JavaScript* Meets Zephyr™ OS

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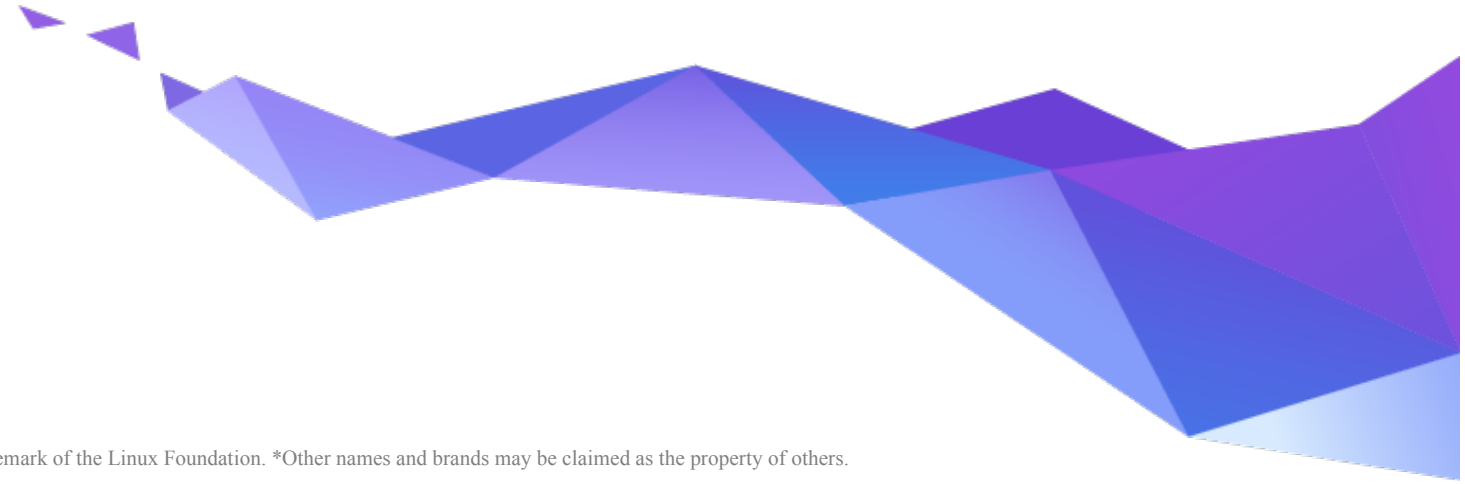
Intel



