What is Node.js?

Session ID:

Agenda Key:

First, how do IBM i keep up?

LPP OPS – watch this space
… Node.js
… Python
… more coming
… (http://www.ibm.com/developerworks/ibmi/techupdates/opensource)

5733-OPS Option 4	Python 2
5733-OPS Option 5	Node.js v4
5733-OPS Option 6	Git

Node.js, installation, PTFs, etc.?

Open Source Technologies on IBM i

Node.js
SAMBA on IBM i
Python

API Reference

DB2 for i access APIs (with asynchronized support)
DB2 for i access APIs - old
Toolkit for IBM i APIs

What is Node.js?

Node.js moves to IBM i

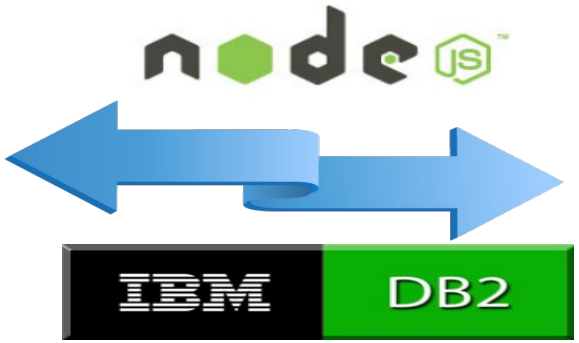
Node.js® is a platform built on Chrome's JavaScript runtime

- **easily building fast, scalable network applications**
- **event-driven, non-blocking I/O model**
- **lightweight and efficient**
- **perfect for data-intensive real-time applications**

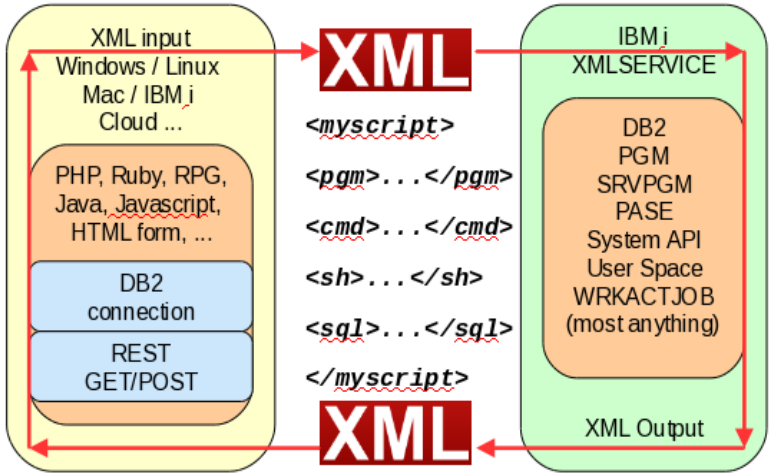
Yes, Node.js on IBM i!

Node.js, like all successful Open Source, has many contributors

- **IBM i Node.js contribution**
  - **DB2 access (new)**
  - **Toolkit XMLService (new)**

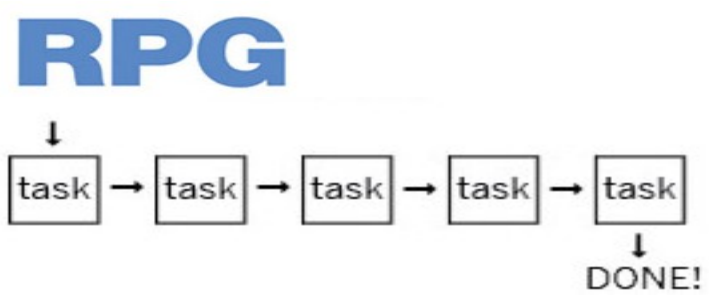


XMLService

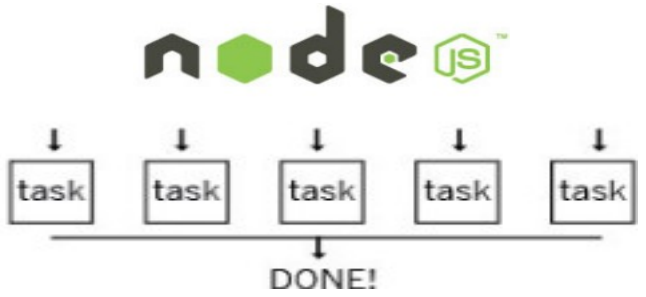


Node.js® like asynchronous RPG sub-procedures

- **Different threads sub-procedure tasks (same time)**
- **Callback when task completed**



Synchronous



Asynchronous

Node.js example (Bears)

Node.js bears project download.

https://bitbucket.org/litmis/nodejs

In download zip file find:
> node4_tutorial_bears

Step 0 - Node.js bears project requirements

Node.js bears project.

Project requirements.
> JSON API interface
> Browser interface
> Serve 2000/hits second (7.2 million/hour)
> Current LPAR hardware partition (small)
> Isolate Node.js from root of machine
> Integrated into existing Apache site
> Different teams API and GUI (browser)
> Use only JavaScript and html skills
Programmer note:
… partridge in a pear tree, ya crazy zoo keeper ...

