INDEX
SAN FRANCISCO

Discover. Collaborate. Deploy.

Talk to your Code

Michael Dawson

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About Michael Dawson

IBM Runtimes/IBM Node.js Community Lead

Node.js collaborator
Chair of Technical Steering Committee (TSC)
Community Committee member

Active in many working groups/teams

- Benchmarking
- Build
- Release
- N-API
- Diagnostics
- Security-wg
- User Feedback

Twitter: @mhdawson1
GitHub: @mhdawson
Linkedin: https://www.linkedin.com/in/michael-dawson-6051282

Overview

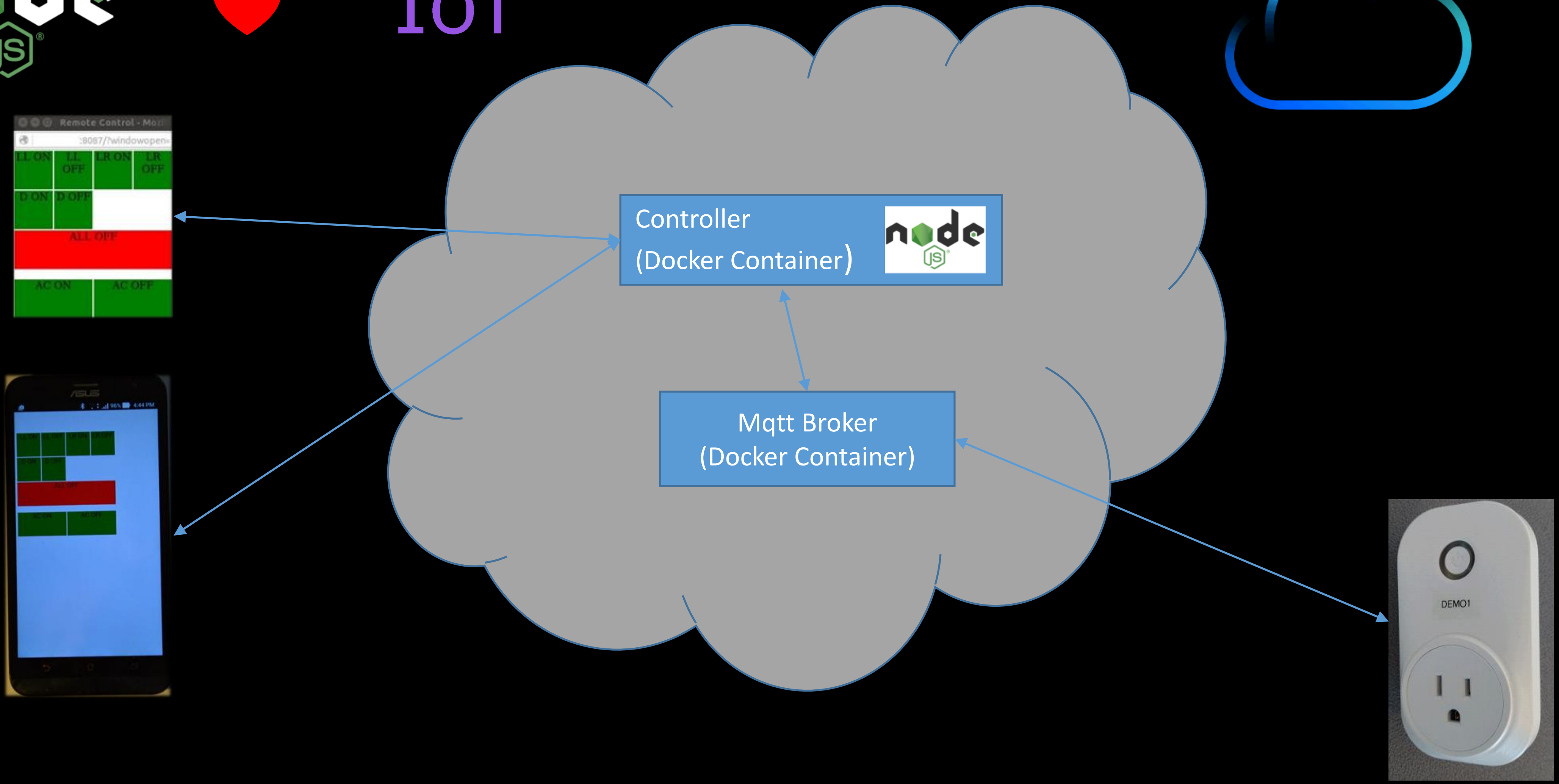
- node ❤ IoT
- Interaction V1
- Voice Service on the Rise
- Alexa to Mqtt Bridge
- Interaction V2
- Building an Alexa Skill
- Real world experience

node ♥ IoT

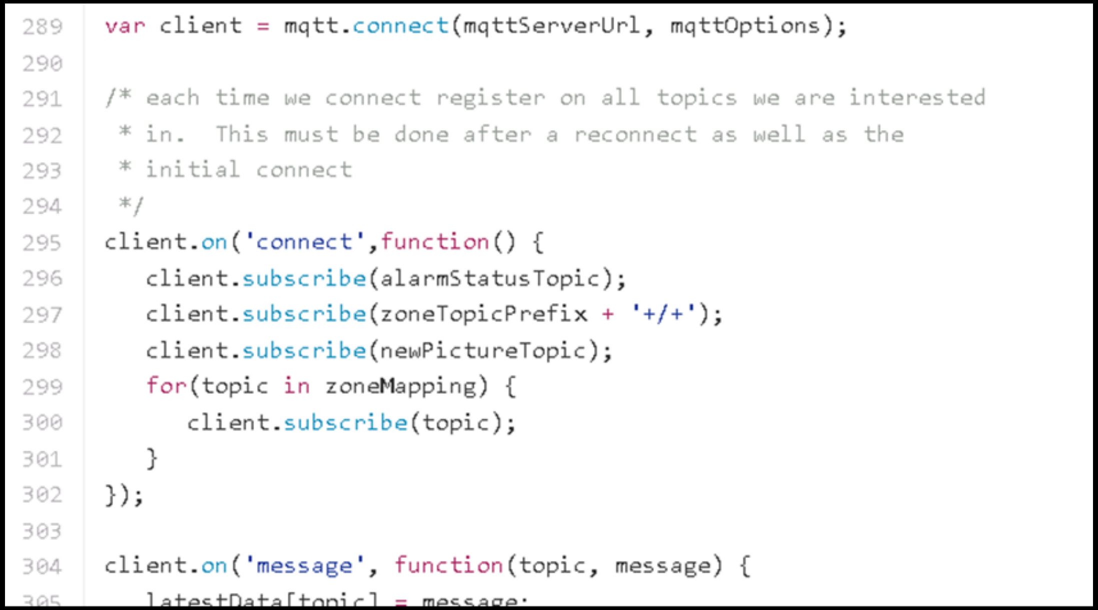
Async

- Internet of Things (IoT)
  - network of physically connected devices (things)
  - devices provide data
  - devices can be controlled
  - https://en.wikipedia.org/wiki/Internet_of_Things
- MQTT (MQ Telemetry Transport)
  - lightweight publish/subscribe
  - small footprint
  - low bandwidth (minimum size is 2 bytes)
  - From http://mqtt.org/ "MQTT is a machine-to-machine (M2M)/"Internet of Things" connectivity protocol"
- node

