Workshop: Simple IoT Data Storage & Presentation

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https://thinnovation.com/remon.html

https://remon.io

What you are going to see…

What's producing the data

LoRaWAN on TTN

Where we are going to store it

Mongodb Atlas

Connectin to TheThingsNetwork

TTN Console

Collector – using MQTT(S)

Node.js

Viewer – Simple Mongodb access

More Node.js

Let's draw a graph

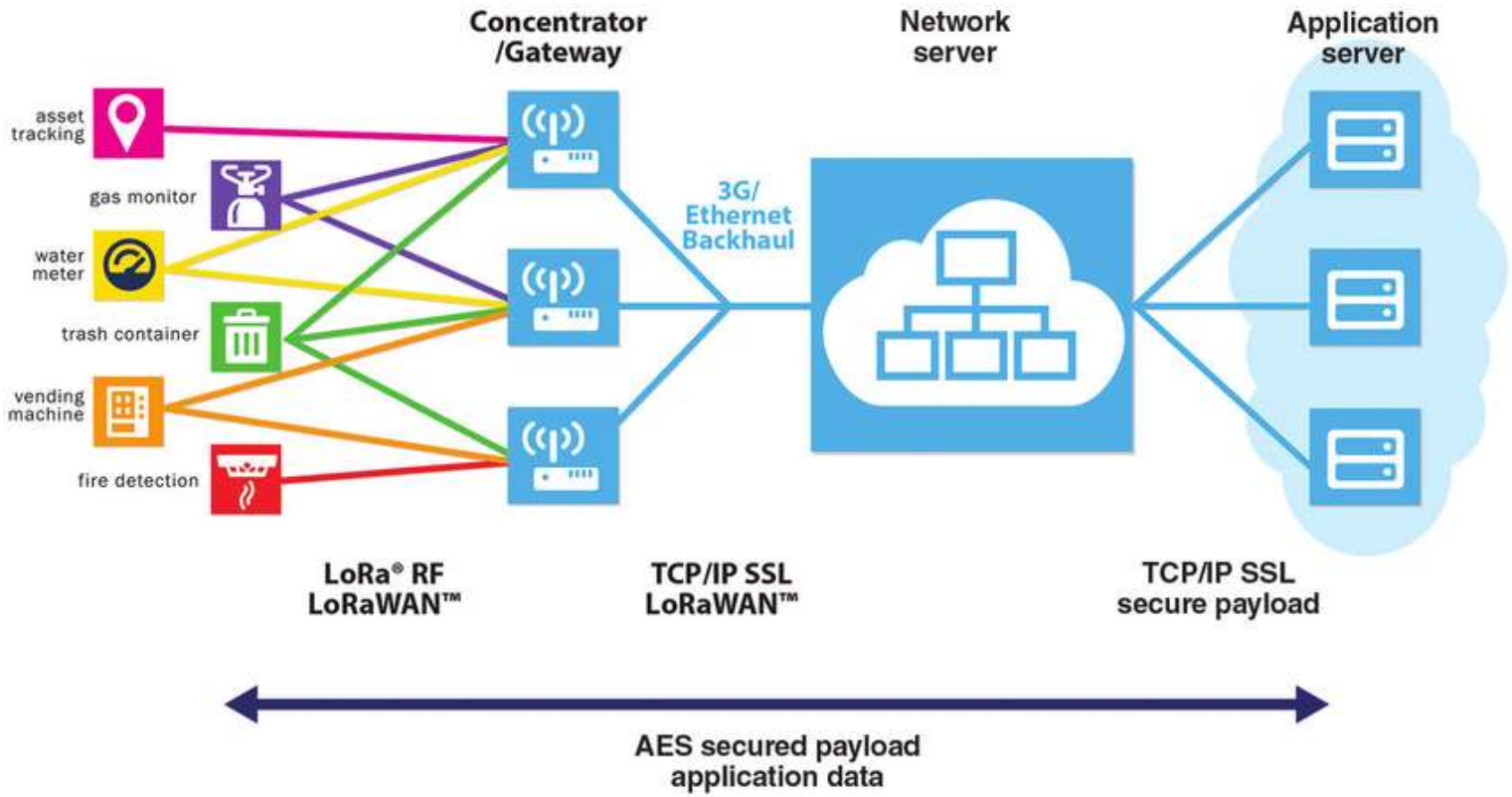
Google Charts

The LoRaWAN™ protocol

A node (device) requests to join & is approved by a Join Server

A Network Server routes the packets from/to each node on the network to/from an associated Application Server