Step 1 - Node.js bears isolate by chroot (admin)

Step 1 – Isolation node.js from root machine (auto-sign-on chroot)

When a user profile with a "." (dot) in their home directory path connects using ssh, sftp, or scp path the "/" (root) directory for that connected session is set to be the portion of the directory path prior to the "."

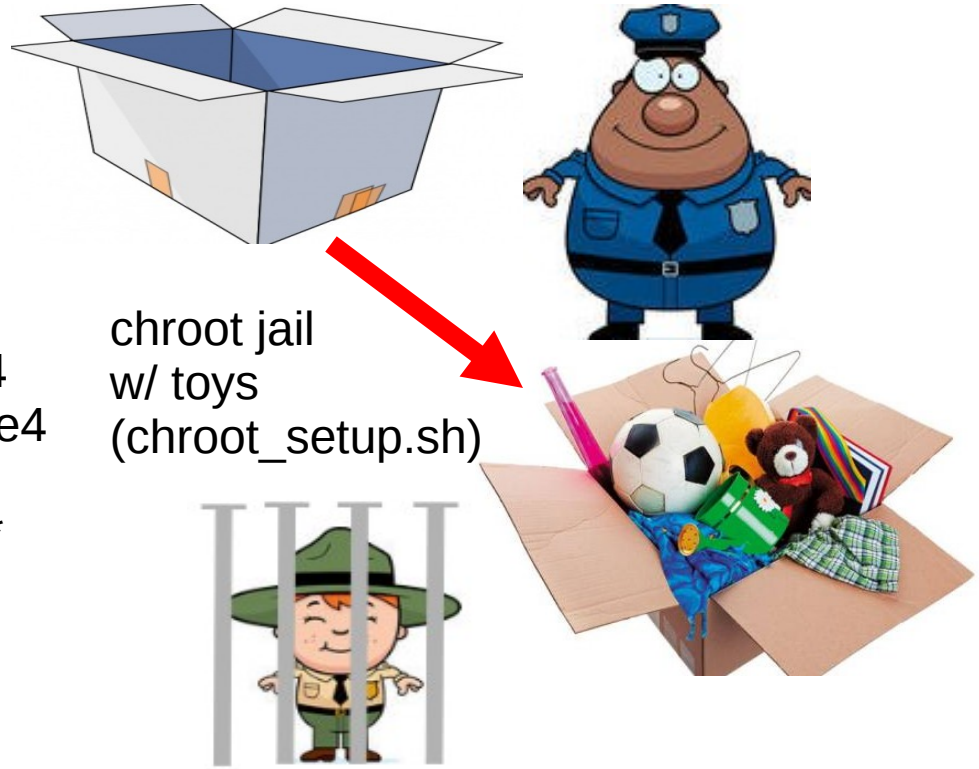
On 400
======
> strTCPSVR SERVER(*SSHD)
```
> mkdir -p /QOpenSys/node4/home/node4
> CRTUSRPRF USRPRF(NODE4) PASSWORD() USRCLS(*PGMR) TEXT('Tony Cairns')
> CHGUSRPRF USRPRF(NODE4) LOCALE(*NONE) HOMEDIR('/QOpenSys/node4/./home/node4')
```

On laptop
=========
$ ssh node4@myibmi

Step 1 – Isolation node.js from root machine

*** download latest ibmichroot (IBM i use profile-admin) ***
https://bitbucket.org/litmis/ibmichroot/downloads
$ ./chroot_setup.sh chroot_minimal.lst /QOpenSys/node4
$ ./chroot_setup.sh chroot_nls.lst /QOpenSys/node4
$ ./chroot_setup.sh chroot_OPS_SC1.lst /QOpenSys/node
$ ./chroot_setup.sh chroot_gen_OPS_tools.lst /QOpenSys/node4
$ ./chroot_setup.sh chroot_gen_OPS_Node4.lst /QOpenSys/node4

*** make node4 owner of new chroot (IBM i use profile-admin) ***
$ chroot /QOpenSys/node4 /QOpenSys/usr/bin/ksh
$ cd /
$ chown -Rh node4 /
$ exit



Step 2 - Node.js bears json api (node4 user)

Step 2 - sign on to chroot provided by admin.