IoT

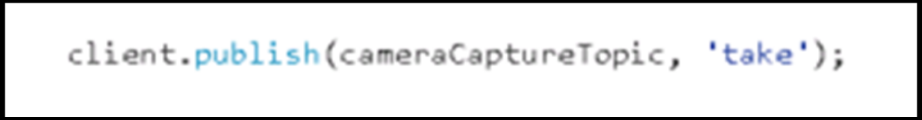

Remote Control - Mozi
:8087/?windowopen
LL ON
LL OFF
LR ON
LR OFF
D ON
D OFF
ALL OFF
AC ON
AC OFF
Controller
(Docker Container)
Mqtt Broker
(Docker Container)
DEMO1

IoT



```
var client = mqtt.connect(mqttServerUrl, mqttOptions);

/* each time we connect register on all topics we are interested
 * in.  This must be done after a reconnect as well as the
 * initial connect
 */
client.on('connect',function() {
   client.subscribe(alarmStatusTopic);
   client.subscribe(zoneTopicPrefix + '+/+');
   client.subscribe(newPictureTopic);
   for(topic in zoneMapping) {
      client.subscribe(topic);
   }
});

client.on('message', function(topic, message) {
   latestData[topic] = message;
```

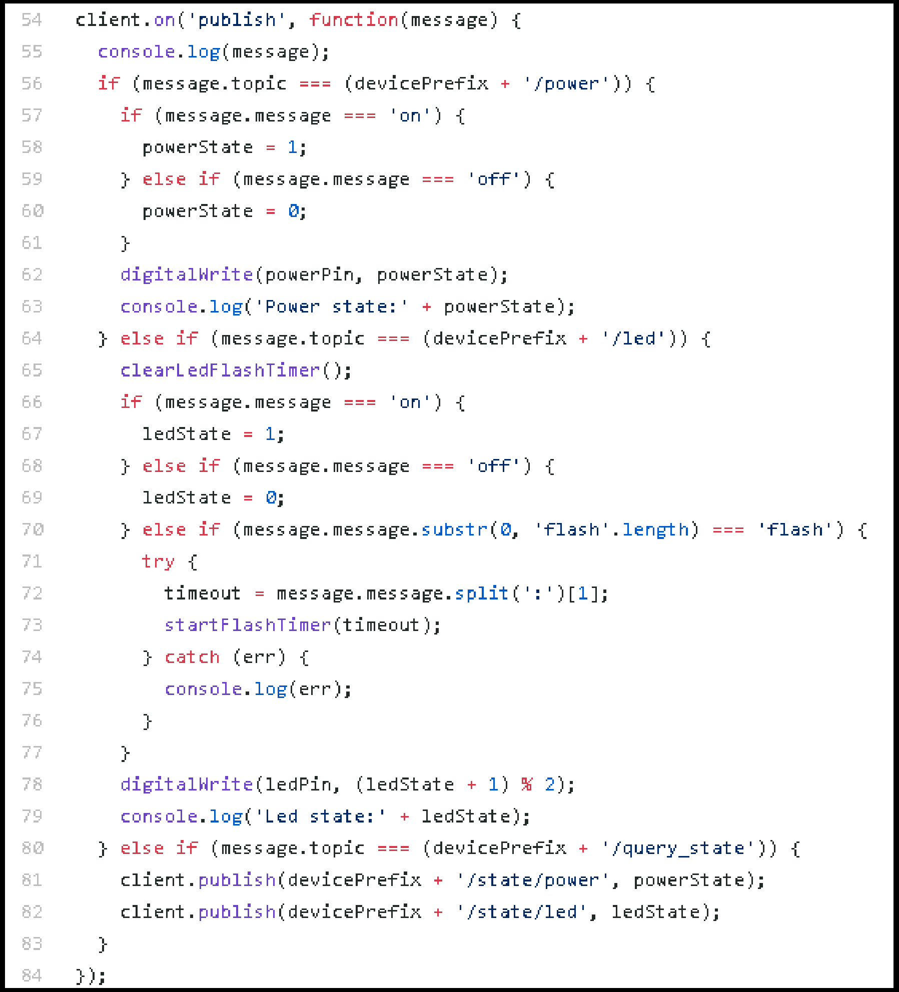
Receive



```
client.publish(cameraCaptureTopic, 'take');
```

Send

JavaScript ❤ IoT



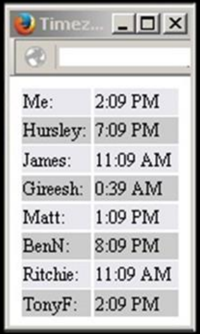
```
client.on('publish', function(message) {
  console.log(message);
  if (message.topic === (devicePrefix + '/power')) {
    if (message.message === 'on') {
      powerState = 1;
    } else if (message.message === 'off') {
      powerState = 0;
    }
    digitalWrite(powerPin, powerState);
    console.log('Power state:' + powerState);
  } else if (message.topic === (devicePrefix + '/led')) {
    clearLedFlashTimer();
    if (message.message === 'on') {
      ledState = 1;
    } else if (message.message === 'off') {
      ledState = 0;
    } else if (message.message.substr(0, 'flash'.length) === 'flash') {
      try {
        timeout = message.message.split(':')[1];
        startFlashTimer(timeout);
      } catch (err) {
        console.log(err);
      }
    }
    digitalWrite(ledPin, (ledState + 1) % 2);
    console.log('Led state:' + ledState);
  } else if (message.topic === (devicePrefix + '/query_state')) {
    client.publish(devicePrefix + '/state/power', powerState);
    client.publish(devicePrefix + '/state/led', ledState);
  }
});
```