Data security is provided by an exchange of 128-bit keys between node and Join Server and between Network & Application Server



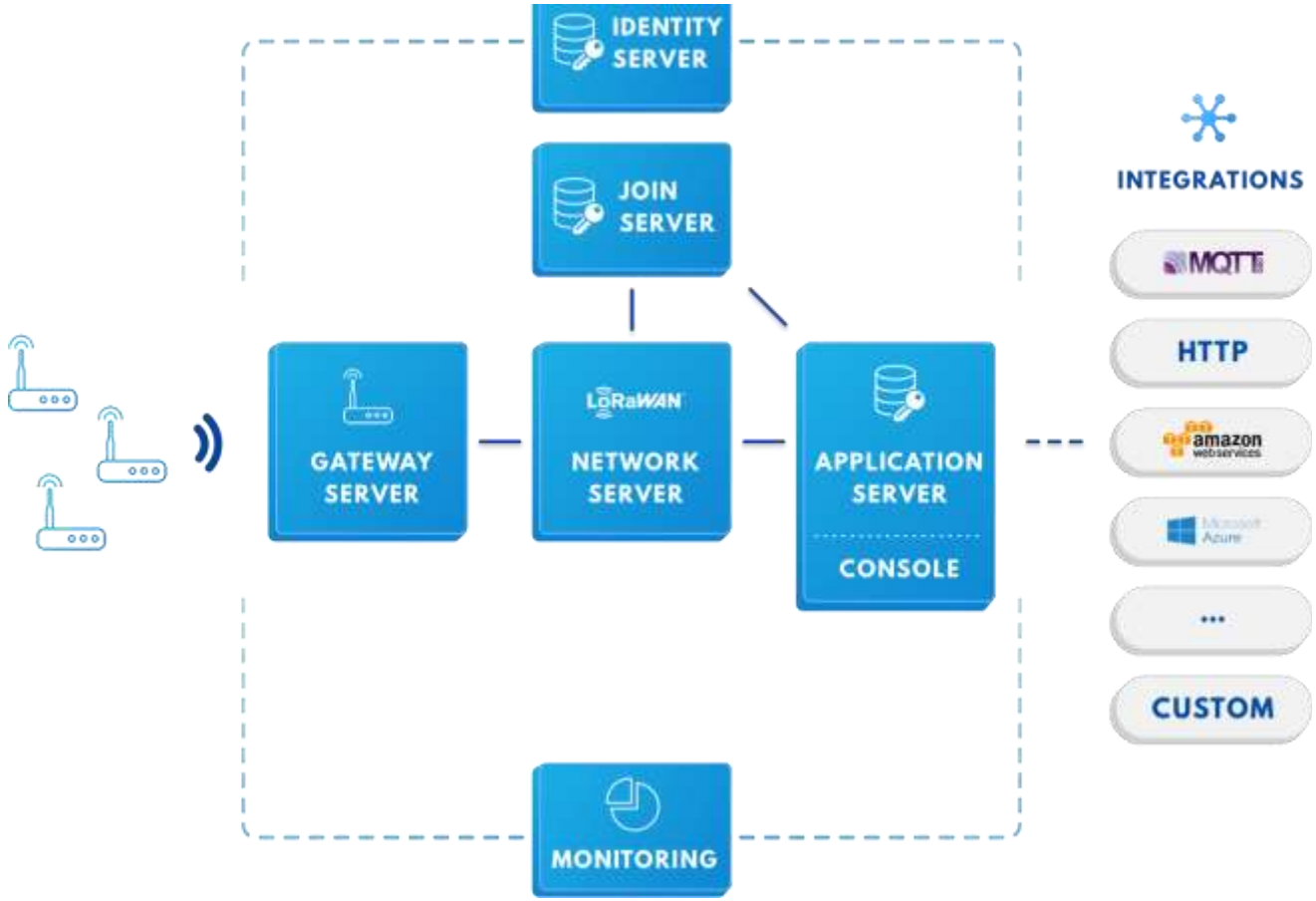
The Things Network (TTN)

TTN makes your **data**
available **globally**
with **security**
scalability
& **resilience**

It does **NOT** store your data

Except for Storage Integration

Then only for 7 days…



The Things Network (TTN)

TTN Integrations include:

AWS IoT, Cayenne, Collos, EVRYTHNG, OpenSensors, Tago

But what if you want to keep your **LoRaWAN node data** in-house?

