

IoT quickstart

ARM

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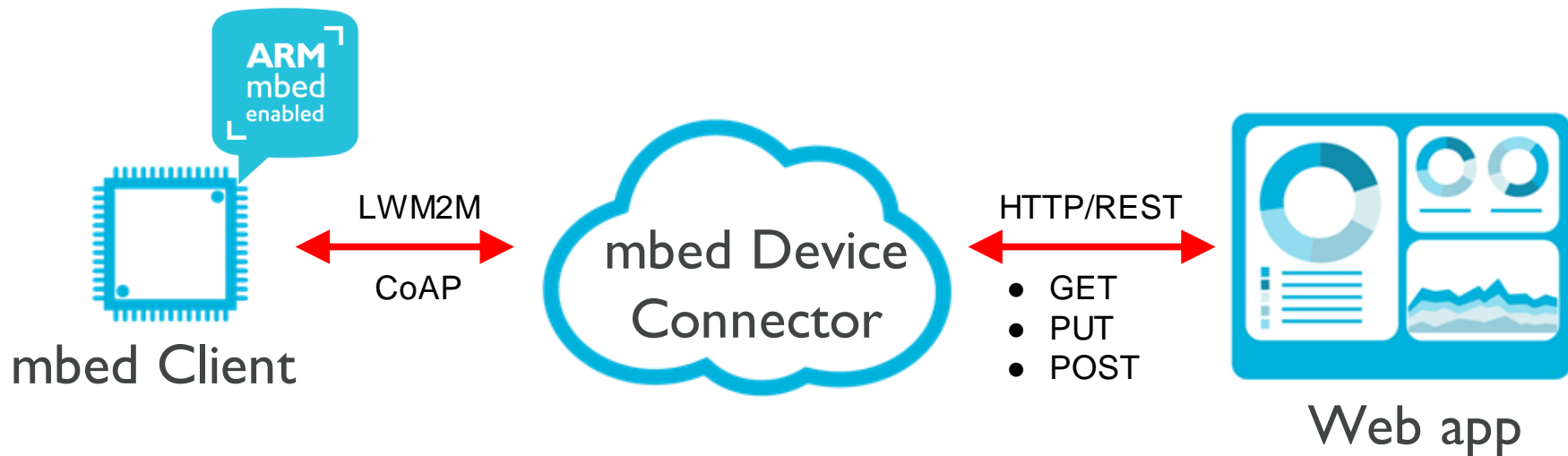
Topics

- Overview
 - mbed URI format
 - LWM2M resources
 - REST API
- mbed Client endpoint example
- mbed Connector web app example
 - Node.js or python
- Challenges