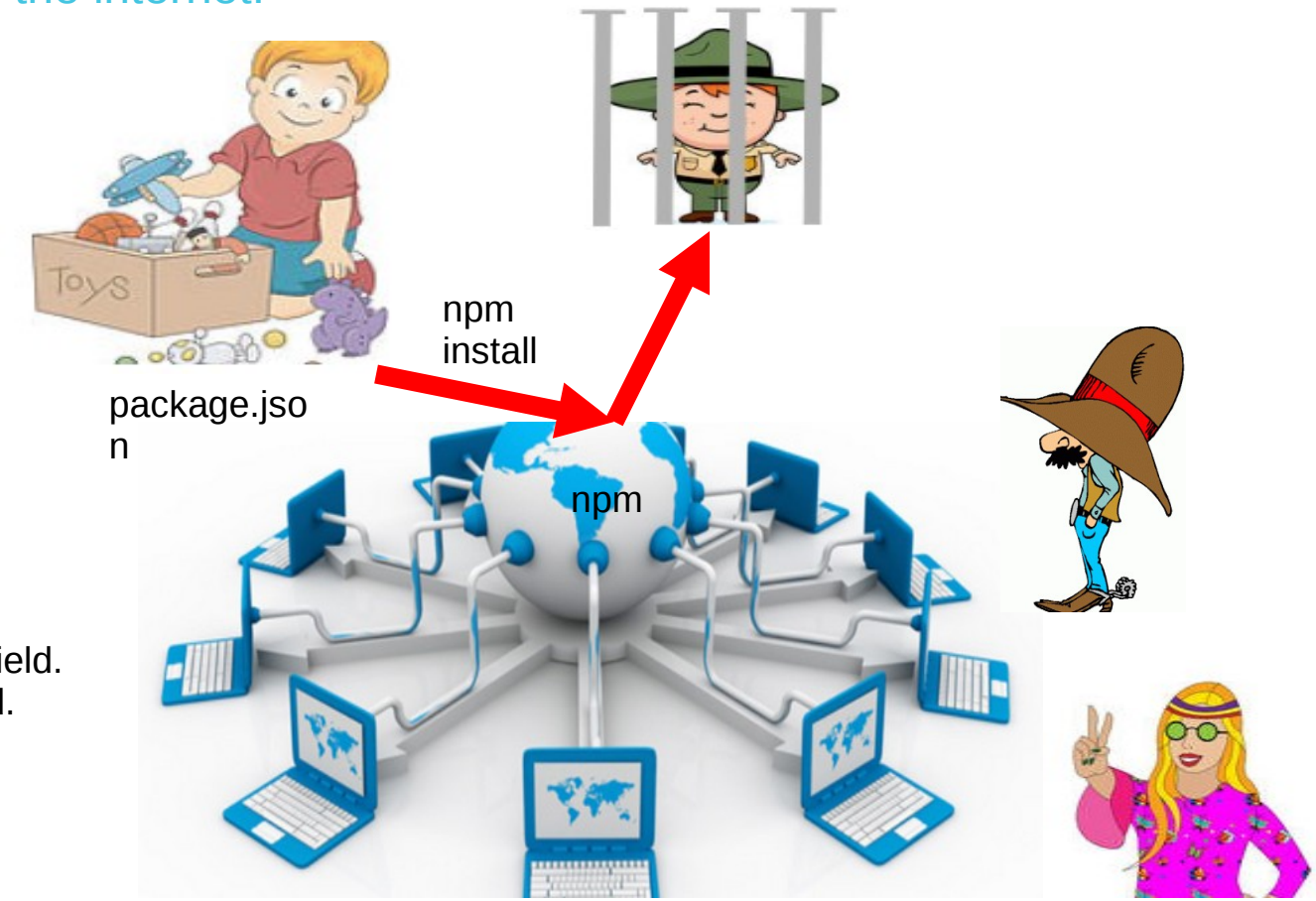
*** ssh to new chroot (node4 profile) ***
$ ssh -X node4@ut28p63
node4@ut28p63's password:
$ ksh
$ export PATH=.:/QOpenSys/QIBM/ProdData/OPS/Node4/bin:/QOpenSys/QIBM/ProdData/OPS/tools/bin:/QOpenSys/usr/bin
$ bash
$ node --version
v4.4.6
$


```
CHGUSRPRF USRPRF(NODE4) LOCALE(*NONE) HOMEDIR('/QOpenSys/node4/./home/node4')
```

Step 2 – npm more node.js toys from the internet.

*** Defining our Node Packages package.json ***
$ cat package.json
```
{
    "name": "node-api",
    "main": "server.js",
    "dependencies": {
        "express": "~4.0.0",
        "body-parser": "~1.0.1"
    }
}
```

*** Installing Our Node Packages ***
$ npm install
npm WARN package.json node-api@ No repository field.
npm WARN package.json node-api@ No license field.
body-parser@1.0.2 node_modules/body-parser
:
express@4.0.0 node_modules/express
:



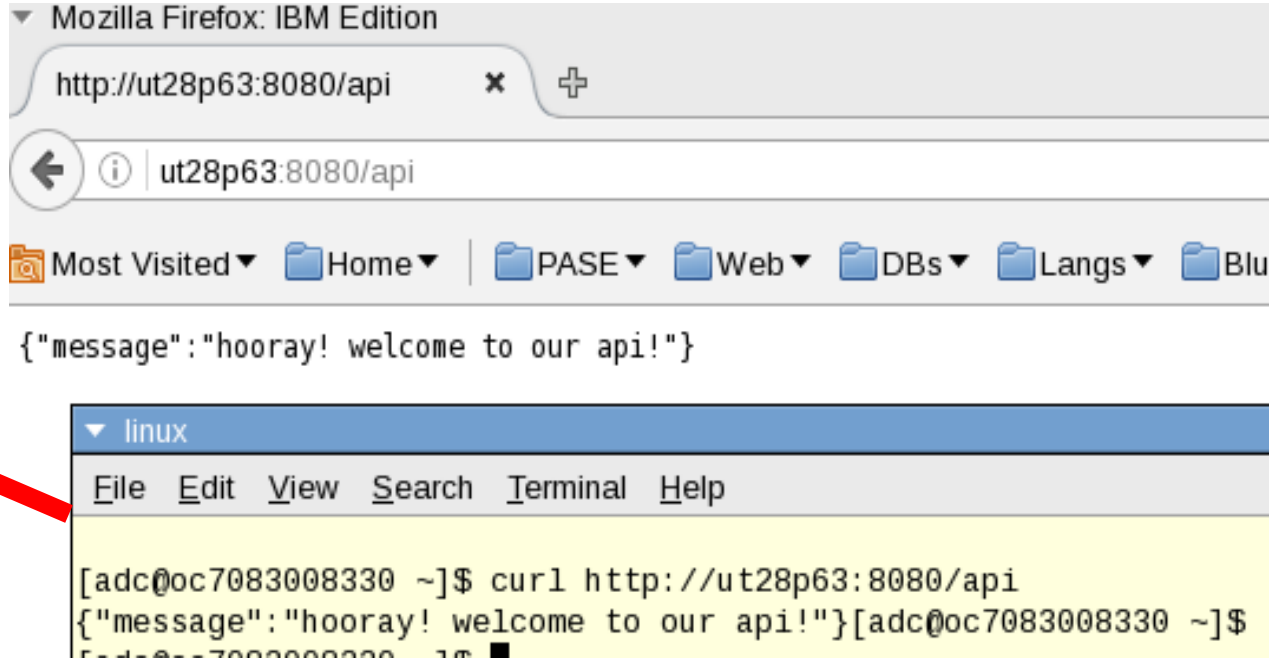
Step 2 – try initial api server

server_step_1.js - Initial server

*** Setting Up Our Server server.js ***
$ cp server_step_1.js server.js

*** Starting Our Server and Testing ***
$ node server.js
Magic happens on port 8080

http://myibmi:8080/api
{"message":"hooray! welcome to our api!"}



Step 2 – set up bear model

*** bear_step_2.js - Initial REST model ***
$ cp app/models/bear_step_2.js app/models/bear.js

*** Testing ***
$ node test/test_bear_ctor.js
$ node test/test_bear_save.js
$ node test/test_bear_find.js
$ node test/test_bear_findById.js nbr
$ node test/test_bear_removeById.js nbr

Step 2 – set up bear rest routes

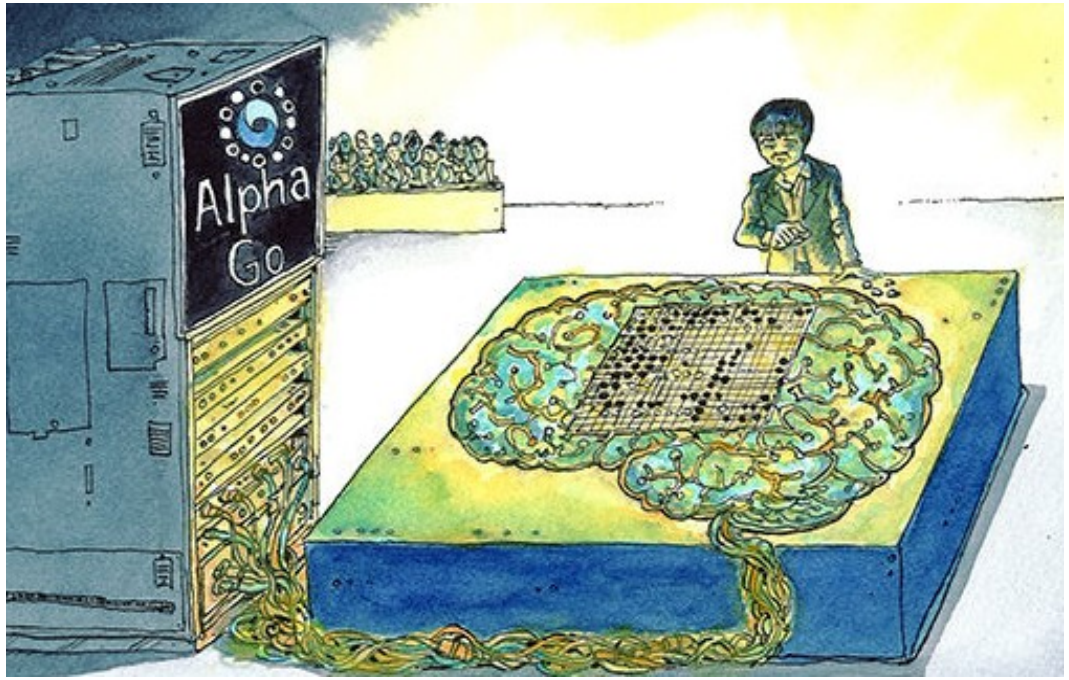
**server_step_3.js - REST route and view
$ cp server_step_3.js server.js
$ node server.js
Magic happens on port 8080