TTN provides SDKs & libraries, such as:

Go(lang), Java, Node-RED, Node.js, Python

TTN also provides an **MQTT API** to securely expose your data

So, let’s use MQTT, Node.js & MongoDB…

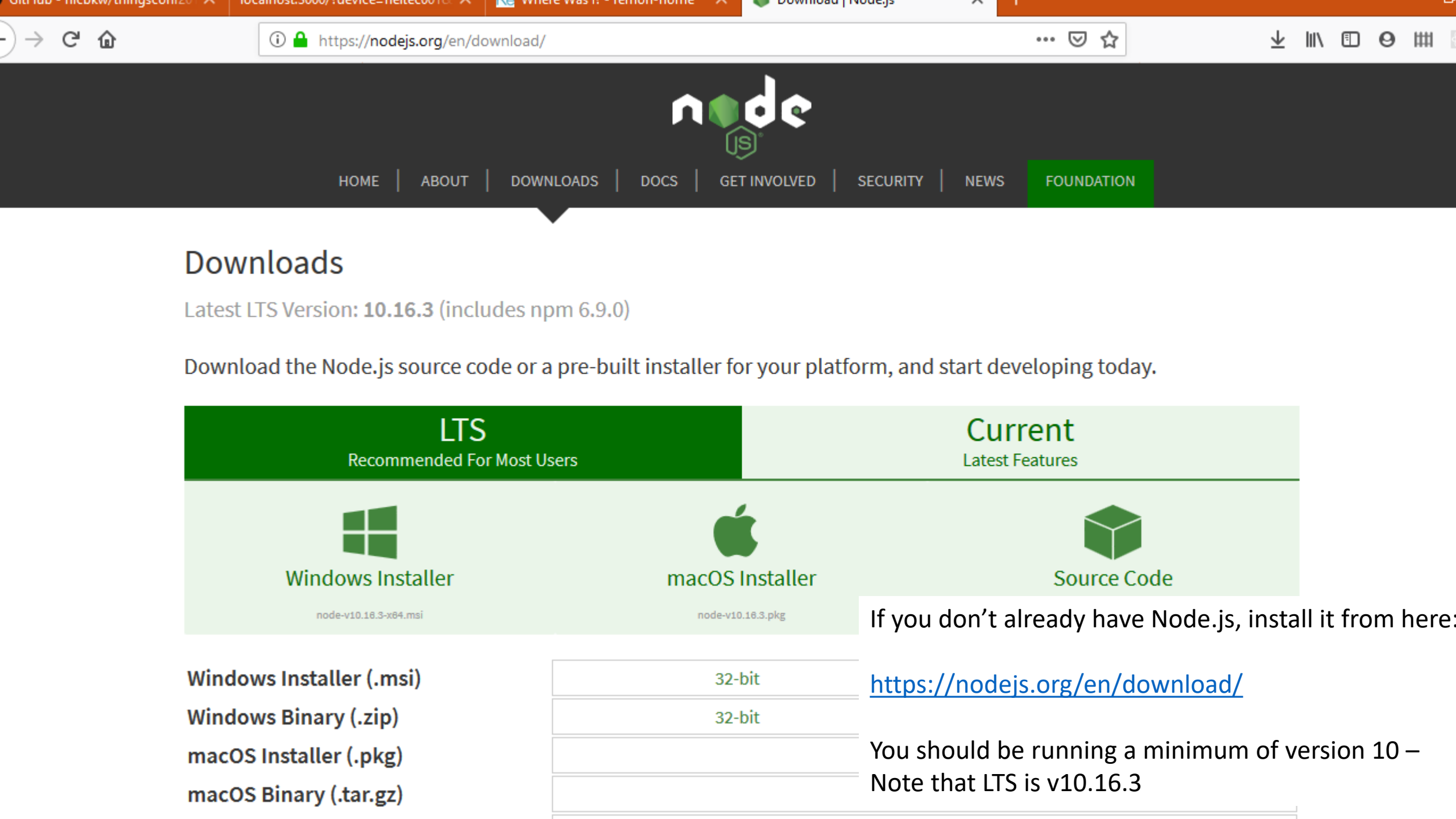
Our LoRaWAN device will deliver data similar to this →

We can see this data in the TTN console, but then what should we do?