https://github.com/mhdawson/espruino-stuff/blob/master/SmartPlug.js

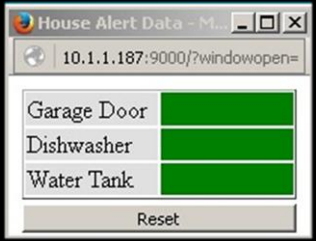
Interaction – V1

- Demo

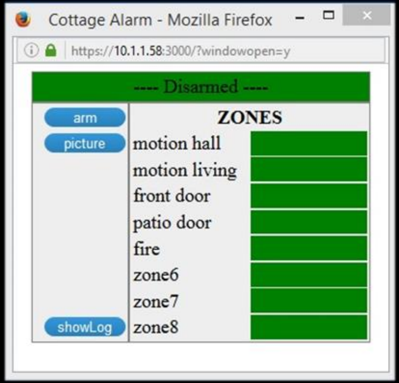
Good enough, create bunch of Apps



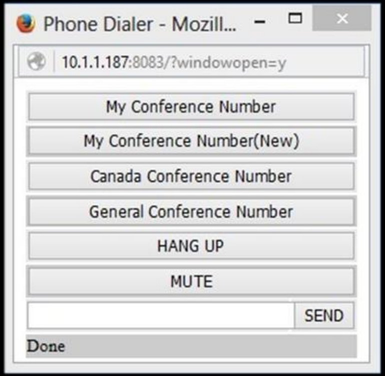
Me:	2:09 PM
Hursley:	7:09 PM
James:	11:09 AM
Gireesh:	0:39 AM
Matt:	1:09 PM
BenN:	8:09 PM
Ritchie:	11:09 AM
TonyF:	2:09 PM



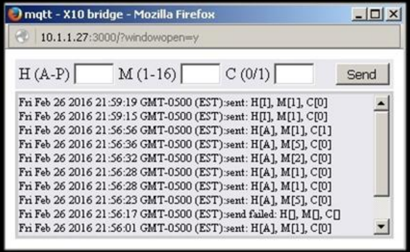
Garage Door	🟩
Dishwasher	🟩
Water Tank	🟩


Cottage Alarm - Mozilla Firefox
https://10.1.1.58:3000/?windowopen=y
---- Disarmed ----
arm
picture
showLog

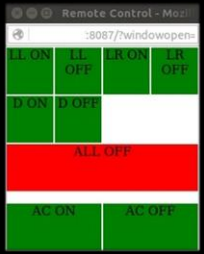
ZONES	
motion hall	🟩
motion living	🟩
front door	🟩
patio door	🟩
fire	🟩
zone6	🟩
zone7	🟩
zone8	🟩

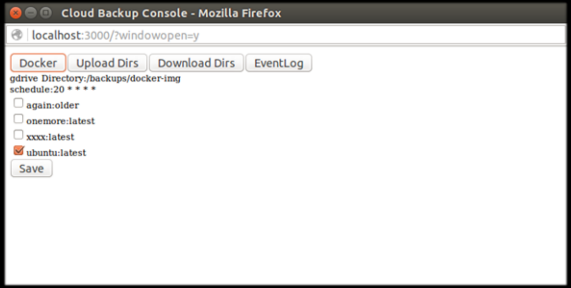


825782
15

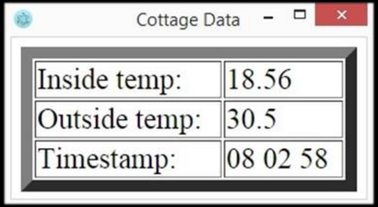

mqtt - X10 bridge - Mozilla Firefox
10.1.1.27:3000/?windowopen=y
H (A-P)
M (1-16)
C (0/1)
Send

```
Fri Feb 26 2016 21:59:19 GMT-0500 (EST):sent: H[I], M[1], C[0]
Fri Feb 26 2016 21:59:15 GMT-0500 (EST):sent: H[I], M[1], C[0]
Fri Feb 26 2016 21:56:56 GMT-0500 (EST):sent: H[A], M[1], C[1]
Fri Feb 26 2016 21:56:36 GMT-0500 (EST):sent: H[A], M[5], C[0]
Fri Feb 26 2016 21:56:32 GMT-0500 (EST):sent: H[A], M[2], C[0]
Fri Feb 26 2016 21:56:28 GMT-0500 (EST):sent: H[A], M[1], C[0]
Fri Feb 26 2016 21:56:28 GMT-0500 (EST):sent: H[A], M[1], C[0]
Fri Feb 26 2016 21:56:23 GMT-0500 (EST):sent: H[A], M[5], C[0]
Fri Feb 26 2016 21:56:17 GMT-0500 (EST):send failed: H[], M[], C[]
Fri Feb 26 2016 21:56:01 GMT-0500 (EST):sent: H[A], M[1], C[0]
```

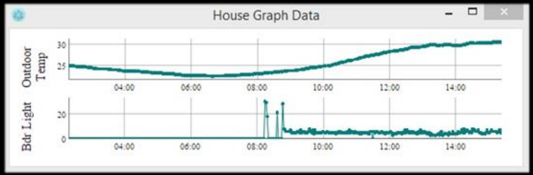



Cloud Backup Console - Mozilla Firefox
localhost:3000/?windowopen=y
Docker
Upload Dirs
Download Dirs
EventLog
Save

gdrive Directory:/backups/docker-img
schedule:20 * * * *
☐ again:older
☐ onemore:latest
☐ xxxx:latest
☑ ubuntu:latest

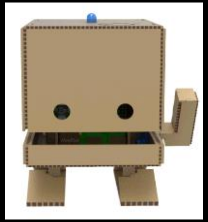


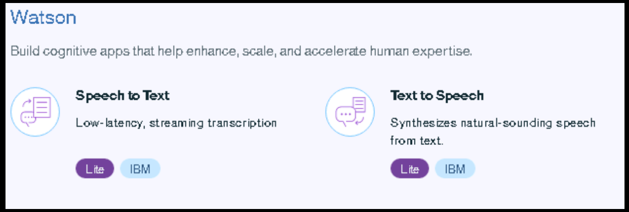
Inside temp:	18.56
Outside temp:	30.5
Timestamp:	08 02 58



Voice services on the Rise

- IBM Watson





Watson

Build cognitive apps that help enhance, scale, and accelerate human expertise.

Speech to Text

Low-latency, streaming transcription

Lite IBM

Text to Speech

Synthesizes natural-sounding speech from text.