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Outline

Why JavaScript*

Architecture


Arduino 101* Port

Building


Security and Memory Consumption


APIs and Roadmap


Browser IDE


Open Source Project

Demo

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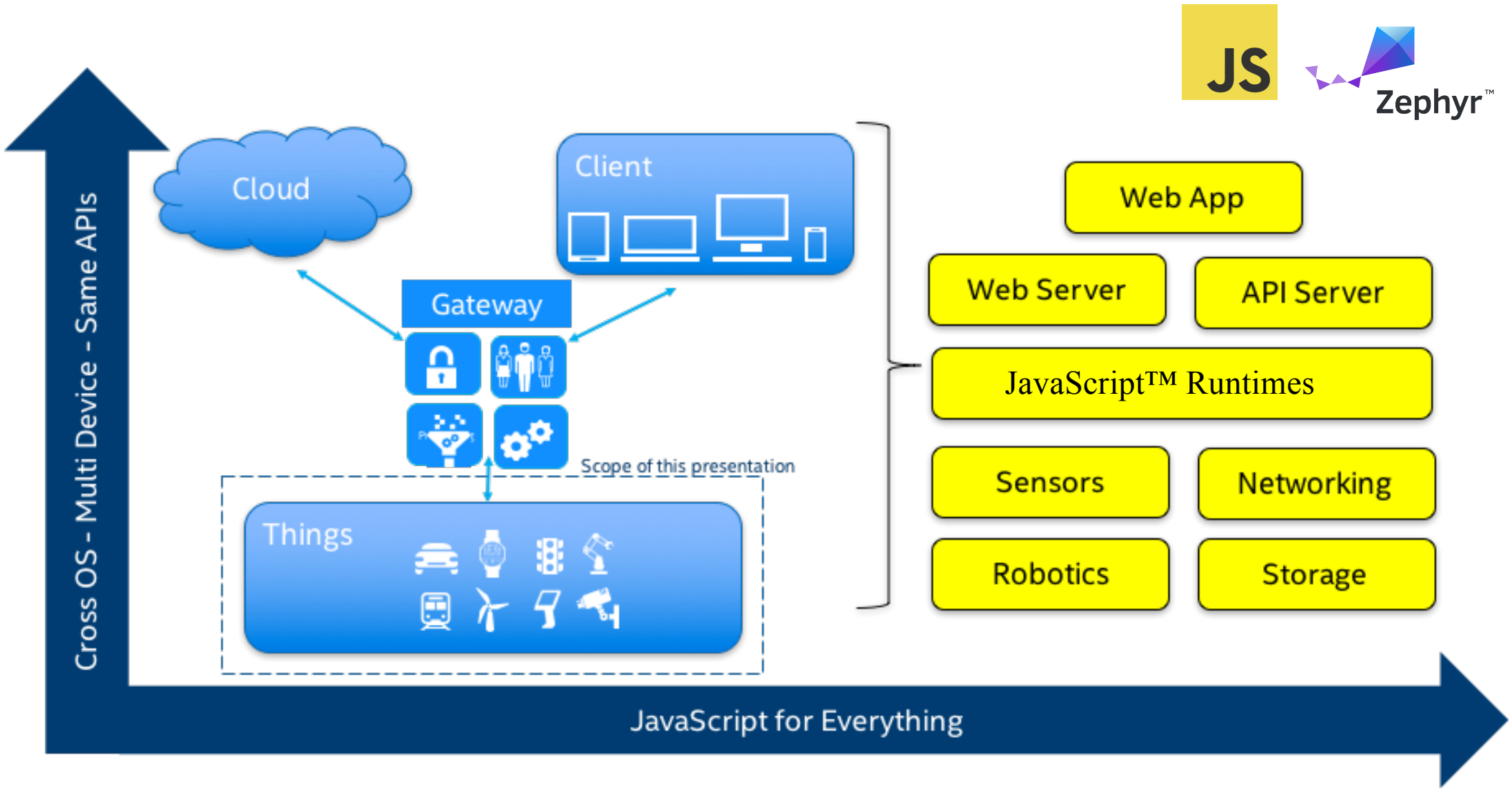

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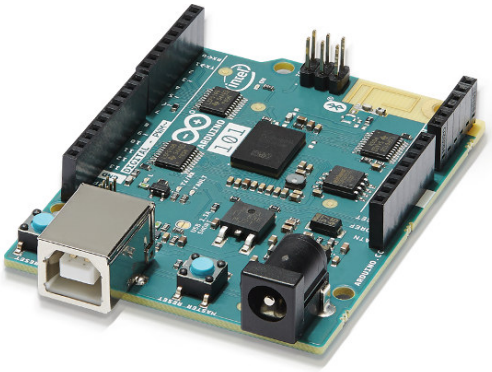
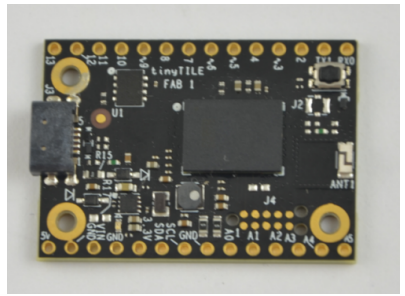
WHAT