The code for this presentation is here:

https://github.com/nicbkw/thingsconf2019

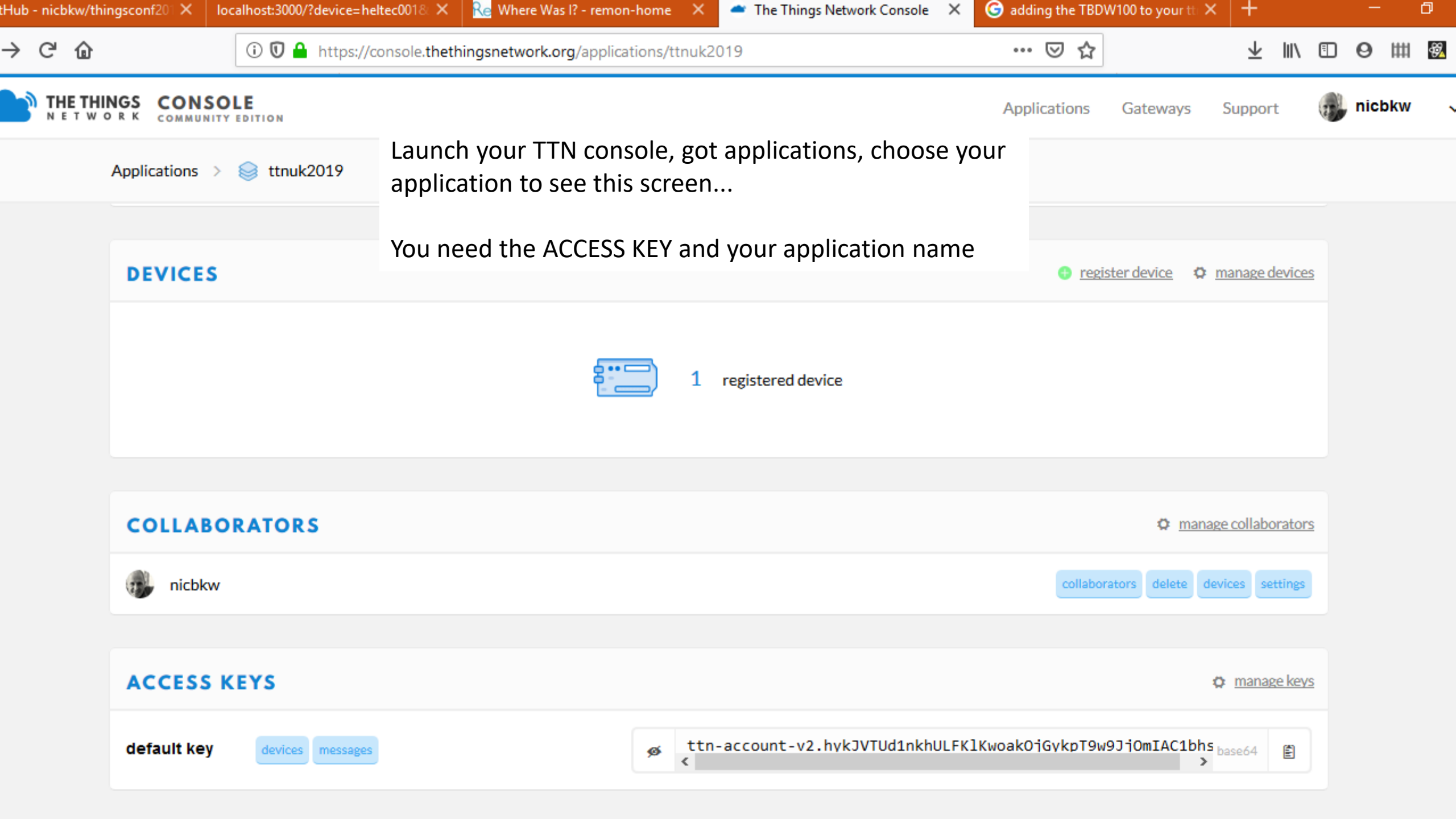

```
"device": "sparklan001",
"counter": {
        "$numberInt": "2328"
},
"tod": "2019-10-10 10:29:46",
"payload": {
        "$binary": {
                "base64": "AAAATg==",
                "subType": "00"
        }
}...
```