*** Testing ***
GET list
$ curl http://ut28p63:8080/api/bears

GET by id
$ curl http://ut28p63:8080/api/bears/3

POST save name
$ curl -d "name=Sally" http://ut28p63:8080/api/bears

DELETE by id
$ curl -X DELETE http://ut28p63:8080/api/bears/3



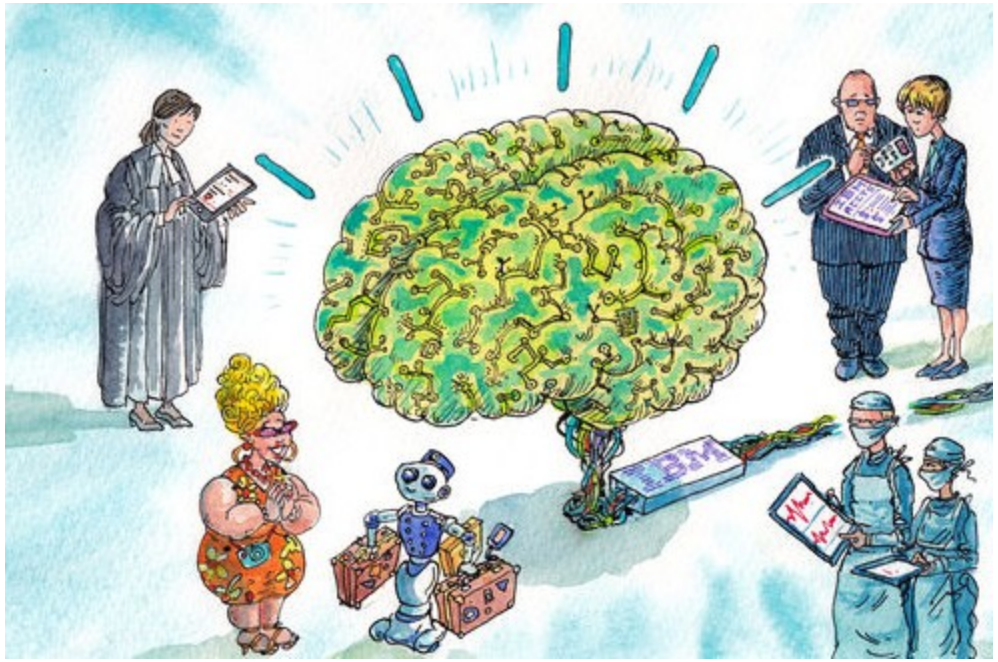
Step 2 – check the speed (Uh Oh)

***before cache (ab tool test) ***
$ ab -t 15 -c 60 http://ut28p63:8080/api/bears/2
Concurrency Level: 60
Time taken for tests: 15.072 seconds
Complete requests: 1351
Failed requests: 0
Write errors: 0
Total transferred: 276606 bytes
HTML transferred: 37719 bytes
Requests per second: 89.64 [#/sec] (mean)
Time per request: 669.361 [ms] (mean)
Time per request: 11.156 [ms] (mean, across all concurrent requests)
Transfer rate: 17.92 [Kbytes/sec] received

Step 2 – check speed with cache (Yahoo)

*** copy model cache code ***
$ cp app/models/bear_step_4.js app/models/bear.js

*** after cache (ab tool test) ***
$ ab -t 15 -c 60 http://ut28p63:8080/api/bears/2
Concurrency Level: 60
Time taken for tests: 15.003 seconds
Complete requests: 38197
Failed requests: 0
Write errors: 0
Total transferred: 7563006 bytes
HTML transferred: 1031319 bytes
Requests per second: 2545.91 [#/sec] (mean)
Time per request: 23.567 [ms] (mean)
Time per request: 0.393 [ms] (mean, across all concurrent requests)
Transfer rate: 492.28 [Kbytes/sec] received



Step 3 - Node.js bears gui (browser)

Step 3 – GUI team set-up view to use our JSON API

*** app/view ***
index.html -- list bears
bear_find.js -- list bears create
bear_add.js -- add a bear name
bear_findById.js -- single bear
bear_id.html -- view single bear action
bear_gone.html -- remove bear
bear_remove.js -- remove bear delete
helper.js -- helper js functions
bear.css -- view layout

Web GUI team

Step 3 – configure gui (admin)

*** view (admin -- outside chroot) ***

*** config ***
> cp /QOpenSys/node4/home/node4/node4_tutorial_bears/conf/httpd.conf /www/apachedft/conf/.
> cd /www/apachedft/htdocs
> ln -sf /QOpenSys/node4/home/node4/node4_tutorial_bears/app/view bears
bash-4.3$ ls -l
lrwxrwxrwx   1 adc   0   112 Oct 20 10:06 bears -> /QOpenSys/node4/home/node4/node4_tutorial_bears/app/view
-rwx---r-x   1 qsys   0   1008 Oct 7 2009 index.html
```

*** run (browser) ***
http://ut28p63.rch.stglabs.ibm.com/bears/
```

Step 3 – Open for business test

Bear List

Add

78 Bob
82 Gina
72 Jimmy
92 Lee
89 Liv
90 Mildred
91 Paul
85 Sally

refresh

rows found (BEARS.BEAR)

Bear Find By Id

89 - Liv (remove)

home

row found id (89)

Bear Remove

(89)

home

row found id (89)

Step 4 – Show the boss

Happy project manager.