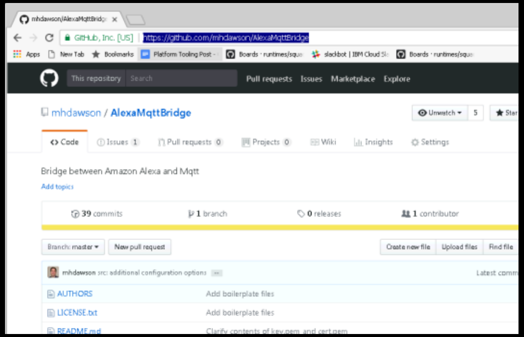
Lite IBM

https://www.ibm.com/watson/services/speech-to-text/

- Google Home

- Amazon Alexa

Alexa to Mqtt Bridge



mhdawson / AlexaMqttBridge

Bridge between Amazon Alexa and Mqtt

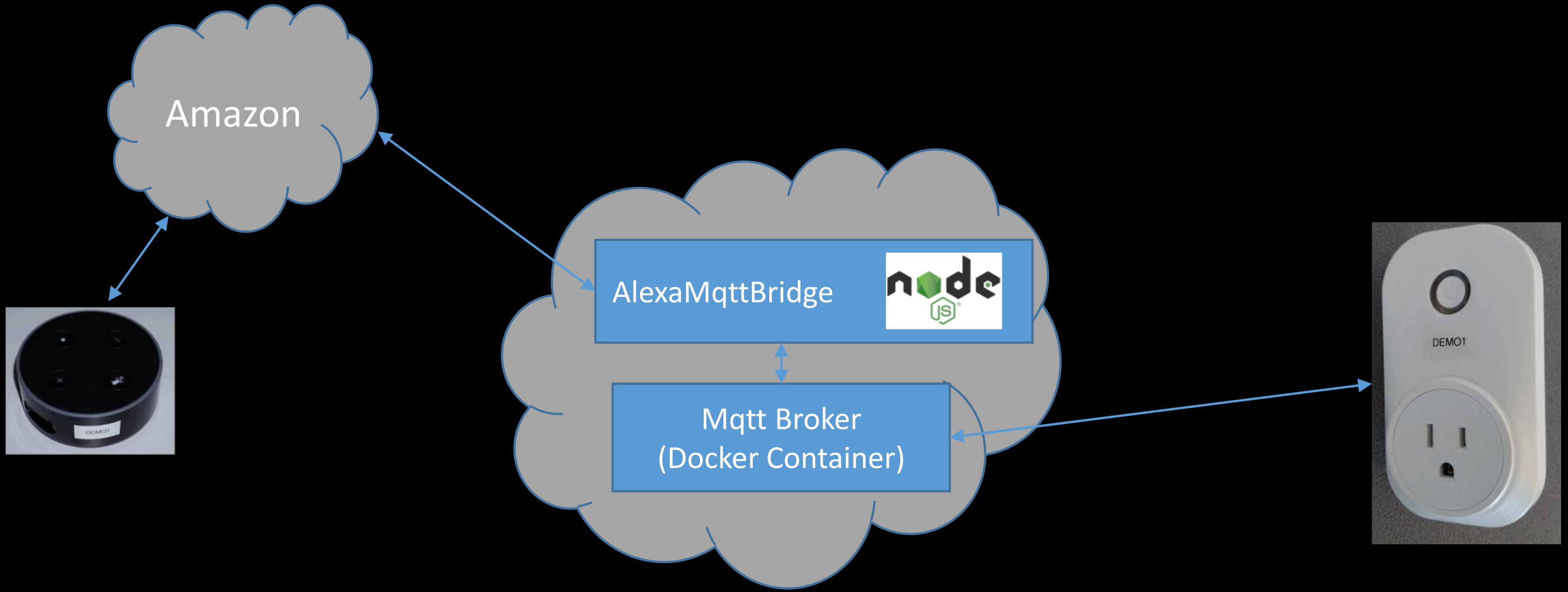
Add topics

39 commits | 1 branch | 0 releases | 1 contributor

mhdawson src: additional configuration options

AUTHORS	Add boilerplate files
LICENSE.txt	Add boilerplate files
README.md	Clarify contents of key.pem and cert.pem

- Convert Voice Request to Mqtt Message (and vice-versa)
- https://github.com/mhdawson/AlexaMqttBridge



Interaction V2

- Demo

Alexa to Mqtt Bridge

- Server in
- Alexa Skill

Writing an Alexa Skill

- Skill Information
- Interaction Model
  - Intent
  - Slots/Slot Types
  - Sample Utterances
- Endpoint

Skill Information

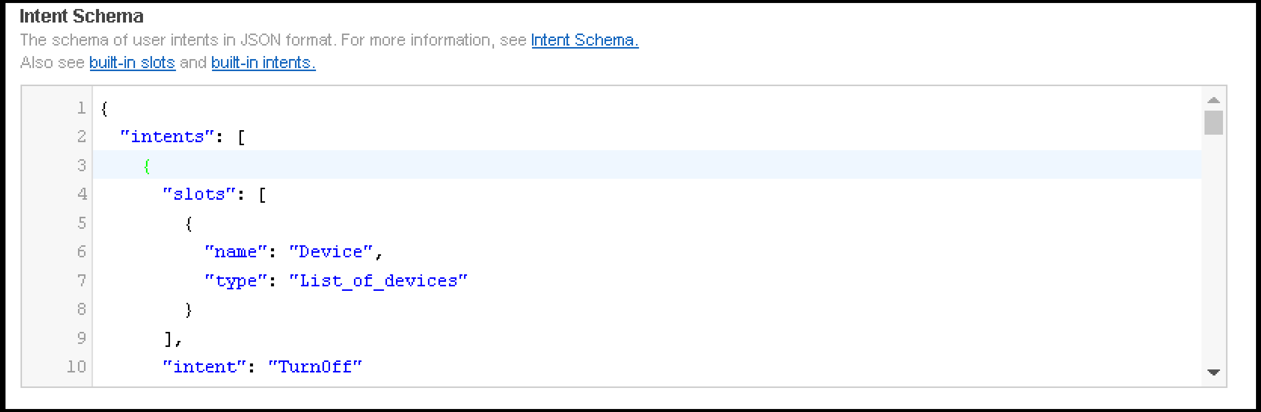
- Name
- Invocation Name

Ask **Michael** to …

- Language (new, at least to me ☺)

Intents

```
{
 "intents": [
  {
   "slots": [
    {
     "name": "Device",
     "type": "List_of_devices"
    }
   ],
   "intent": "TurnOff"
  },
  {
   "slots": [
    {
     "name": "Device",
     "type": "List_of_devices"
    }
   ],
   "intent": "TurnOn"
  },
…
```