JavaScript* Runtime for Zephyr OS





- Enable **JavaScript** application development on Zephyr OS
- Address **large** JavaScript developer **community**
- **Fast** development cycle - No flashing, just copy .js files
- Good tooling including **browser based IDE** and debugging
- Based on open source JerryScript JS engine and **API layer**
- **Well known** JavaScript **APIs** (Node.js* like)
- Application **portability** between MCU and MPU platforms
- Support now for **Arduino101** and **FRDM-K64F**, all Zephyr OS supported boards in the future

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WHY

JavaScript* on Zephyr OS - Benefits

- Big JavaScript developer community
- Well known cross-OS APIs
- Single skill set for device, client, gateway and cloud application development
- Code sharing
- Development and simulation on host systems (PC)
- Fast development cycle
- Browser based IDE
- Easy integration to cloud systems

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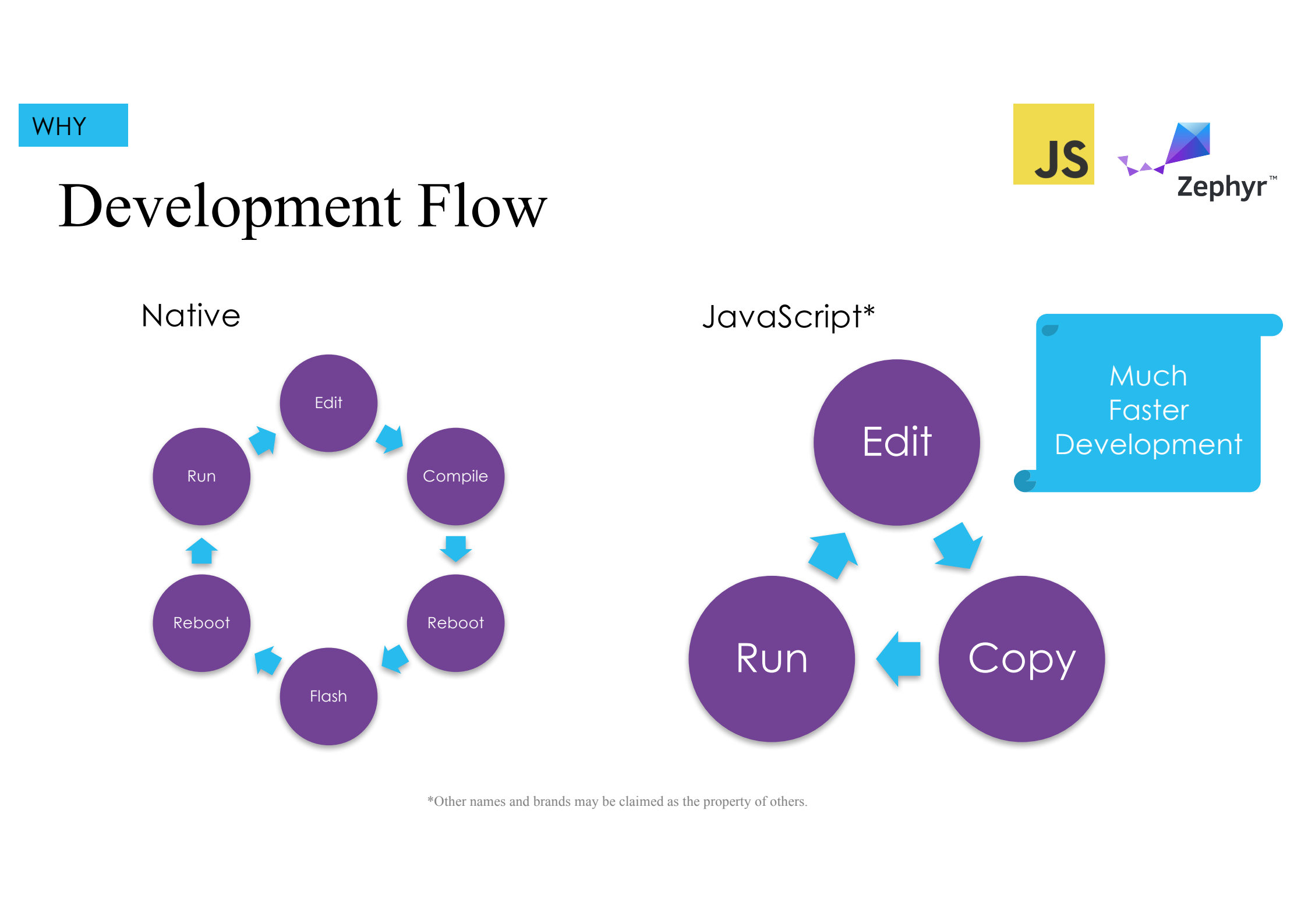
WHY