Project requirements.
yes> JSON API interface
yes> Browser interface
yes> Serve 2000/hits second (7.2 million/hour)
yes> Current LPAR hardware partition (small)
yes> Isolate Node.js from root of machine
yes> Integrated into existing Apache site
yes> Different teams API and GUI (browser)
yes> Use only JavaScript and html skills

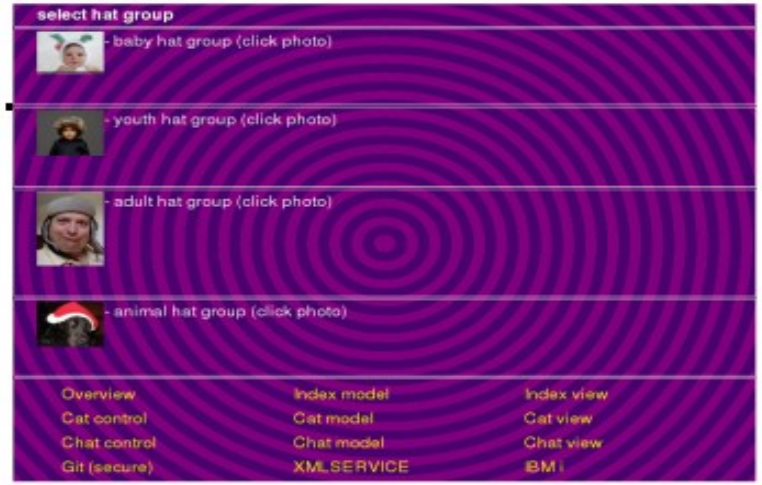
Bluemix Node.js remote IBM i?

http://myibminodejs.mybluemix.net/

BLUEMIX cloud node.js to IBM i ..

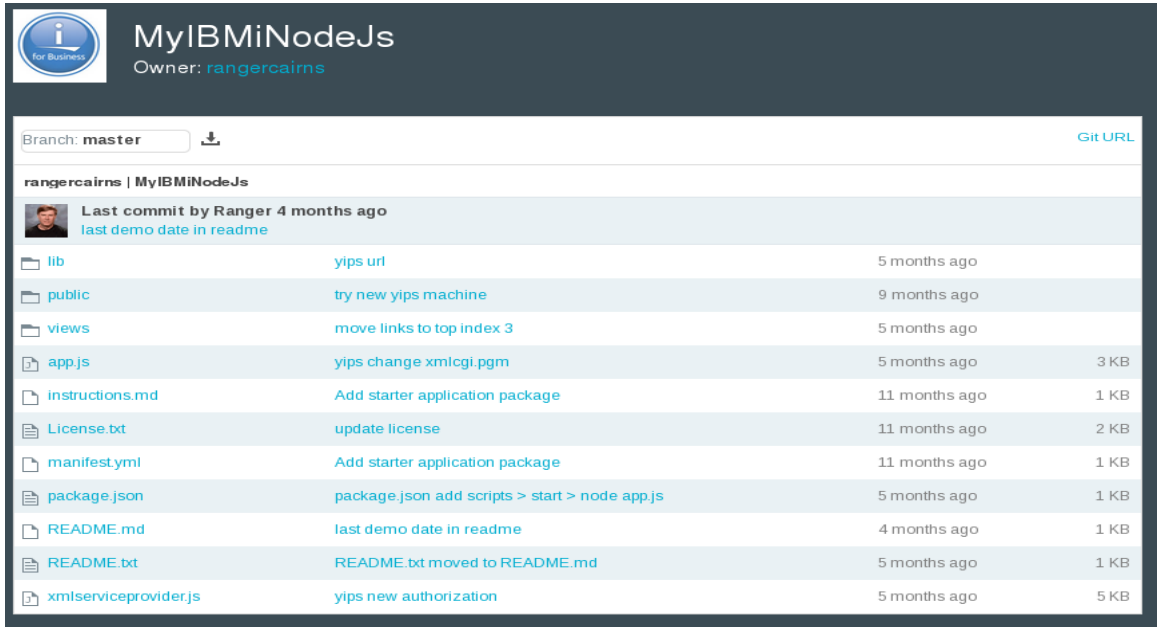
Q: New technology?

A: IBM i Node.js toolkit (available IBM i)



(application not always running)

Web Application: http://myibminodejs.mybluemix.net/
Git repository: https://hub.jazz.net/project/rangercairns/MyIBMiNodeJs/overview