Intent Schema

The schema of user intents in JSON format. For more information, see Intent Schema.
Also see built-in slots and built-in intents.

```
{
  "intents": [
    {
      "slots": [
        {
          "name": "Device",
          "type": "List_of_devices"
        }
      ],
      "intent": "TurnOff"
```

Slot Types

- List of options for Slot
  - Does not have to be exhaustive
  - Helps recognition
- Built in types as well
  - AMAZON.TVSeries, AMAZON.NUMBER
- Custom example:
  - List_of_devices

living room lights
living room right
living room left
dining room
power monitor
TV
TV 1
alarm
andrew
office light
fan
fan low
fan hi
fan medium
media1
Tv1
Socket
socketlight

Sample Utterances

- Samples of expected speech patterns

```
TurnOff Turn off {Device}
TurnOff to Turn off {Device}
TurnOn Turn on {Device}
TurnOn to Turn on {Device}
Tune {Device} to channel {Channel}
Tune {Device} channel {Channel}
Tune set {Device} channel {Channel}
Tune set {Device} to channel {Channel}
Tune to set {Device} channel {Channel}
Tune to set {Device} to channel {Channel}
VolumeUp {Device} volume up {Repeat}
VolumeUp to turn {Device} volume up {Repeat}
VolumeUp turn {Device} volume up {Repeat}
VolumeDown {Device} volume down {Repeat}
VolumeDown to turn {Device} volume down {Repeat}
VolumeDown turn {Device} volume down {Repeat}
Mute mute {Device}
Pause pause {Device}
UnPause unpause {Device}
Stop stop {Device}
Seek seek {Device} to {Time}
```

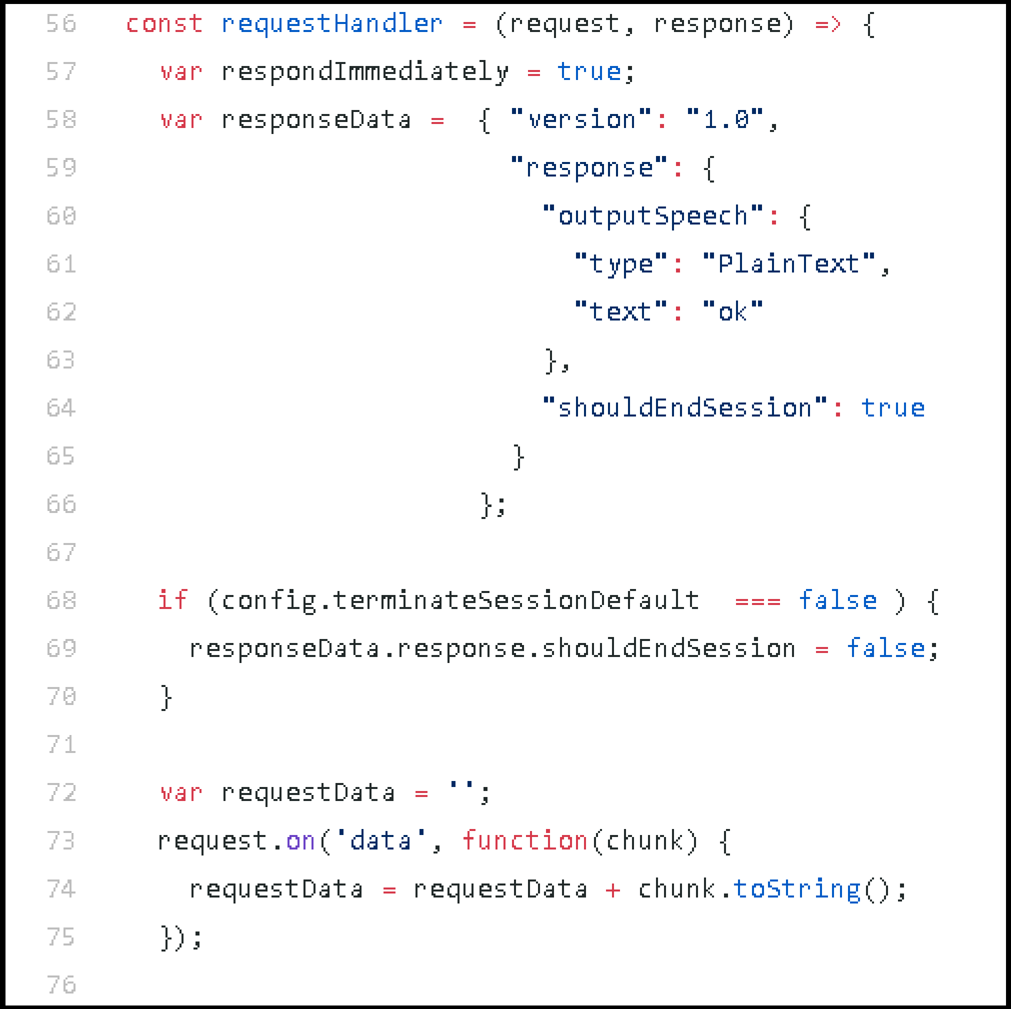
Endpoint

- AWS Lamda
- Microservice
  - https://alexademo.devrus.com/alexa?XXXXXXX
  - Must be SSL
    - Trusted cert authority
      - Let's Encrypt™ certificate - https://letsencrypt.org/
      - CloudFlare
      - Cloud provider (ex IBM Cloud)
    - Upload self-signed