Development Flow



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HOW

JavaScript* Runtime for Zephyr OS

- Node.js* is too big for MCU devices
- We need something like Node.js but smaller
- PoC: JavaScript Runtime for Zephyr OS based on JerryScript
  - Arduino 101 (256K ROM / 80 K RAM)
  - Timers, BLE, PWM, AIO, GPIO, and OCF APIs
- Target
  - Same APIs on Linux* and Zephyr OS
  - Same JavaScript application runs (unmodified) on Linux and Zephyr OS, or even in the browser

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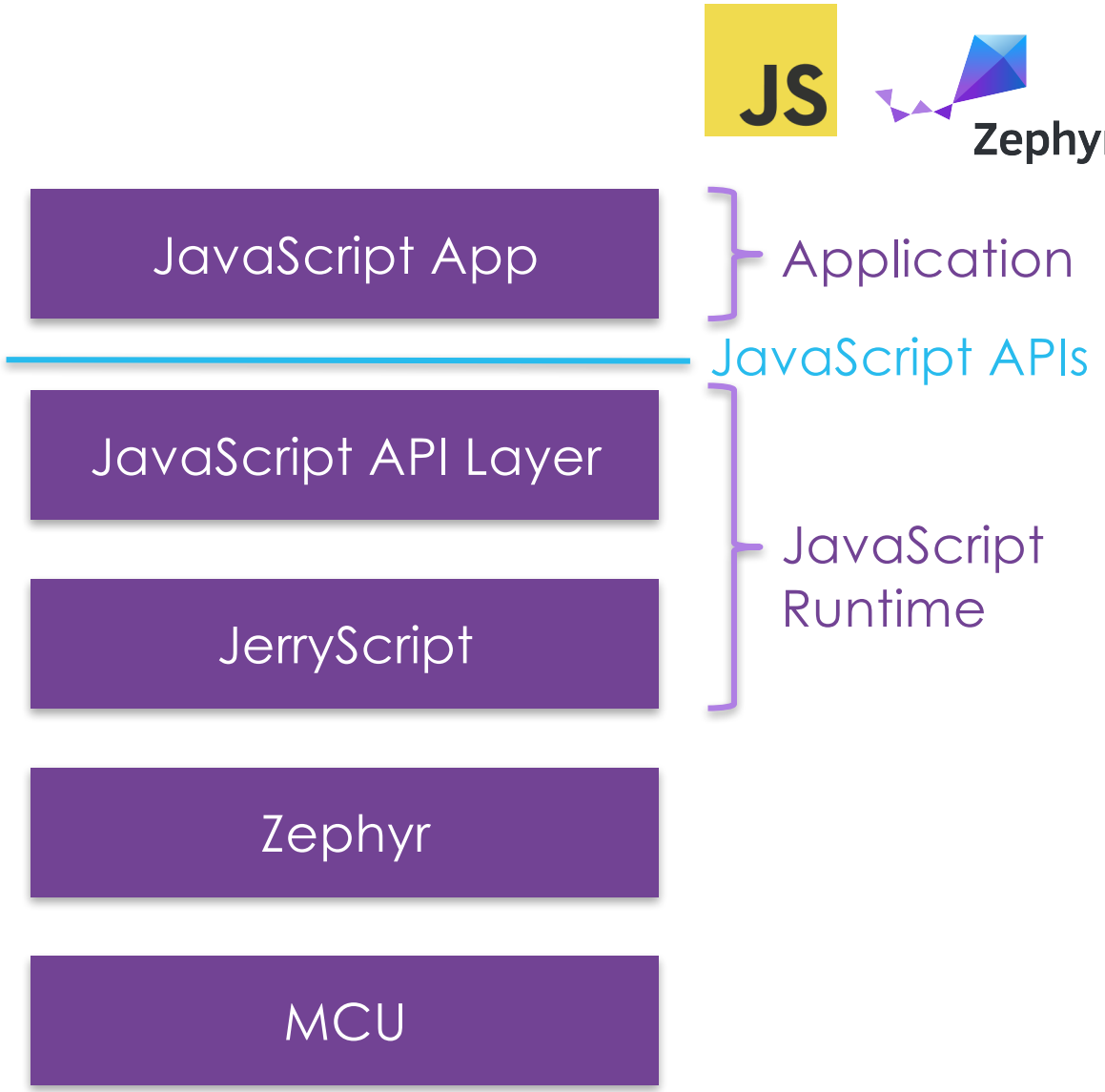
HOW

