

The virtual side of IoT 3/4 Networking

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Learning Goals

- Why do IoT applications work in a networked fashion?
- How do IoT applications communicate with each other?
- What are the typical ways to connect, and what practical difference does it make?

Why to network?

- Faster way of processing data
 - Resource allocation – big computers do big calculations
- “Higher level of expertise for different parts”
 - Components can be specialised
 - Smaller things are typically less complicated, more robust to build
 - Better solution and user experience
- Access to larger data sets
- Updates
- Remote access
 - Heating a car remotely

APIs, Sockets, and Broadcasts

- REST API (=Application Programming Interface)
 - Works on separate 'letters'
- WebSocket (=Two-way real-time data)
 - Line is opened, and kept alive
- MQTT (=Message Queue Telemetry Transport)
 - Devices can broadcast messages



Structured messaging



Two-way line

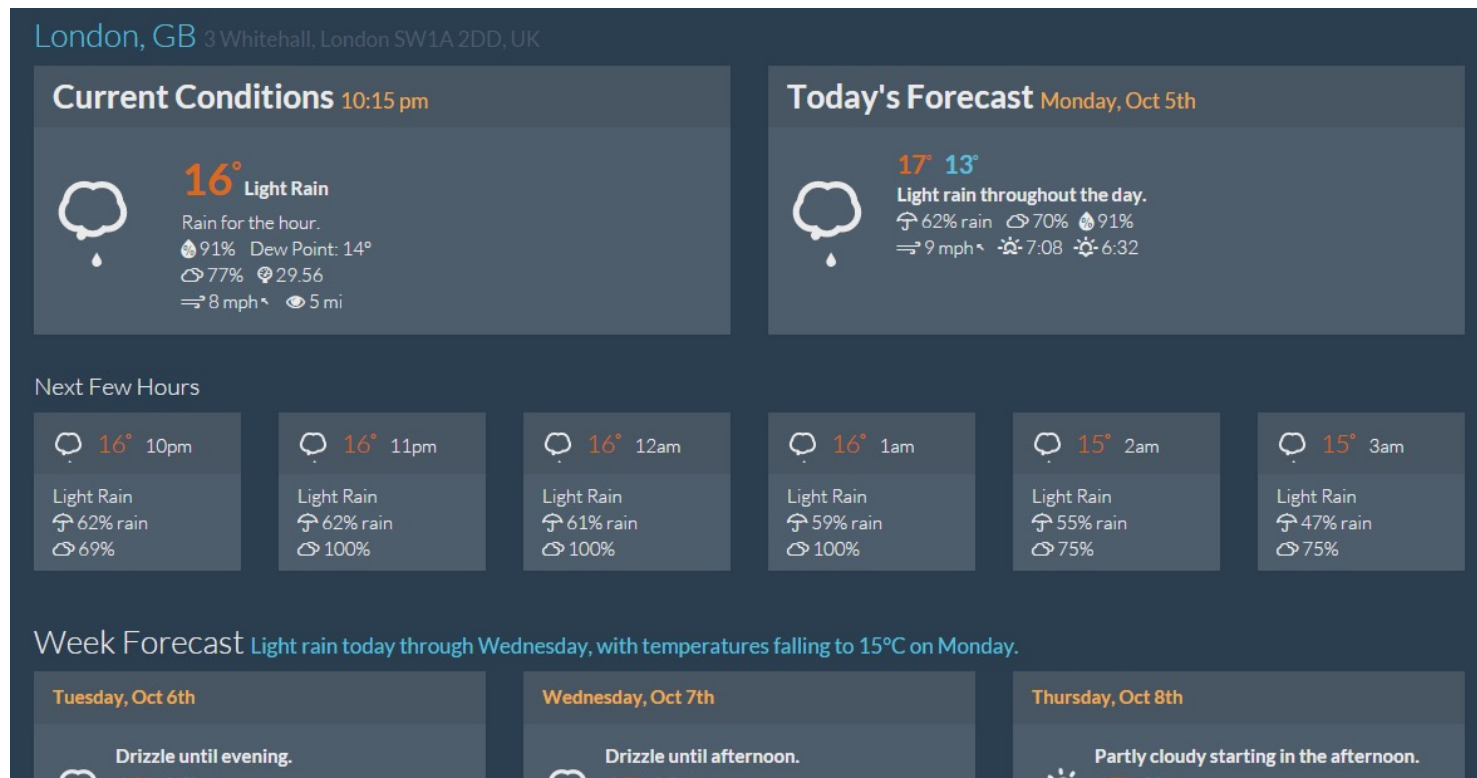


Message
Broadcast

REST APIs (Application Programming Interfaces)


- CREATE information (POST)
- READ information (GET)
- UPDATE information (PUT/PATCH)
- DELETE information (DELETE)

REST APIs (Application Programming Interfaces) – Read/GET



9:41 PM 100%

Create your account!



