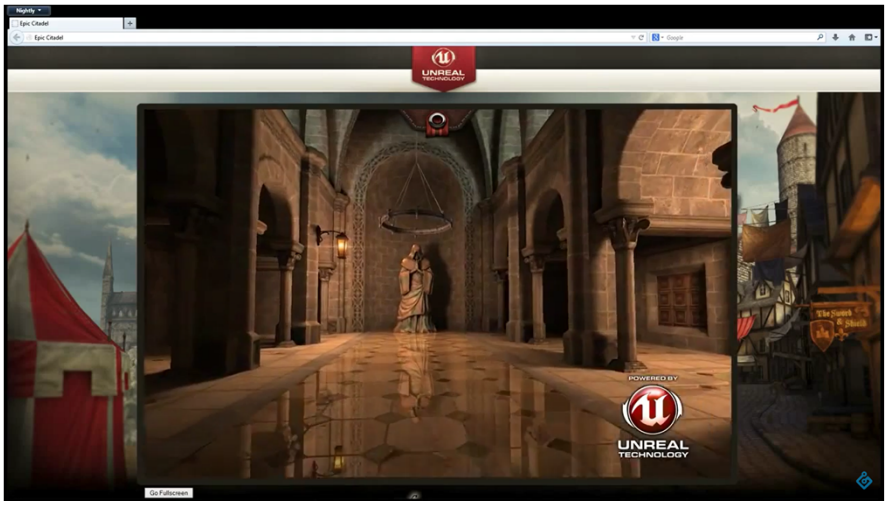
http://asmjs.org
http://kripken.github.io/emscripten-site/

History



http://asmjs.org

History



https://youtu.be/nB9Pm9Mr7xo

Details

WEBASSEMBLY

https://github.com/carlosbaraza/web-assembly-logo

Details

WebAssembly

Overview | Demo | Design | Specification | Community Group

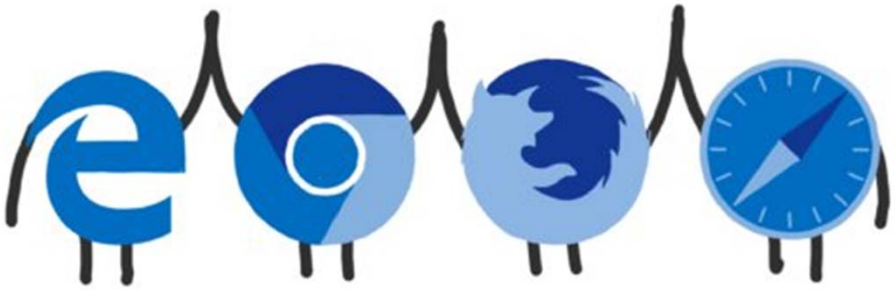
WebAssembly or *wasm* is a new portable, size- and load-time-efficient format suitable for compilation to the web.

WebAssembly is currently being designed as an open standard by a W3C Community Group that includes representatives from all major browsers. Expect the contents of this website and its associated design repositories to be in flux: everything is still under discussion and subject to change.

http://webassembly.github.io/

http://webassembly.github.io/

Details



https://twitter.com/linclark/status/836609222733348864/photo/1

Details

- Efficient and fast
- Safe
- Open and debuggable
- Part of the open web platform

Details

Value Types	Description
`i32`	32-bit integer
`i64`	64-bit integer
`f32`	32-bit floating point
`f64`	64-bit floating point

Details

Operand	Description
`i32.load8_s`	Load 1 byte and sign-extend i8 to i32
`i32.load16_u`	Load 2 bytes and zero-extend i16 to i32
`f32.load`	Load 4 bytes as f32
`i32.store16`	Wrap i32 to i16 and store 2 bytes
`i64.store16`	Wrap i64 to i16 and store 2 bytes
`f64.store`	(No conversion) store 8 bytes

Details

Operand	Description
`get_local`	Read the current value of a local variable
`set_local`	Set the current value of a local variable
`tee_local`	Like `set_local`, but also returns the set value
`get_global`	Get the current value of a global variable
`set_global`	Set the current value of a global variable

Details

Operand	Description
`loop`	A block with an additional label at the beginning which may be used to form loops
`br_if`	Conditionally branch to a given label in an enclosing construct
`return`	Return zero or more values from this function