Architecture

- JavaScript* App
  - Business logic by the app developer
- JavaScript API Layer
  - API bindings - NEW
  - Open source (Apache 2.0) - **NOW**
- JS Engine
  - Micro JS engine - JerryScript
  - Open source (Apache 2.0)
- Integration
  - Separate repo in GitHub
  - Make pulls in all the dependencies



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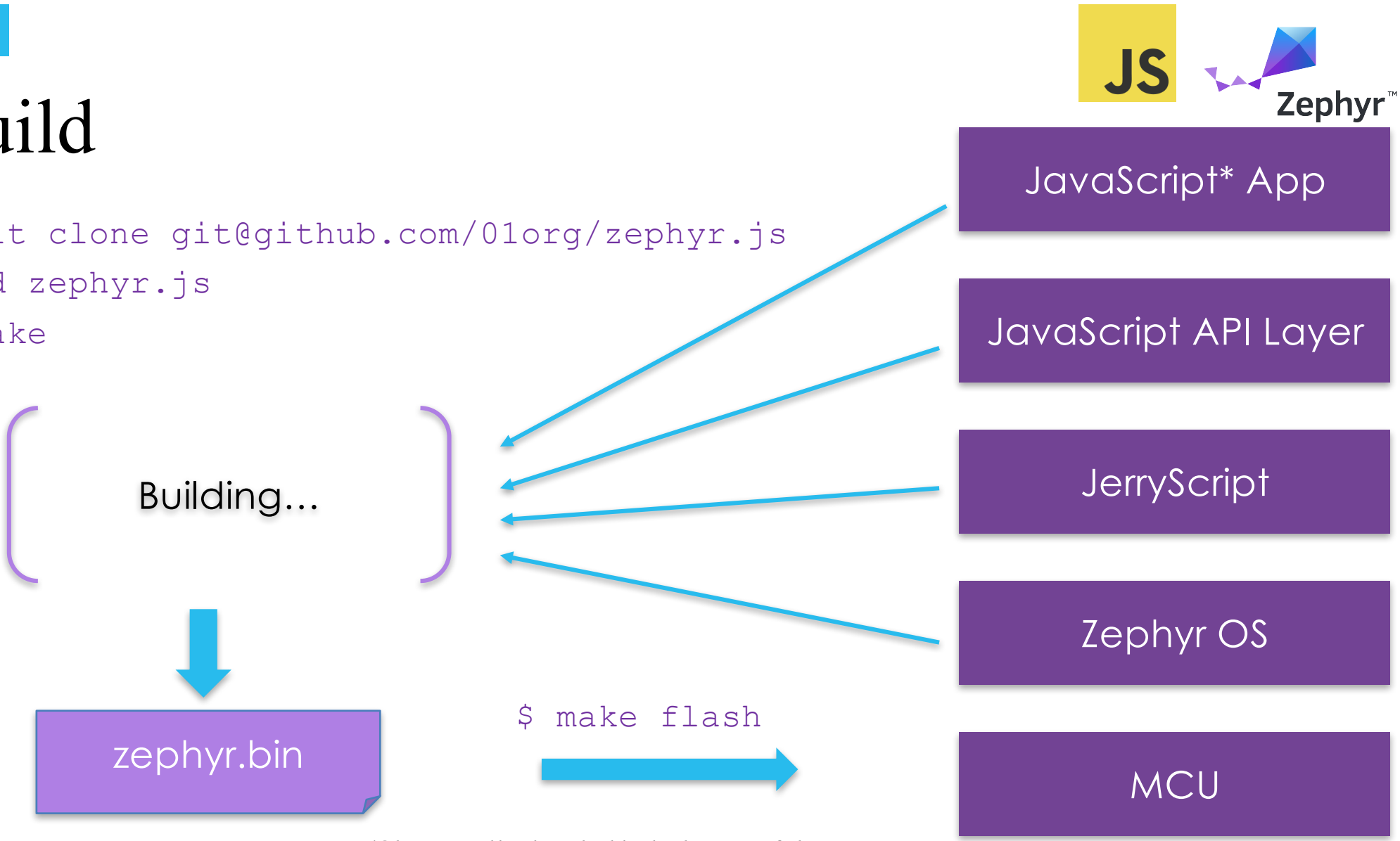
HOW