Add your photo

[CREATE ACCOUNT](#)

Already have an account? [Login.](#)

REST APIs (Application Programming Interfaces)

- Create/POST

A remote camera experiment

- Getting an e-mail if someone visits your property
- Works with a single POST call to a cloud service

Getting the image from the camera



4 MB

Getting the image from the camera



4 MB

Downscaling the image



0.175 MB

Getting the image from the camera



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Downscaling the image



0.175 MB

Sending to
image
recognition

Getting the image from the camera



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0.175 MB

Sending to image recognition

Getting information about the image

Date: 2019-07-22
Time: 17:43:02
Car : 99.783935546875
Transportation : 99.783935546875
Automobile : 99.783935546875
Vehicle : 99.783935546875
Dirt Road : 97.31932067871094
Gravel : 97.31932067871094
Road : 97.31932067871094
Wheel : 90.91046905517578
Machine : 90.91046905517578
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Tree : 81.66389465332031
Fir : 81.66389465332031
Tire : 81.63427734375
Spoke : 80.32305145263672
Sports Car : 77.7590103149414
Alloy Wheel : 75.0927963256836
Offroad : 71.78450775146484
Coupe : 70.38583374023438

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Checking if worth noting

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Checking if worth noting

Sending e-mail about visit

Getting the image from the camera



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POST

Sending to
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recognition

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POST

response

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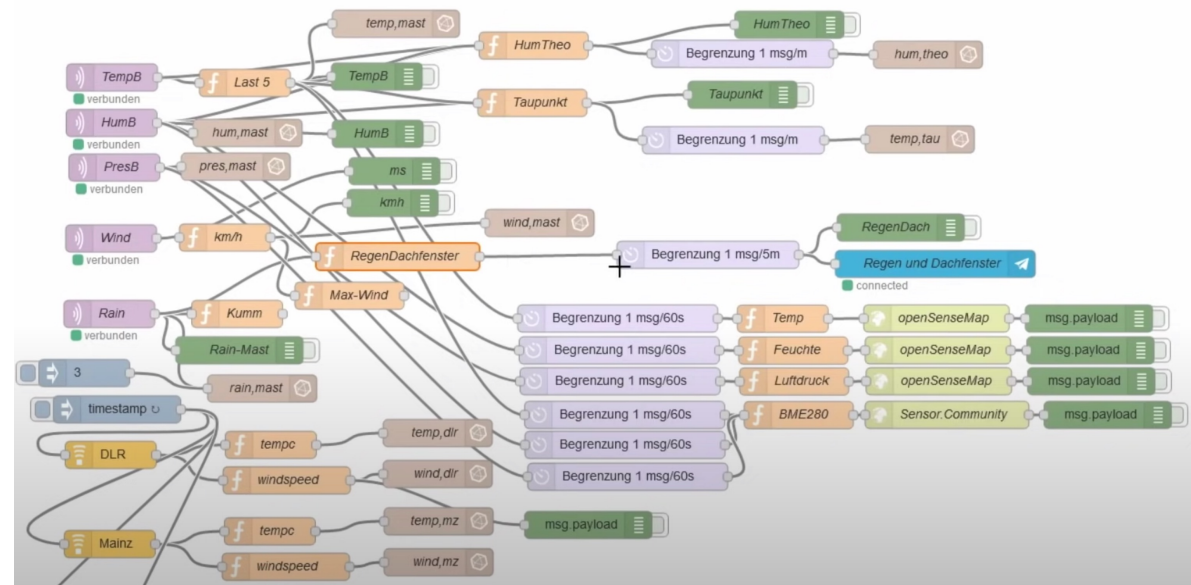
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MQTT example

- Remote sensor device
 - Is the window open

<https://www.youtube.com/watch?v=vxbuO1zWo3w>



WebSocket example

- Chat service

- Example:

- <https://www.shawndsilva.com/projects/laravel-react-chat.html>