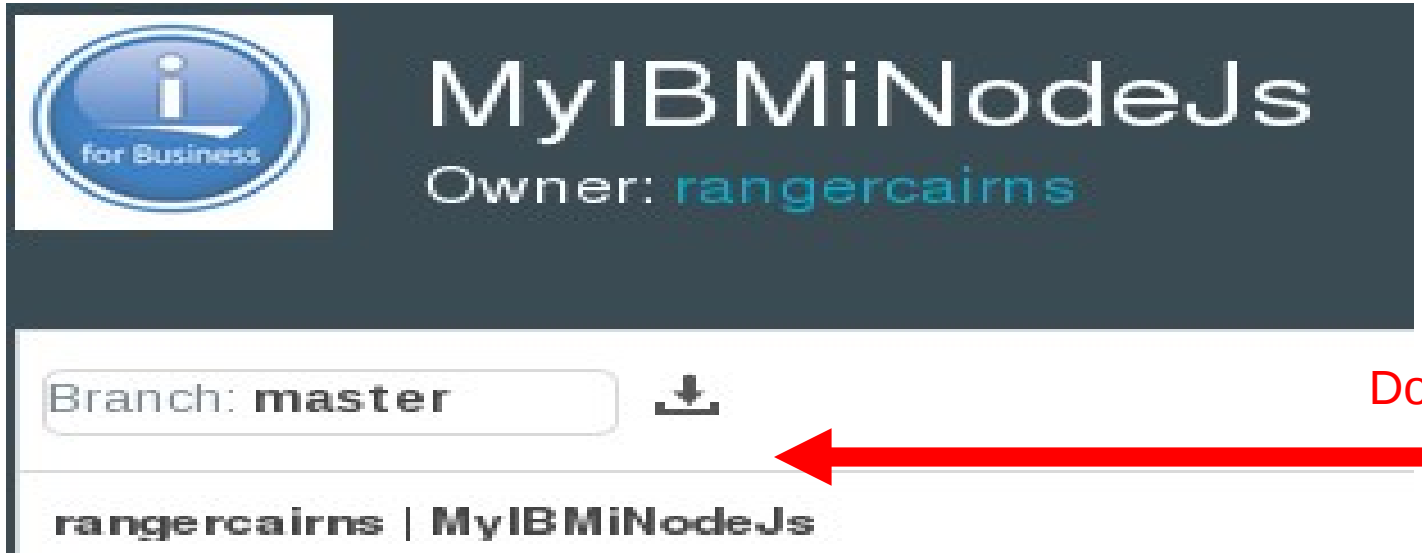


(application not always running, but source available)

Bluemix app move to IBM i?

Bobby download Git ...

Git repository: https://hub.jazz.net/project/rangercairns/MyIBMiNodeJs/overview



Download

Download and unzip on your pc. Transfer all files up to IBM i, into your chroot location, same directories as in zip (/home/bobby/MyIBMiNodeJs).

Bobby chroot application ...

```
$ ssh bobby@ut30p30
bobby@ut30p30's password:
$
```


```
$ cd /home/bobby/MyIBMiNodeJs
$ ls
License.txt          instructions.md      public
README.md            lib                  views
README.txt           manifest.yml         xmlserviceprovider.js
app.js               package.json
```

```
$ ksh
$ export PATH=/QOpenSys/QIBM/ProdData/Node/bin:/usr/bin
$ export LIBPATH=/QOpenSys/QIBM/ProdData/Node/bin:/usr/lib
$ node --version
v0.10.29
```

Bobby chroot application ...

```
$ node app.js
module.js:340
    throw err;
Error: Cannot find module 'express'
```

```
$ npm install express
module.js:340
    throw err;
Error: Cannot find module 'npmlog'
```

Never goes perfectly, most presentations lie about 'ops', this one shows it all.

Bobby chroot application ...

```
$ cd /QOpenSys/QIBM/ProdData/Node/bin
$ ls ../lib/node_modules/npm/bin/npm-cli.js
../lib/node_modules/npm/bin/npm-cli.js
$ ln -sf ../lib/node_modules/npm/bin/npm-cli.js npm
$ ls -l npm
lrwxrwxrwx    1 bobby    0               76 Nov  9 07:48 npm -> ../lib/node_modules/npm/bin/npm-
cli.js
$ cd
$ npm --version
1.4.14
```


```
$ npm install express
npm ERR! fetch failed https://registry.npmjs.org/buffer-crc32/-/buffer-crc32-0.2.1.tgz
npm ERR! fetch failed https://registry.npmjs.org/mkdirp/-/mkdirp-0.3.5.tgz
npm ERR! fetch failed https://registry.npmjs.org/fresh/-/fresh-0.2.0.tgz
npm ERR! fetch failed https://registry.npmjs.org/batch/-/batch-0.5.0.tgz
express@3.4.7 node_modules/express
```

Never goes perfectly, most presentations lie about 'ops', this one shows it all.

Bobby chroot application ...