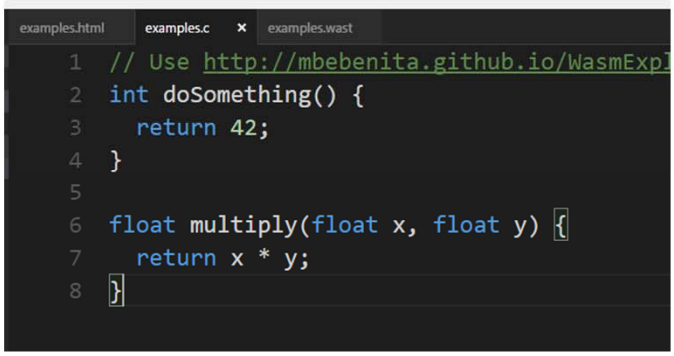
Details

http://www.2112.net/powerwindows/downloads/smartphone960x854/Rush-HoldYourFire2.jpg

Assembling the Web – A Tour of WebAssembly

DEMO: TARGETING WASM

Demo: Targeting wasm

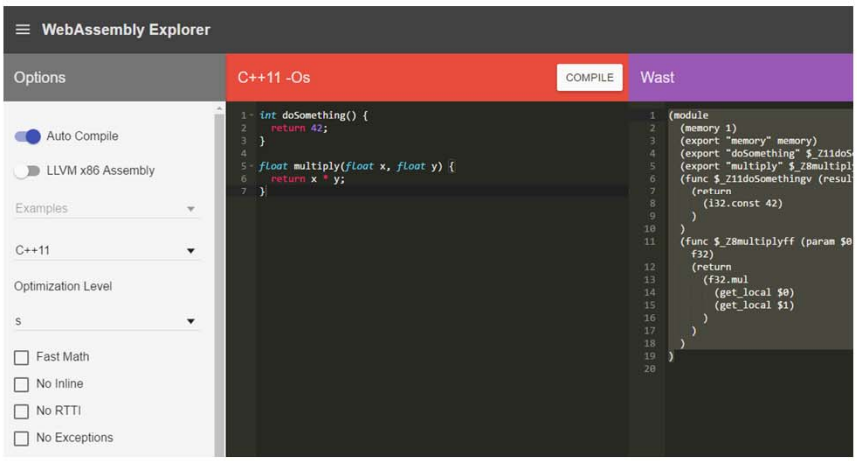


Demo: Targeting wasm

examples.html examples.c examples.wast ×

```
(module
  (memory 1)
  (export "memory" memory)
  (export "doSomething" $_Z11doSomethingv)
  (export "multiply" $_Z8multiplyff)
  (func $_Z11doSomethingv (result i32)
    (return
      (i32.const 42)
    )
  )
  (func $_Z8multiplyff (param $0 f32) (param $1 f32) (result f32)
    (return
      (f32.mul
        (get_local $0)
        (get_local $1)
      )
    )
  )
)
```

Demo: Targeting wasm



Demo: Targeting wasm

```
<script>
  // https://developer.mozilla.org/en-US/docs/Web/API/Fetch_API/Using_Fetch
  var wasmExports;

  fetch('examples.wasm')
    .then(response =>
      response.arrayBuffer())
    .then(buffer => {
      let codeBytes = new Uint8Array(buffer);
      try {
        WebAssembly.compile(codeBytes)
          .then(module => {
            let instance = new WebAssembly.Instance(module);
            wasmExports = instance.exports;
            console.log('wasm is loaded');
        })
      } catch (e) {
        alert("Error: " + e);
      }
    });
</script>
```

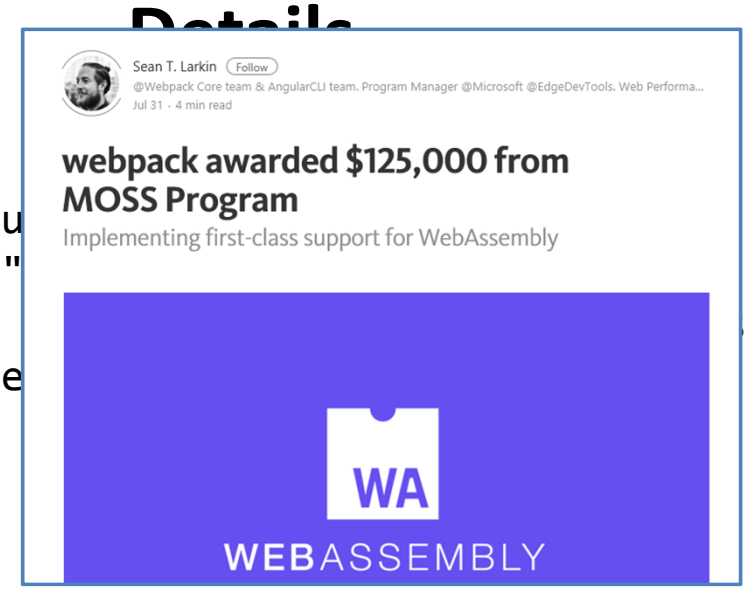
Demo: Targeting wasm

```
<button onclick='multiplyClick()'>Multiply!</button>
<script>
  function multiplyClick() {
    alert(wasmExports.multiply(2, 21));
  }
</script>
```