Build

```
$ git clone git@github.com/01org/zephyr.js
$ cd zephyr.js
$ make
```



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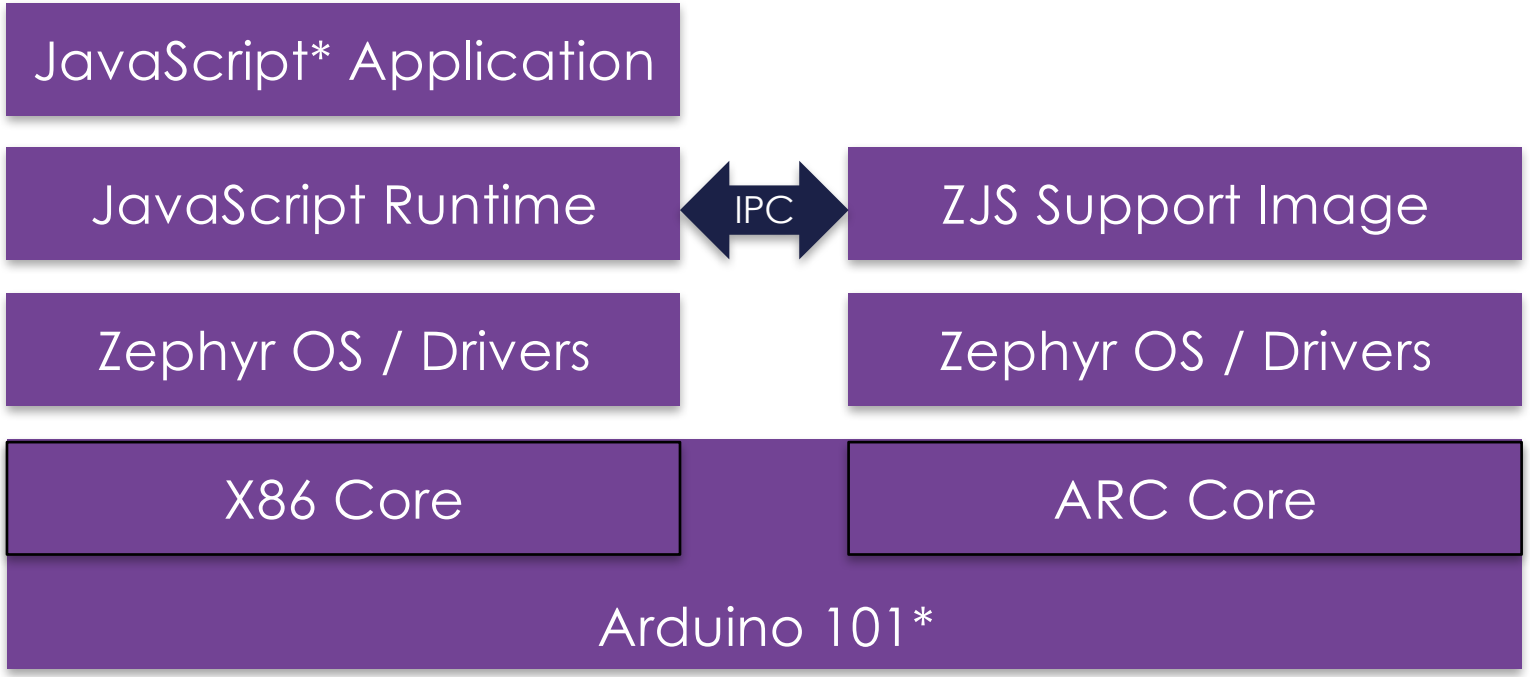
Arduino 101* Port