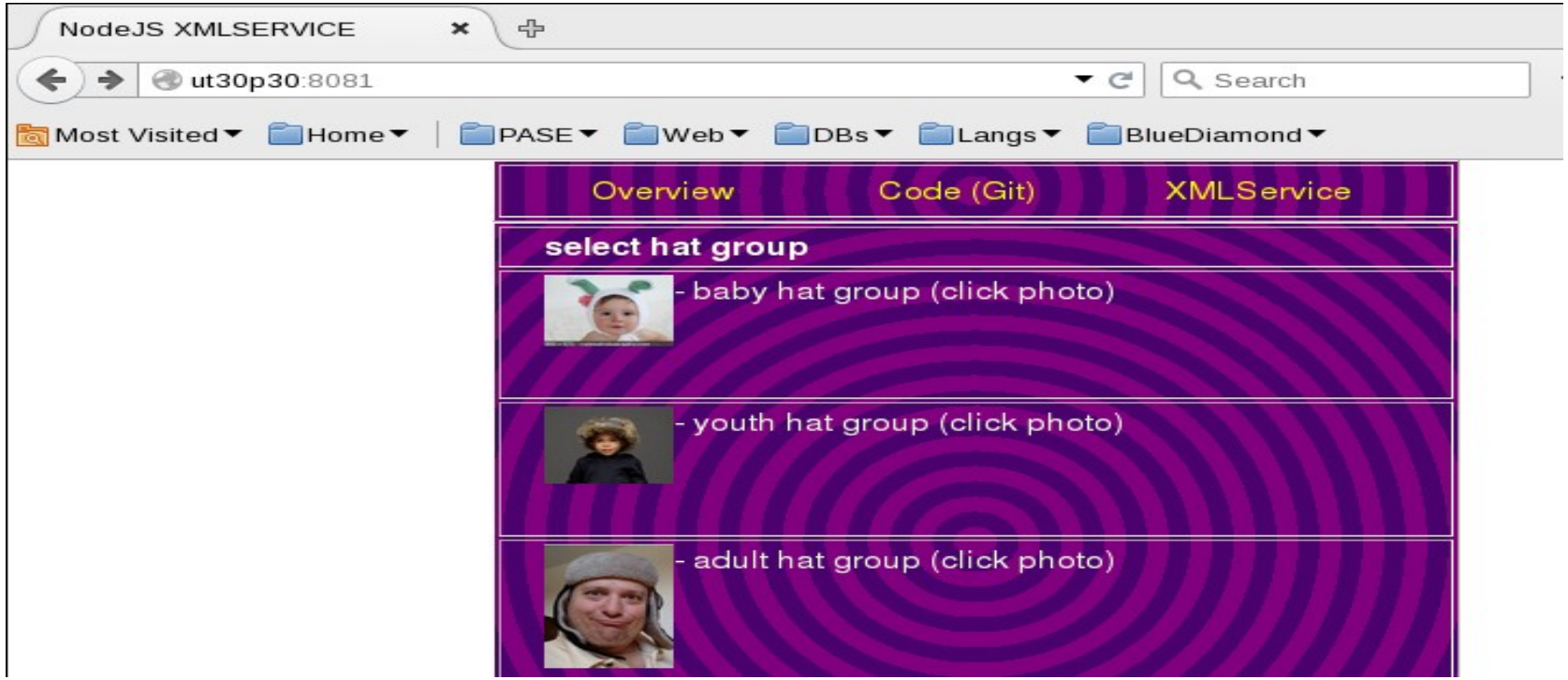
```
$ node app.js
App started on port 3000
events.js:72
        throw er; // Unhandled 'error' event
Error: listen EADDRINUSE
```


```
$ export VCAP_APP_PORT=8081
$ export VCAP_APP_HOST=ut30p30
$ node app.js
App started on port 8081
module.js:340
    throw err;
          ^
Error: Cannot find module 'jade'
```

Never goes perfectly, most presentations lie about 'ops', this one shows it all.

Bobby chroot application ...

```
$ npm install jade
npm ERR! fetch failed https://registry.npmjs.org/character-parser/-/character-
parser-1.2.0.tgz
jade@1.1.4 node_modules/jade
$ node app.js
App started on port 8081
```



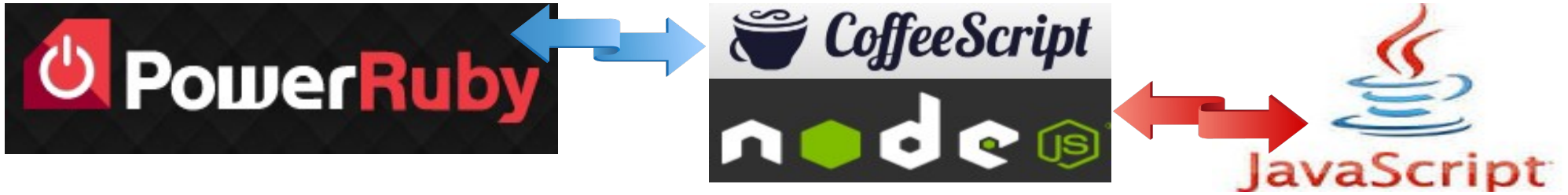
This IBM i application moved from Bluemix is remotely chatting with Yips IBM i machine. It works my_IBMi<2>yips_IBMi, but, demo assuming your IBM i can talk REST web services outside firewall to HTTP (of course).

Also, Ruby Rails use Node.js?

PowerRuby Rails Asset Pipeline requires JavaScript (Node.js)

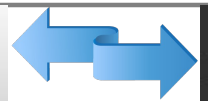
- **framework concatenate JavaScript and CSS assets**
- **hybrid lang assets CoffeeScript, Sass and ERB.**
- **CoffeScript compiles into JavaScript (via Node.js)**

> rails new appname



Rails Asset Pipeline

PowerRuby Rails Asset Pipeline




```
# Assignment:
number   = 42
opposite = true
# Conditions:
number = -42 if opposite
# Functions:
square = (x) -> x * x
# Arrays:
list = [1, 2, 3, 4, 5]
# Objects:
math =
  root:   Math.sqrt
  square: square
  cube:   (x) -> x * square x
```

```
var cubes, list, math, number, opposite, square;
number = 42;
opposite = true;
if (opposite) {
  number = -42;
}
square = function(x) {
  return x * x;
};
list = [1, 2, 3, 4, 5];
math = {
  root: Math.sqrt,
  square: square,
  cube: function(x) {
    return x * square(x);
  }
};
```

Questions?