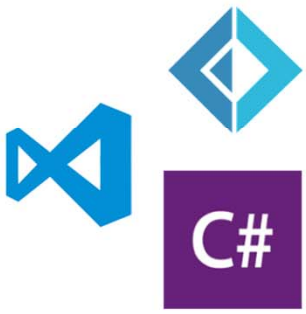
Demo: Targeting wasm

Details

```
<!-- In the fu
<script type="
  import * as                    m';
  alert(wasmMe
</script>
```

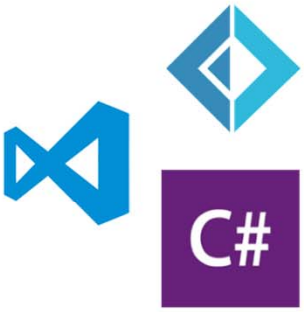


Details



???

Details



CoreCLR
https://github.com/dotnet/coreclr

CoreCLR for WASM

JavaScript VM (?)

Details

"C# and Java require … GC and stack manipulation primitives. That's also on the roadmap, but after MVP, threads, and dynamic linking."

"We want to use the rich type information that has been produced by the TypeScript team to produce strongly typed APIs that can be consumed by C# on WebAssembly."

http://stackoverflow.com/questions/31994034/webassembly-javascript-and-other-languages
https://www.reddit.com/r/programmerchat/comments/4dxpcp/i_am_miguel_de_icaza_i_started_xamarin_mono_gnome/d1v9xyd

Details

WebAssembly for .NET

nuget v0.2.4-preview

A library able to create, read, modify, write and execute WebAssembly (WASM) files from .NET-based applications. *Execution does not use an interpreter.* WASM instructions are mapped to their .NET equivalents ar
language by the .NET JIT compiler.

A preview is available via NuGet at https://www.nuget.org/packages/WebAssembly . N
planned; the next release will be 1.0 with full support for the WebAssembly "MVP".

Getting Started

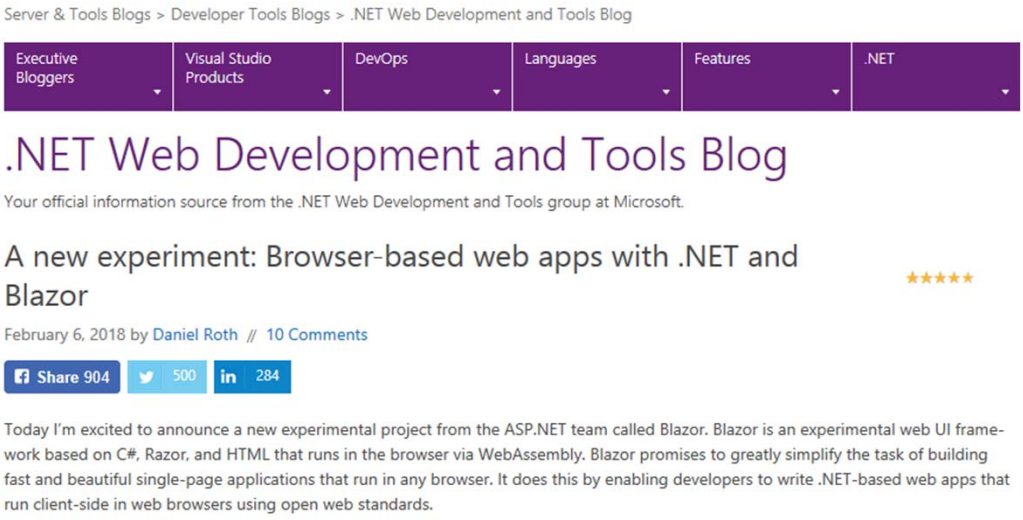
The API is unstable--this means the names and structure of everything can change--bu
is `WebAssembly.Module`.

- Read and write WASM binary files via `ReadFromBinary()` and `WriteToBinary()`.
- Create a new WASM binary file from scratch: create a new `WebAssembly.Module` ins
- `WebAssembly.Module` reflects the binary format in a very pure form: nearly anything
file is covered. As the binary format is optimized for size efficiency, it can be difficu
index space and labels. The best resource for understanding how things work is th
WebAssembly.Tests.
- `WebAssembly.Compile` converts WebAssembly binary files (WASM) to .NET via the run-time code generation features in System.Reflection.Emit. As it ultimately runs on the same CLR as C#, performance is equivalent.

```
class Program
{
  static void Main(string[] args)
  {
    var module = Compile.FromBinary<dynamic>(
      "collatz.wasm");
    Console.WriteLine(
      module().Exports.collatz(5));
  }
}
```