Prerequisites

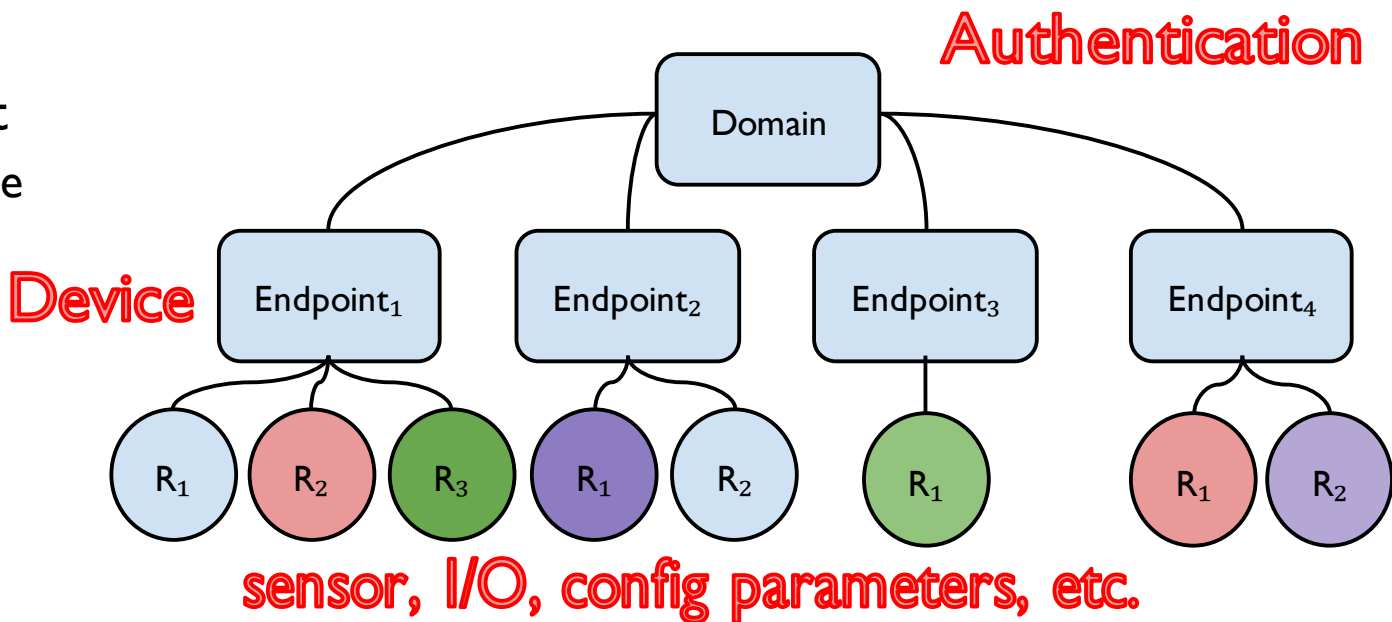
- Free [mbed developer account](#)
- Python 2.7.*
- Node.js
- Git
- mbed Windows serial driver
 - <https://developer.mbed.org/platforms/Nuvoton-NUC472/>
- Clone example code
 - `git clone https://github.com/armmbed/mbed-connector-api-python-quickstart.git`
 - `git clone https://github.com/armmbed/mbed-connector-api-node-quickstart.git`

Using mbed Device Connector



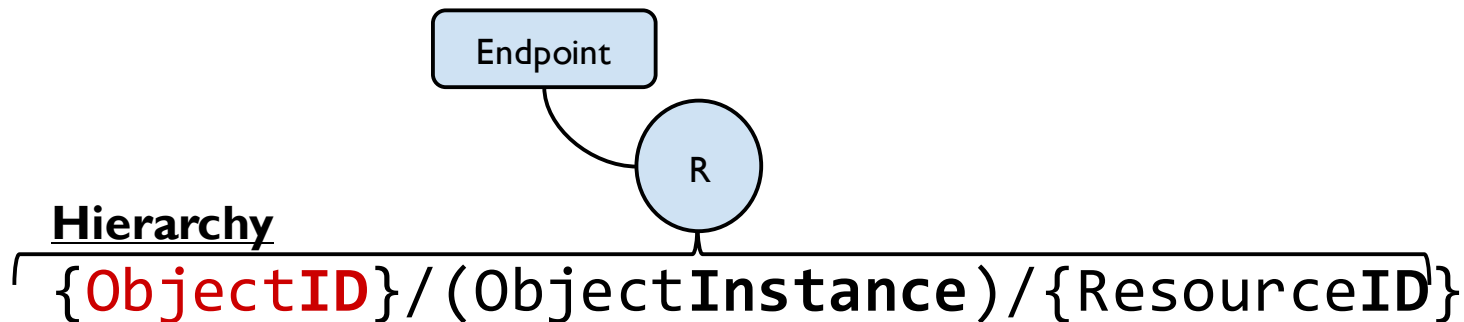
Data model

- Domain
 - Endpoint
 - Resource



/endpoints/endpointName/{LWM2M Resource}

Resource: LWM2M data model

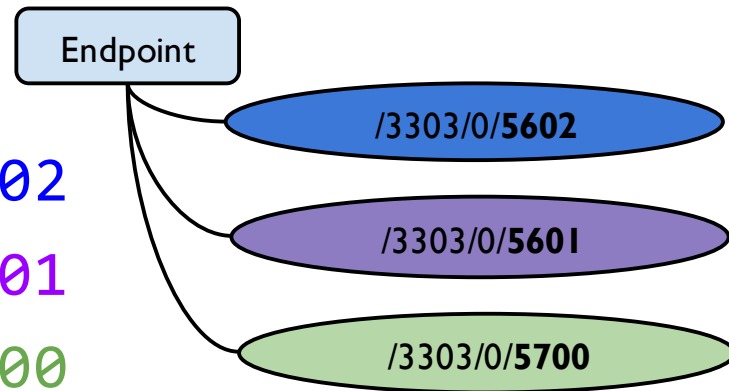


ex) temperature sensor object

/temp/0/maxValue /3303/0/5602

/temp/0/minValue /3303/0/5601

/temp/0/sensorValue /3303/0/5700



LWM2M Spec

<http://technical.openmobilealliance.org/Technical/technical-information/omna/lightweight-m2m-lwm2m-object-registry>