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WHAT

Security

- Build time
  - JavaScript* source is converted into C string and embedded into zephyr.bin image
  - JavaScript `eval()` function is disabled
  - Special developer mode can be enabled via make command (`make DEV=ashell`)
- Runtime
  - Only the embedded JavaScript application is executed
  - Web pages or foreign scripts are NOT executed
- Developer Mode
  - JavaScript application is executed from Zephyr OS filesystem
  - JavaScript application replaceable via USB or BLE using browser IDE or CLI tool

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WHAT

Memory Consumption

- Runtime
  - The JS engine boot up memory is around 5 KB RAM
- Application
  - Depends on the application and what it does
  - For reference, JavaScript* application running on Zephyr OS/Arduino 101*
    - 80K RAM/384 ROM
    - BLE physical web advertising
    - BLE GATT service with two characteristics (temperature and LED)
    - PWM and AIO for controlling temperature sensor and RGB LED
    - I2C for LCD
    - 200 lines of JavaScript code

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Zephyr Project Booth Demo Details

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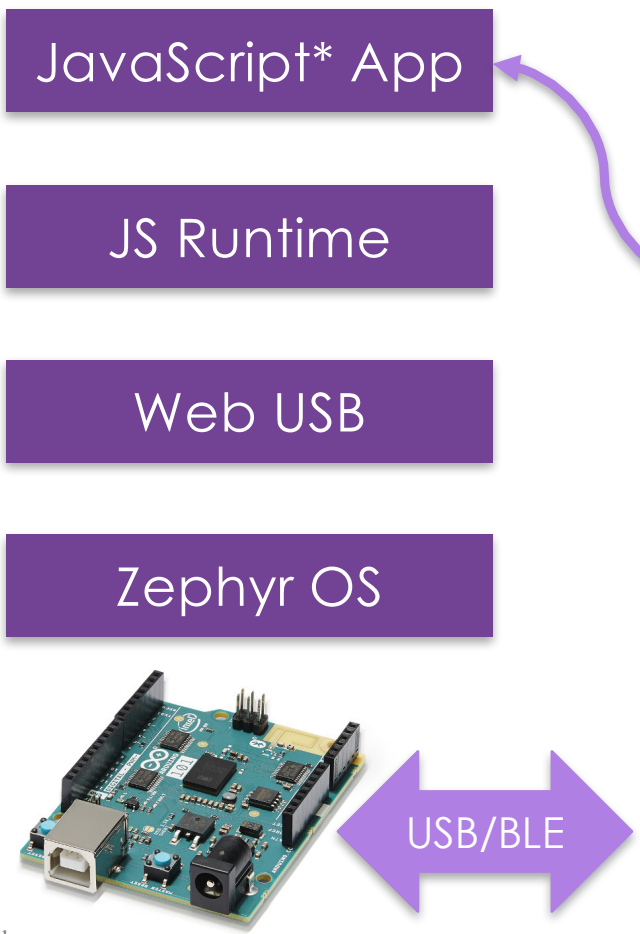