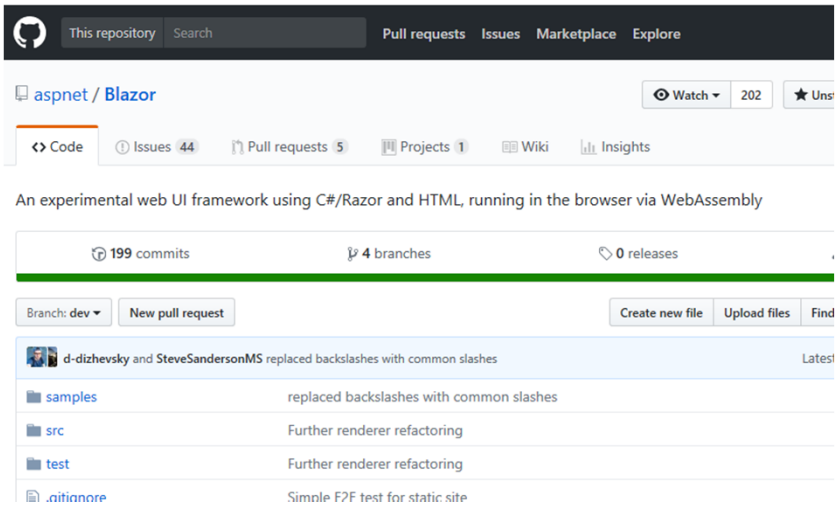
https://github.com/RyanLamansky/dotnet-webassembly

Details



https://blogs.msdn.microsoft.com/webdev/2018/02/06/blazor-experimental-project/

Details



https://github.com/aspnet/blazor

Assembling the Web – A Tour of WebAssembly

DEMO: C# AND WASM EXPERIMENTS

Conclusion

Greg Reimer, Web Developer

"We won't need to learn wasm any more than C++ programmers need to learn assembly. In the same vein, to remain competitive as developers, we'll need to learn how it fits in our toolchains, which means getting nice and cozy with it. In other words, we'll all be *generating* wasm, but few of us will actually be writing or debugging it directly."

https://www.quora.com/What-does-WebAssembly-mean-for-those-who-are-currently-learning-web-development

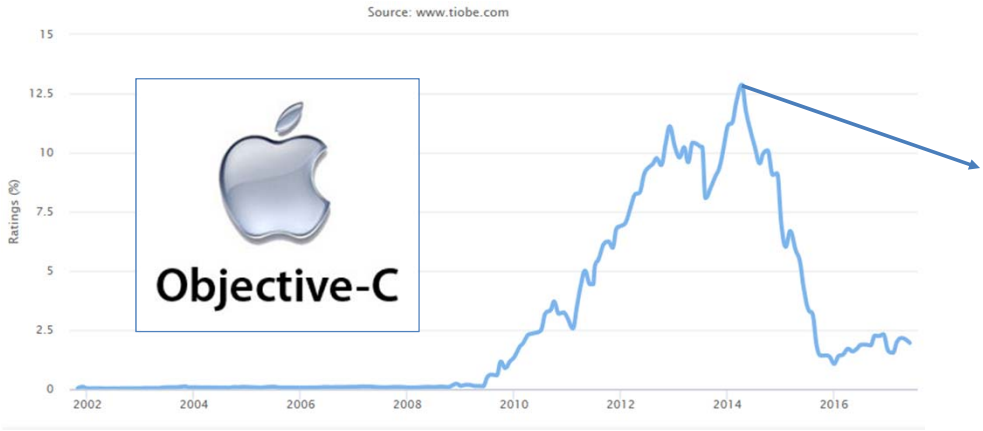
Conclusion

https://formula1.files.wordpress.com/2016/05/season2016_race5_wallpapers_09.jpg

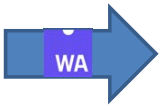
Conclusion

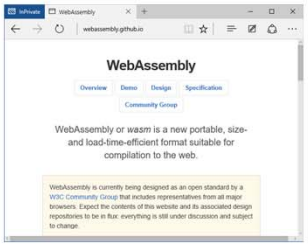
http://thebridge-can.com/wp-content/uploads/2014/09/Braveheart-Freedom-Slide.jpg

Conclusion



Conclusion





Conclusion

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Assembling the Web – A Tour of WebAssembly

Remember…

- https://github.com/JasonBock/Presentations/blob/master/Assembling%20the%20Web%20–%20A%20Tour%20of%20WebAssembly.pptx
- https://github.com/JasonBock/AssemblingTheWeb
- References in the notes on this slide

Jason Bock
Practice Lead
Magenic

Level: Intermediate

Code Again for the First Time!

Visual Studio 25 YEARS OF CODING INNOVATION