- XML
- Detail

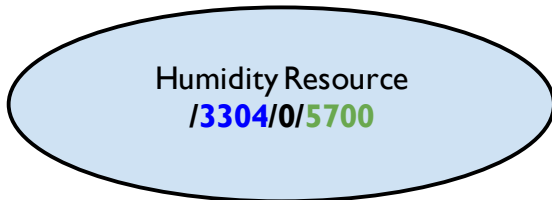
Example: LWM2M

Example: Get temperature and humidity sensor data
(assume 1 sensor per endpoint)

Temperature ObjectID = **3303**

Humidity ObjectID = **3304**

Sensor Value *ResourceID* = **5700**



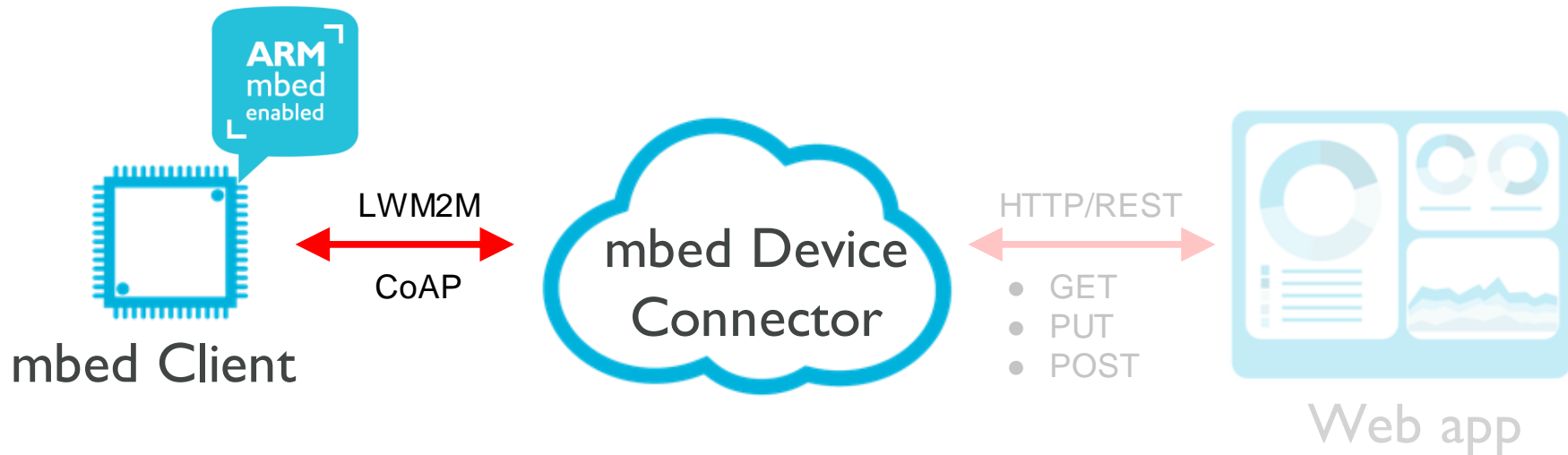
Takeaway

Path describes data

- How you access the data tells you what the data is
- URL-based accessors
- ResourceID can have same number but different meaning, depending on object ID

mbled Client code

Let's build an endpoint!



mbed Client endpoint code

1. Plug in board to computer
2. Open mbed.html on board
3. Import code to online compiler: mbed.com/s/mc2016
4. Get security certificate from connector.mbed.com/#credentials
5. Paste into security.h
6. Compile / download code
7. Drag and drop code to board
8. Turn on board

Serial console

1. Open CoolTerm
2. Options -> Baudrate -> 9600 -> OK
3. Connect
4. Reset board

API Console

View endpoint data on connector website

API Console

My environment

Dashboard

My devices

Connected devices

Security credentials

Device Connector

API Console

My applications

Access keys

Web applications interact with mbed Device Server (mbed DS) using a set of RESTful Web interfaces over HTTP. API Console lets you simulate your application requests against mbed Device Connector REST API.