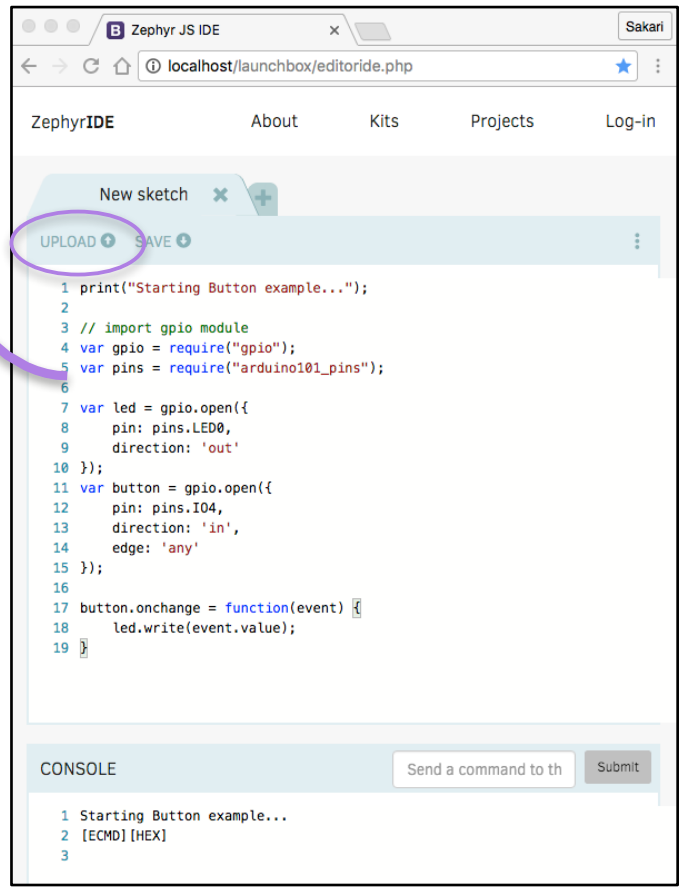
Browser IDE

- Only in DEV mode
- Copy-n-Run
- 3rd Party IDEs
- CLI Tools
- Web USB - **NEW**





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Demo Time

JavaScript APIs

API	Zephyr OS	Node.js
Events	Now	Core API
Buffer	Now	Core API
BLE	Now	Bleno NPM
GPIO, I2C, AIO, etc.	Now	Johnny-Five like
OCF	Now	IoTivity-node NPM
CoAP	Planned	CoAP NPM
MQTT	Planned	MQTT NPM
W3C Sensors	Planned	TBD
HTTP	Planned	Core API

WHEN

Roadmap

1H/16

- PoC
- Few APIs
- Arduino 101* support

2H/16

- Subset of Node.js APIs
- OCF
- BLE
- PIN and BUS Access
- Copy-and-Run
- Browser IDE
- FRDM-K64F support

1H/17

- More Node.js* APIs
- Power and Battery
- CoAP, MQTT
- NFC
- Security and Crypto
- W3C Sensors
- Remote debugging

Open Source Project

- https://github.com/01org/zephyr.js
- We want people to participate and contribute
- Alpha quality status
- Sample Code
- API documentation
- README

Summary

- JavaScript Application development on Zephyr
- Open Source Project - Please Join
- This the first step - Let’s make many more together


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Questions ?


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Thank You !
Please Visit Zephyr Project Booth for Demo