Server Config

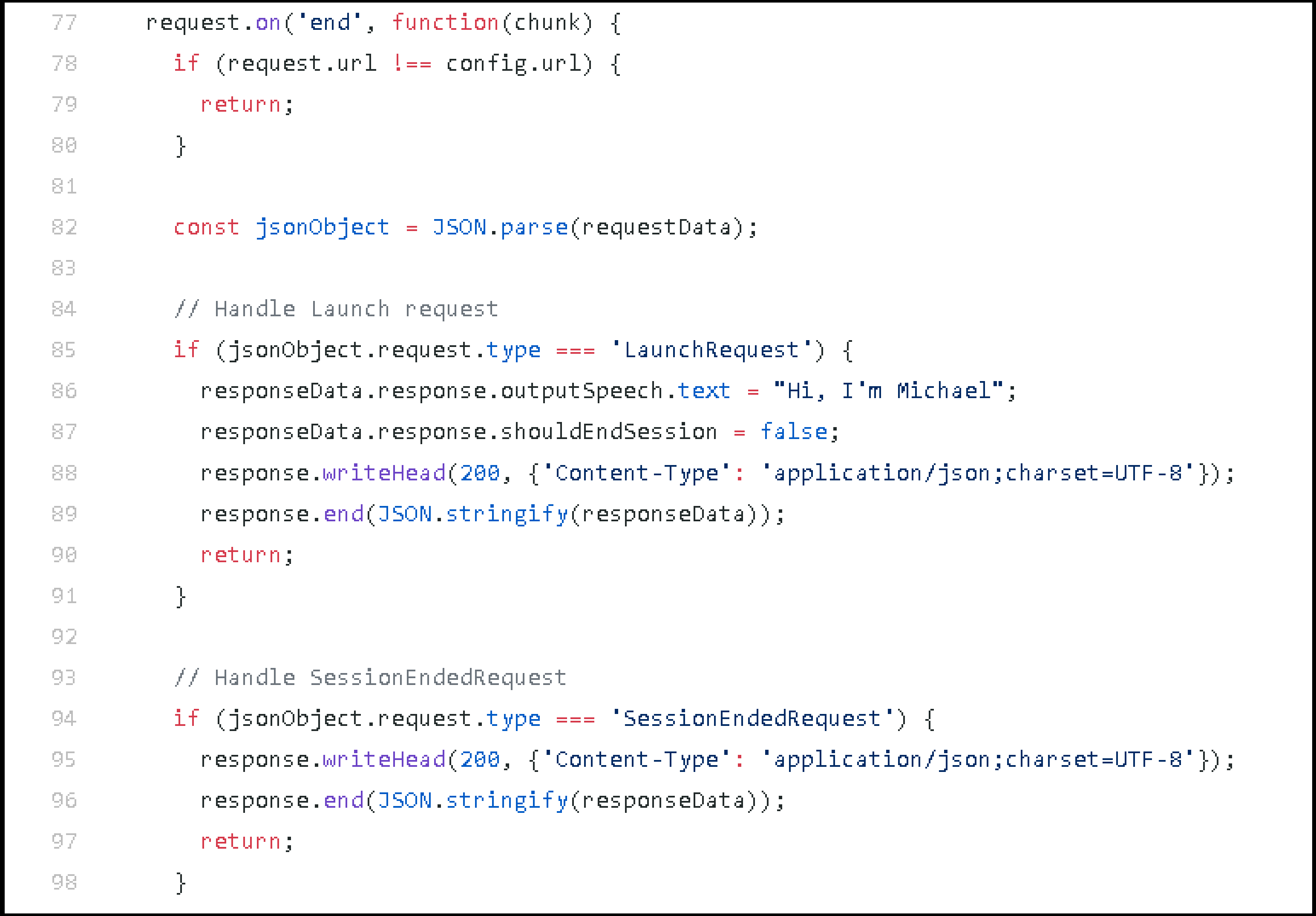
```
{
  "logging": false,
  "port": 5000,
  "terminateSessionDefault": true,
  "url": "/alexa?XXXXXXXXXXXXXXXXX",
  "intents": { "TurnOn": { "alarm": { "topic": "house/alarm/control", "message": "arm" },
                           "livingroomright": { "topic": "house/x10", "message": "A,1,1" },
                           "diningroom": { "topic": "house/x10", "message": "A,5,1" },
                           "officelight": { "topic": "home/2272/200", "message": "0F0FFFFF0101" },
                           "ac": { "topic": "home/2272", "message": "0F0FFFFF0110" },
                           "socket": { "topic": "house/esp2/power", "message": "on" },
                           "socketlight": { "topic": "house/esp2/led", "message": "on" }
                         },
               "TurnOff": { "livingroomlights": [ { "topic": "house/x10", "message": "A,5,0" },
                                                  { "topic": "house/x10", "message": "A,1,0:1000" },
                                                  { "topic": "house/x10", "message": "A,2,0:2000" } ],
                            "livingroomright": { "topic": "house/x10", "message": "A,1,0" },
                            "diningroom": { "topic": "house/x10", "message": "A,5,0" },
                            "officelight": { "topic": "home/2272/200", "message": "0F0FFFFF0110" },
                            "socket": { "topic": "house/esp2/power", "message": "off" },
                            "socketlight": { "topic": "house/esp2/led", "message": "off" }
                          },

               "WhatsNew": { "tv": { "topic": "house/dlnaplay/control",
                                     "message": "whatsnew",
                                     "responseTopic": "house/dlnaplay/response" } },

               "Recipe": { "default": { "topic": "pdfViewer/request",
                                        "message": "${slots.RecipeNames.value}" } },

             },
  "mqtt": { "serverUrl": "mqtt:XXXX:1883"
          },
  "mqttExternal": { "serverUrl": "mqtts:XXXXX:8883"
          }
}
```