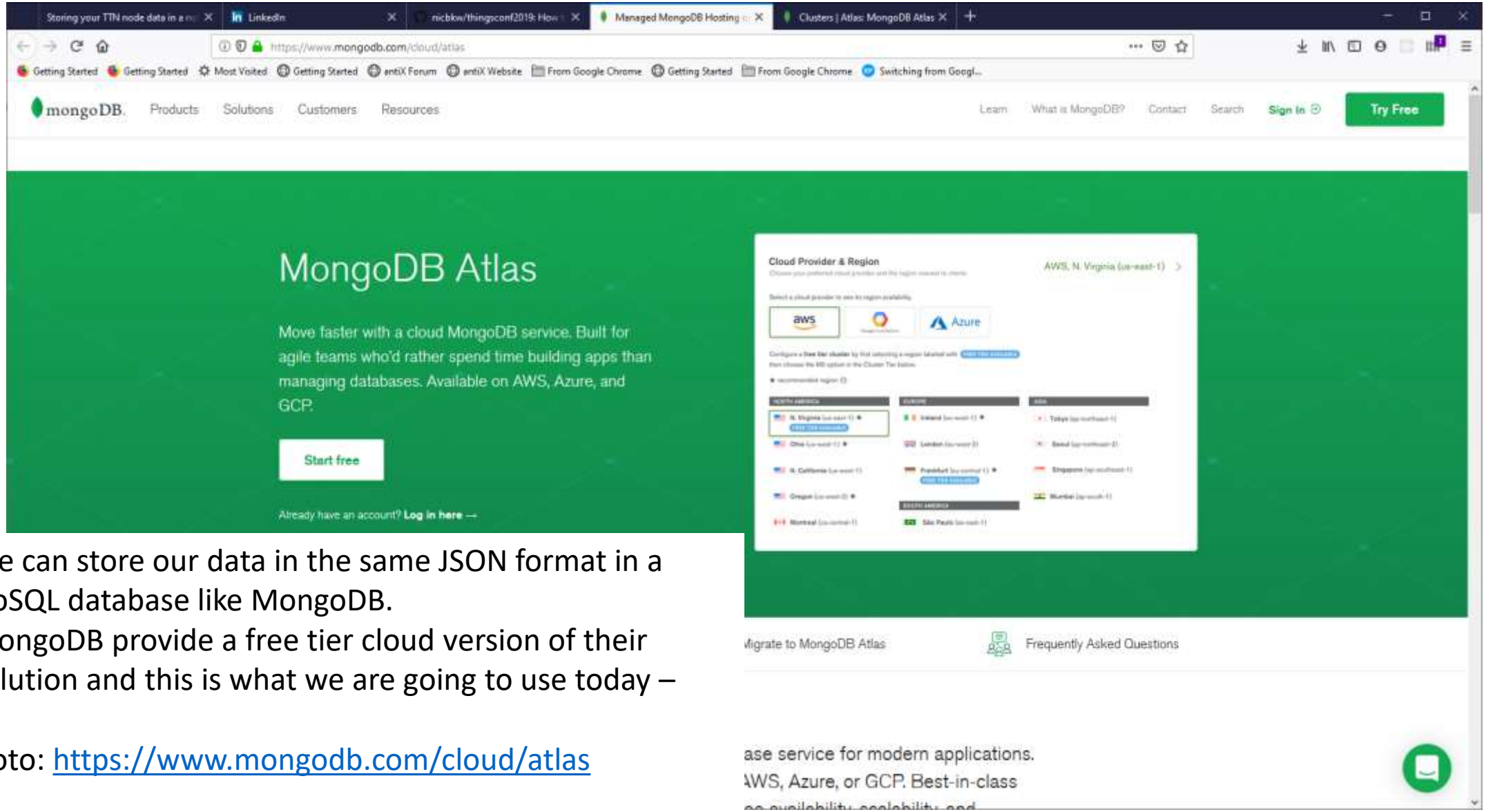


If you don't already have Node.js, install it from here:

https://nodejs.org/en/download/

You should be running a minimum of version 10 – Note that LTS is v10.16.3

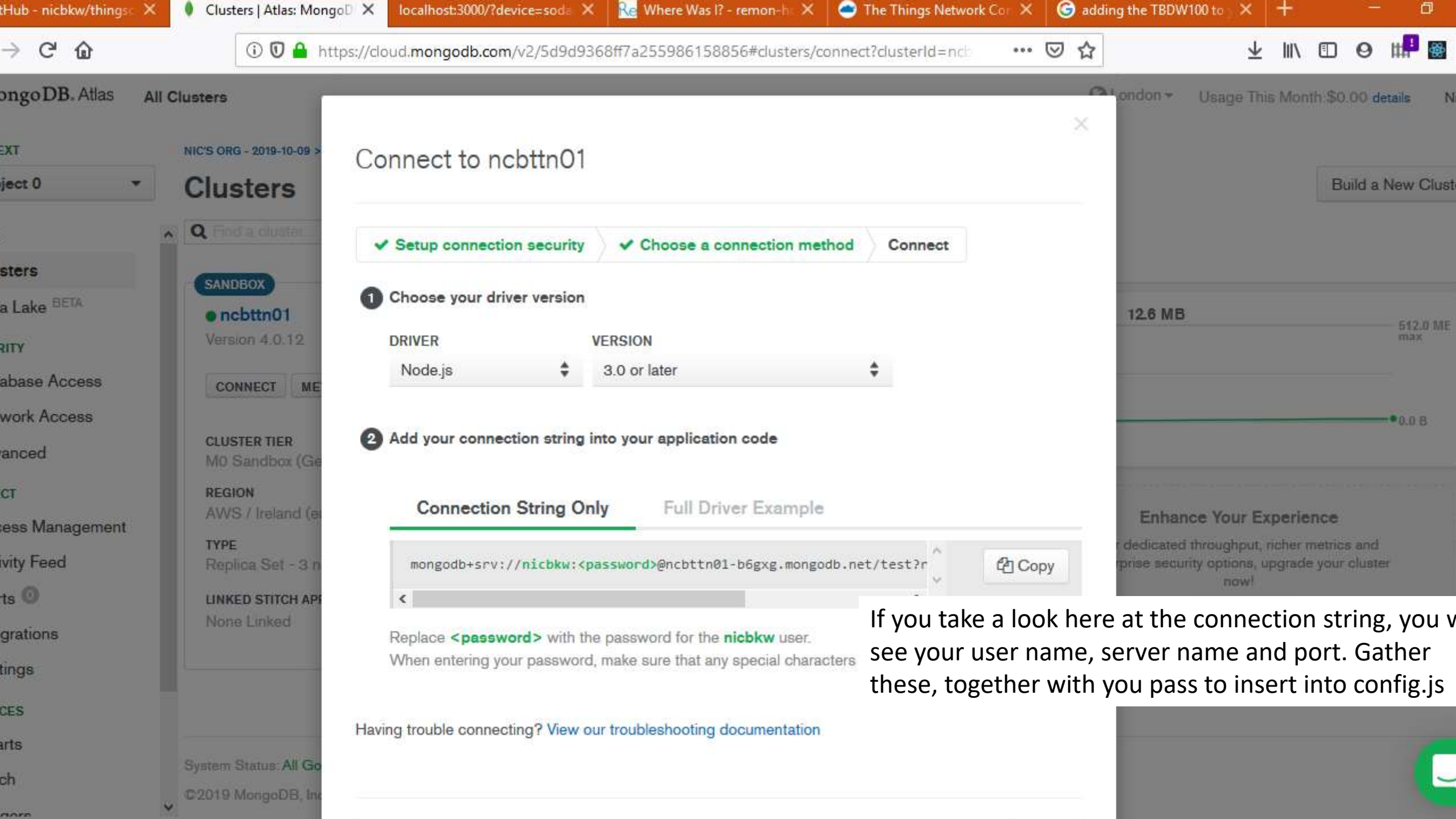

tHub - nicbkw/thingsconf20
localhost:3000/?device=heltec001
Where Was I? - remon-home
The Things Network Console
adding the TBDW100 to your
https://console.thethingsnetwork.org/applications/ttnuk2019
THE THINGS NETWORK CONSOLE COMMUNITY EDITION
Applications
Gateways
Support
nicbkw
Applications > ttnuk2019
Launch your TTN console, got applications, choose your application to see this screen...
You need the ACCESS KEY and your application name
DEVICES
register device
manage devices
1 registered device
COLLABORATORS
manage collaborators
nicbkw
collaborators
delete
devices
settings
ACCESS KEYS
manage keys
default key
devices
messages
ttn-account-v2.hykJVTUd1nkhULFKlKwoakOjGykpT9w9JjOmIAC1bhs
base64