The REST API URL for all requests is <https://api.connector.mbed.com>

Endpoint directory lookups

GET /endpoints

List all endpoints

Request

Parameters | Content-types and headers | Executed request

Parameter	Value	Description	Data type
type	<input type="text"/>	Filter endpoints by endpoint-type.	string
stale	<input checked="" type="radio"/> False <input type="radio"/> True	Optional. Default: false True , the result list will contain stale endpoints.	boolean

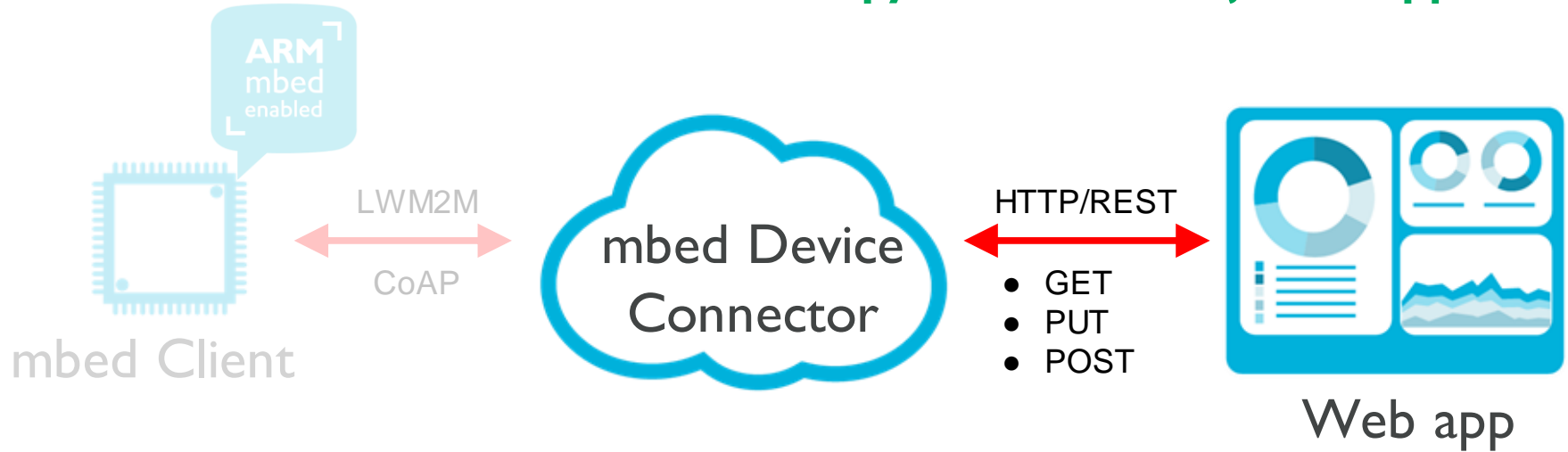
TEST API

Use API Console

- GET number of button presses `/3200/0/5501`
- POST to blink LED `/3201/0/5850`
- PUT to `/3201/0/5853` change pattern of LED `'1000:500:1000:500:1000:500'`

Web app

Create python or Node.js web app



Node.js / Python web app

1. Open node.app in editor
2. Get access key from connector.mbed.com/#accesskeys
3. Replace 'Change Me' with access key in quotes
4. Save
5. Run command ``npm install`` / ``pip install -r requirements.txt``
 1. If pip not work, update it with ``pip install pip --upgrade``
6. Run app ``node app.js`` / ``python app.py``
7. Open web browser to `127.0.0.1:8080`
8. See the app run!

Challenge

Let's modify the code!

Challenge 1 & 2

- Challenge 1 – Add a resource to endpoint
 - Add resource to change light color
 - Hint: **LED1**, **LED2**, **LED3**
 - Compile; load code to board
 - Verify in API Console
- Challenge 2 – Add resource to web app
 - Modify web app code to accept input and send value to device

Questions?

Ask anything about mbed Client
or mbed Device Connector?