Server



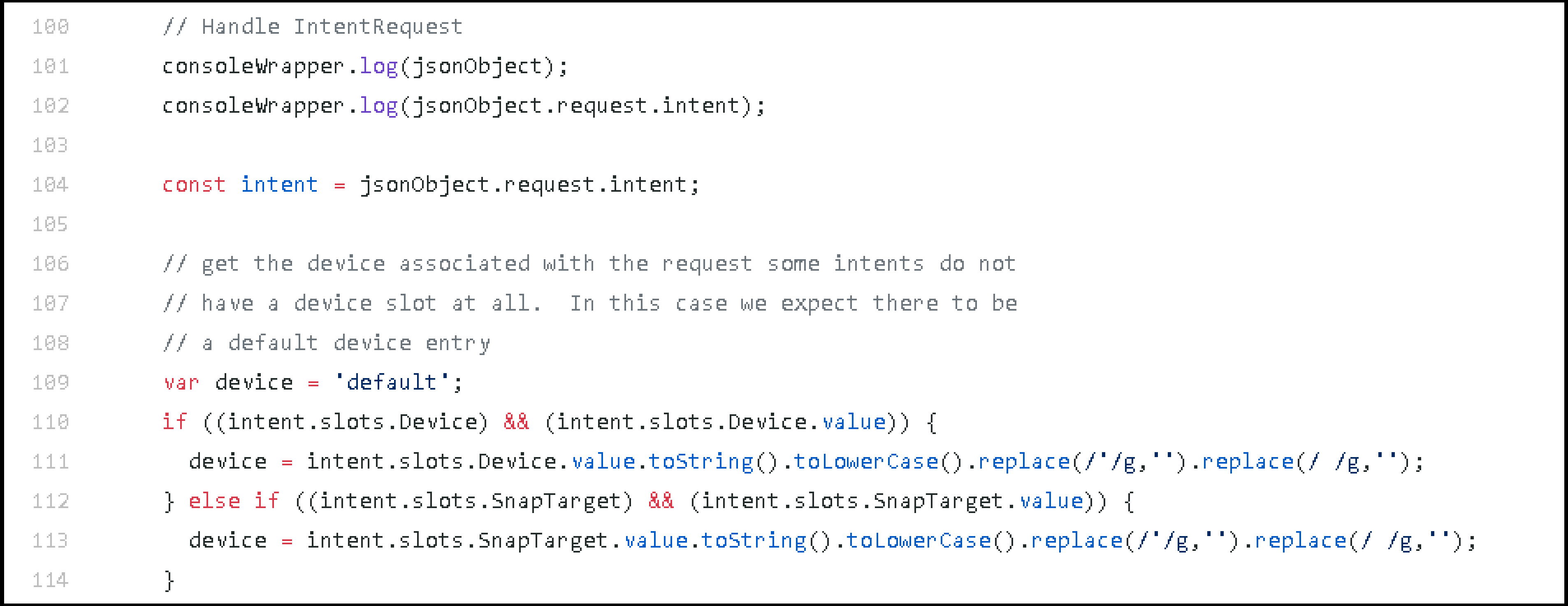
```javascript
const requestHandler = (request, response) => {
  var respondImmediately = true;
  var responseData =  { "version": "1.0",
                        "response": {
                          "outputSpeech": {
                            "type": "PlainText",
                            "text": "ok"
                          },
                          "shouldEndSession": true
                        }
                      };

  if (config.terminateSessionDefault  === false ) {
    responseData.response.shouldEndSession = false;
  }

  var requestData = '';
  request.on('data', function(chunk) {
    requestData = requestData + chunk.toString();
  });

```

Server



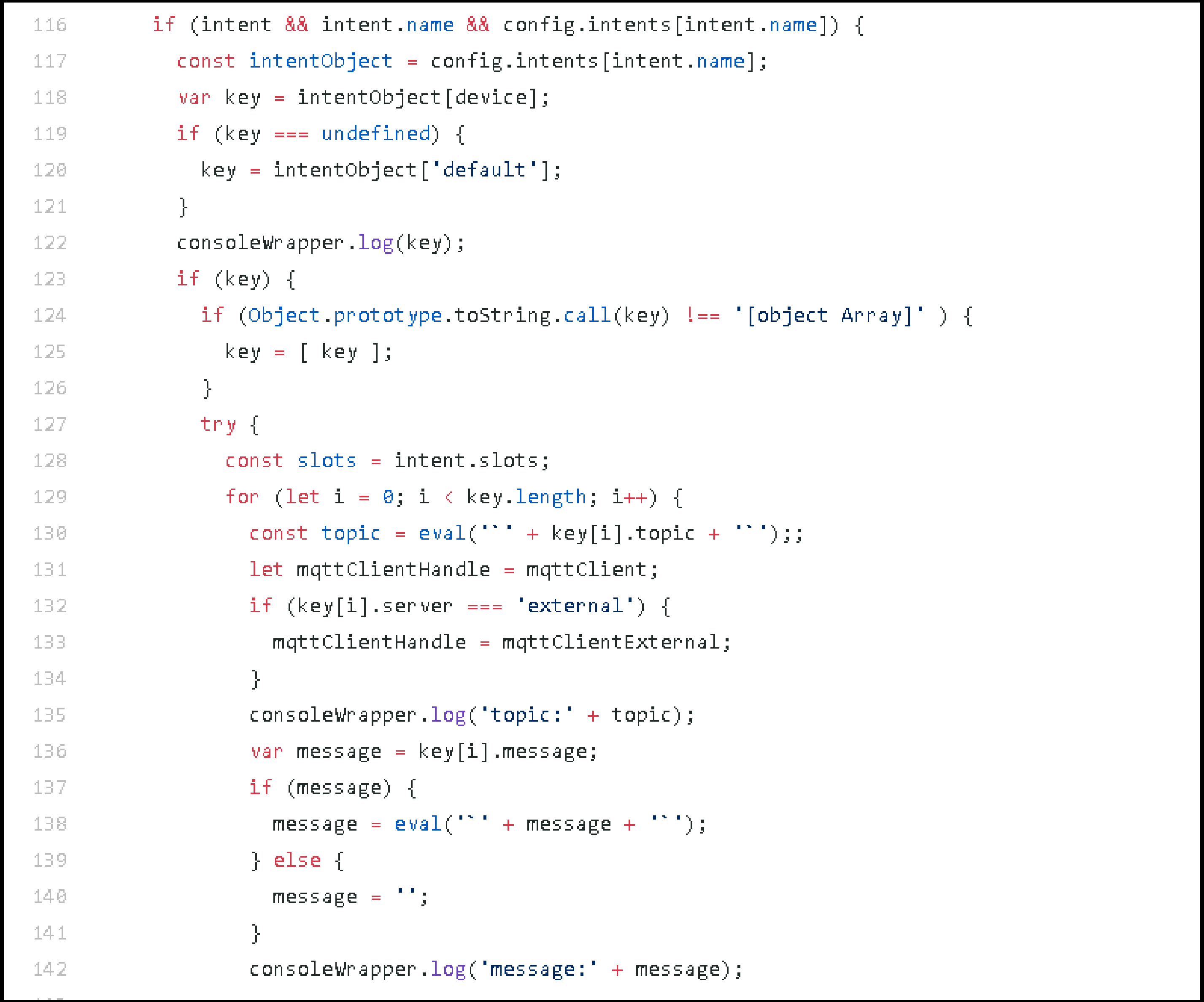
```
  request.on('end', function(chunk) {
    if (request.url !== config.url) {
      return;
    }

    const jsonObject = JSON.parse(requestData);

    // Handle Launch request
    if (jsonObject.request.type === 'LaunchRequest') {
      responseData.response.outputSpeech.text = "Hi, I'm Michael";
      responseData.response.shouldEndSession = false;
      response.writeHead(200, {'Content-Type': 'application/json;charset=UTF-8'});
      response.end(JSON.stringify(responseData));
      return;
    }

    // Handle SessionEndedRequest
    if (jsonObject.request.type === 'SessionEndedRequest') {
      response.writeHead(200, {'Content-Type': 'application/json;charset=UTF-8'});
      response.end(JSON.stringify(responseData));
      return;
    }
```

