Node.js on PowerPC

A story about porting Node.js & V8
Who cares?

- **IBM** - PowerPC Linux & AIX
- **OpenPOWER Consortium**
  - Google
  - NVIDIA
  - Tyan
  - Mellanox
I've never used PowerPC
So I probably don't care about this at all

Really? - Have you ever used..
- Mac G4 / G5?
- PS3? Xbox360? Wii?
IBM Cloud

Whose cloud powers 270,000 more websites than Amazon?

Free cloud server for one month

IBM Cloud supports 24 of the top 25 Fortune 500 companies.
V8 - a JavaScript runtime

That's part of the Chrome browser, right?
Yes, but V8 is also a stand-alone runtime
Node.js uses V8 as its JS runtime engine
Node.js primer

What's Node made of?

<table>
<thead>
<tr>
<th>V8 Engine</th>
<th>libuv</th>
<th>core lib</th>
</tr>
</thead>
<tbody>
<tr>
<td>C++</td>
<td>C platform abstraction layer</td>
<td>JavaScript</td>
</tr>
<tr>
<td>JS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Node.js was created by Ryan Dahl
Joyent is the steward of **Node.js**
What do you do with Node.js?

A few good examples of when Node.js is a good fit

- Single page gmail-like applications
- Creating services with JSON API
- Streaming data

http://pettergraff.blogspot.ca/2013/01/why-node.html
http://nodeguide.com/convincing_the_boss.html
NPM

- **Node Package Manager**
  - online repository of node modules ([npmjs.org](http://npmjs.org))
  - command line utility for interacting with npmjs.org

- Most node applications are built using many packages

- Example:

  ```bash
  $ npm install orion
  $ node node_modules/orion/server.js
  ```
Was it hard to port?

- **Node.js** - No, not really.
- **V8** - Yes. Very.

Why? V8 always compiles JS to machine code.
Can I get it? YES!

- [GitHub](https://github.com/andrewlow/v8ppc)
- [GitHub](https://github.com/andrewlow/node)
- [Jenkins](https://v8ppc.osuosl.org:8080)

Is it open source? YES!
How is PowerPC different?

Not Intel assembly, so completely different machine instructions
PowerPC is Big Endian (actually bi-endian)

Consider 0xDEADBEEF stored in memory

<table>
<thead>
<tr>
<th>Memory location</th>
<th>little</th>
<th>big</th>
<th>mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>base address + 0</td>
<td>EF</td>
<td>DE</td>
<td>AD</td>
</tr>
<tr>
<td>base address + 1</td>
<td>BE</td>
<td>AD</td>
<td>DE</td>
</tr>
<tr>
<td>base address + 2</td>
<td>AD</td>
<td>BE</td>
<td>EF</td>
</tr>
<tr>
<td>base address + 3</td>
<td>DE</td>
<td>EF</td>
<td>BE</td>
</tr>
</tbody>
</table>
Checking Endian

```c
int main()
{
    int x = 1;
    char *y = (char*) &x;
    printf("%c\n", *y + 48);
}
```

Clearly this is a C porting problem
JS doesn't care about endian

**You might.** ES6 introduces TypedArrays

```javascript
var a1 = new Uint32Array([1]);
var a2 = new Uint8Array(a1.buffer);
console.log(a2[0])
```

http://calculist.org/blog/2012/04/24/the-little-endian-web/
TypedArray

- An ArrayBuffer type, representing a generic fixed-length binary buffer
- A group of types are used to create views of the ArrayBuffer
- Multiple typed array views can refer to the same ArrayBuffer, of different types, lengths, and offsets

- Examples (with links)
  - Tutorial on use of TypedArrays
  - Fast canvas pixel manipulation (Mozilla)
  - Direct access to binary data (jpg, mp3)

Typed Array spec: http://www.khronos.org/registry/typedarray/specs/latest
Demo Node.js on PowerPC

Hopefully the demo gods will allow this..
Questions?

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