We can store our data in the same JSON format in a NoSQL database like MongoDB.
MongoDB provide a free tier cloud version of their solution and this is what we are going to use today –

Goto: https://www.mongodb.com/cloud/atlas

https://docs.atlas.mongodb.com/getting-started/


Clusters | Atlas: MongoD
Where Was I? - remon-h
The Things Network Cor
adding the TBDW100 to
https://cloud.mongodb.com/v2/5d9d9368ff7a255986158856#clusters/connect?clusterId=nc
All Clusters
Clusters
NIC'S ORG - 2019-10-09
SANDBOX
ncbttn01
Version 4.0.12
CONNECT
Build a New Clust
Usage This Month $0.00 details
12.6 MB
512.0 ME
max
0.0 B
Enhance Your Experience
Connect to ncbttn01
Setup connection security
Choose a connection method
Connect
1 Choose your driver version
DRIVER
Node.js
VERSION
3.0 or later
2 Add your connection string into your application code
Connection String Only
Full Driver Example
mongodb+srv://nicbkw:<password>@ncbttn01-b6gxg.mongodb.net/test?r
Copy
Replace <password> with the password for the nicbkw user.
When entering your password, make sure that any special characters
Having trouble connecting? View our troubleshooting documentation
If you take a look here at the connection string, you v
see your user name, server name and port. Gather
these, together with you pass to insert into config.js

Your app to collect data from TTN & store in your database

package.json – describes app, dependencies, licence, etc.

config.js – store for all configuration data – URL, username, etc

Note: contains your db password & MQTT access key in plain text!

collector.js – the Node.js app

mongo.js – Node.js database connector

mqtt-ca.pem – enables use of TLS encrypted MQTT traffic (available from your TTN console)

Your app to retrieve data from database & display as chart

package.json – describes app, dependencies, licence, etc.

config.js – store for all configuration data – URL, username, etc

Note: contains your db password & MQTT access key in plain text!

viewer.js – the Node.js app

mongo.js – Node.js database connector

views/index.hbs – html to display chart


SWITCH TO LIVE
DEMO

MongoDB Compass - ncbttn01-b6gxg.mongodb.net:27017/remon.ttndata

Connect View Collection Help

My Cluster

4 DBS 8 COLLECTIONS

HOSTS
ncbttn01-shard-00-00-b6…
ncbttn01-shard-00-01-b6g…
ncbttn01-shard-00-02-b6…

CLUSTER
Replica Set (ncbttn01-shar…
3 Nodes

EDITION
MongoDB 4.0.12 Enterprise

Filter your data

admin
local
remon
ttndata
thinnovation

remon.ttndata
Documents

remon.ttndata

DOCUMENTS 17.8k TOTAL SIZE 8.3MB AVG. SIZE 491B
INDEXES 1 TOTAL SIZE 356.0KB AVG. SIZE 356.0KB

Documents Aggregations Schema Explain Plan Indexes Validation

FILTER {device: "tbdw100868005935"} OPTIONS FIND RESET

INSERT DOCUMENT VIEW LIST TABLE

Displaying documents 1 - 4 of 4

```
_id: ObjectId("5da466b5597f110c84a6c1f7")
device: "tbdw100868005935"
counter: 7
tod: "2019-10-14 12:14:45"
payload: Binary('APs3AAAYAAA=')
metadata: Object
   time: "2019-10-14T12:14:40.387238861Z"
   frequency: 867.5
   modulation: "LORA"
   data_rate: "SF8BW125"
   airtime: 102912000
   coding_rate: "4/5"
   gateways: Array
      0: Object
         gtw_id: "eui-647fdafffe0071eb"
         timestamp: 2222397316
         time: ""
         channel: 2
         rssi: -96
         snr: -2
         rf_chain: 0
         latitude: 51.440872
         longitude: -0.96706736
         location_source: "registry"
      1: Object
      2: Object
```

Summary – it is your responsibility to store your node data…

TTN provides an excellent platform to move your node data to the cloud

TTN enables access via a secure MQTT broker

MongoDB is a noSQL db, good for JSON data

Node.js is a simple way to build a headless server app

NoSQLBooster for MongoDB is a good GUI to access your db

Now, it’s down to you to do something useful with your data!

Thanks for watching – useful links

https://nicbkw.com/

Contact me: @nicbkw on Twitter