Server



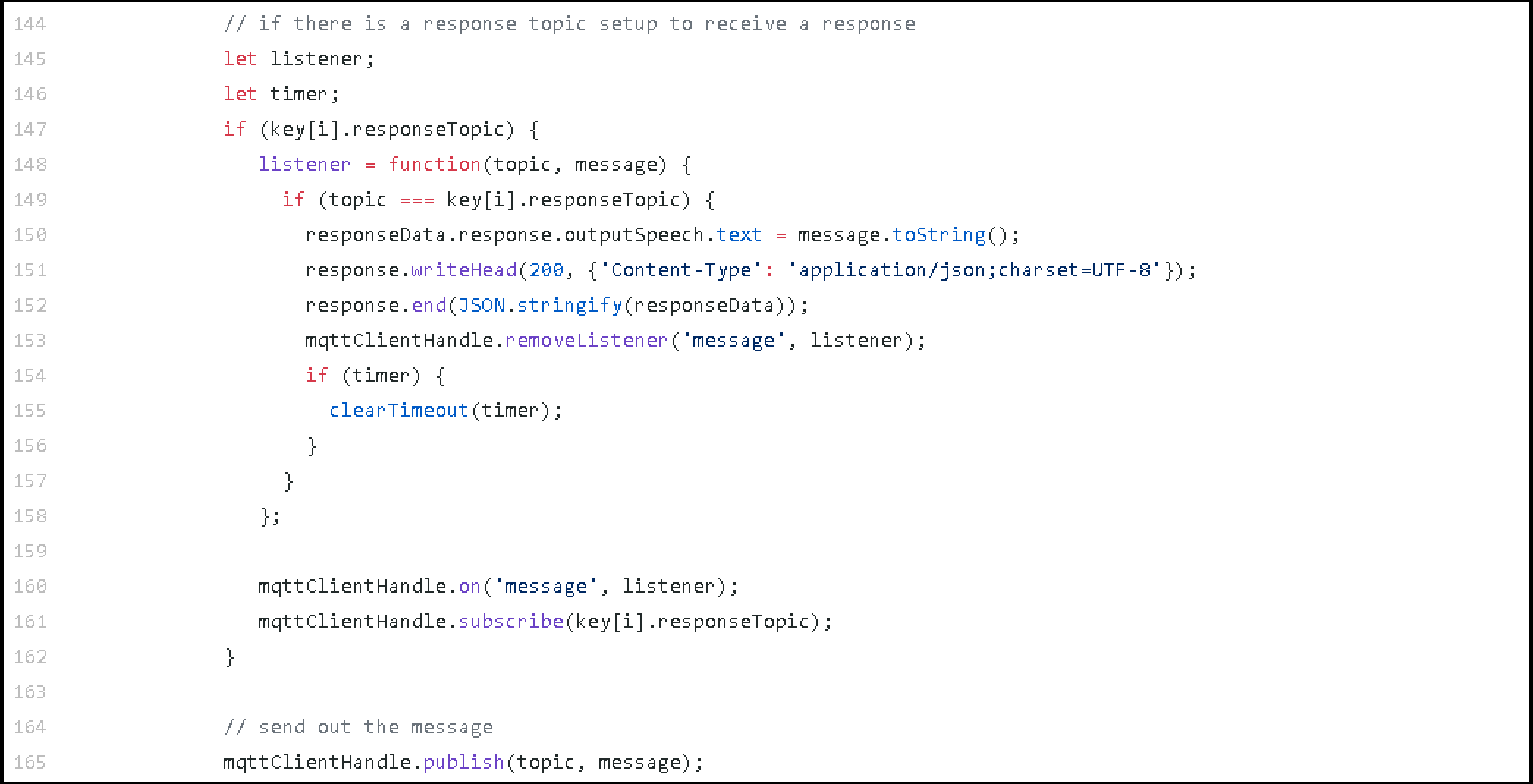
```javascript
// Handle IntentRequest
consoleWrapper.log(jsonObject);
consoleWrapper.log(jsonObject.request.intent);

const intent = jsonObject.request.intent;

// get the device associated with the request some intents do not
// have a device slot at all.  In this case we expect there to be
// a default device entry
var device = 'default';
if ((intent.slots.Device) && (intent.slots.Device.value)) {
  device = intent.slots.Device.value.toString().toLowerCase().replace(/'/g,'').replace(/ /g,'');
} else if ((intent.slots.SnapTarget) && (intent.slots.SnapTarget.value)) {
  device = intent.slots.SnapTarget.value.toString().toLowerCase().replace(/'/g,'').replace(/ /g,'');
}
```

Server



```
    if (intent && intent.name && config.intents[intent.name]) {
      const intentObject = config.intents[intent.name];
      var key = intentObject[device];
      if (key === undefined) {
        key = intentObject['default'];
      }
      consoleWrapper.log(key);
      if (key) {
        if (Object.prototype.toString.call(key) !== '[object Array]' ) {
          key = [ key ];
        }
        try {
          const slots = intent.slots;
          for (let i = 0; i < key.length; i++) {
            const topic = eval('`' + key[i].topic + '`');;
            let mqttClientHandle = mqttClient;
            if (key[i].server === 'external') {
              mqttClientHandle = mqttClientExternal;
            }
            consoleWrapper.log('topic:' + topic);
            var message = key[i].message;
            if (message) {
              message = eval('`' + message + '`');
            } else {
              message = '';
            }
            consoleWrapper.log('message:' + message);
```

Server



```javascript
// if there is a response topic setup to receive a response
let listener;
let timer;
if (key[i].responseTopic) {
  listener = function(topic, message) {
    if (topic === key[i].responseTopic) {
      responseData.response.outputSpeech.text = message.toString();
      response.writeHead(200, {'Content-Type': 'application/json;charset=UTF-8'});
      response.end(JSON.stringify(responseData));
      mqttClientHandle.removeListener('message', listener);
      if (timer) {
        clearTimeout(timer);
      }
    }
  };

  mqttClientHandle.on('message', listener);
  mqttClientHandle.subscribe(key[i].responseTopic);
}

// send out the message
mqttClientHandle.publish(topic, message);
```

Demo

- Show debug/console output

What Works?

- Search
  - Play next episode
  - Recipes
- Hands free

What Doesn’t

- Repeated actions
  - Volume up/down
- Noisy environments
- When you demo to your friends/family ☺

Summary and Questions

Notices and disclaimers

Notices and disclaimers continued

INDEX
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Discover. Collaborate. Deploy.

Talk to your Code

Michael Dawson