



oneM2M Mini Project

Yungi Park (yun0429@keti.re.kr)

Korea Electronics Technology Institute

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Motivation



- This tutorial works on a simple project using oneM2M API
- We will have a practice on group fan-out device control
- Also, we will demonstrate a simple home automation service with oneM2M notification handling

- Prerequisites
- oneM2M – Mini Project part1
 - Mini Project-1 Overview
 - Mini Project-1 Scenario
 - Mini Project-1 Resource Design
 - Mini Project-1 Practice
- oneM2M – Mini Project part2
 - Mini Project-2 Overview
 - Mini Project-2 Architecture
 - Mini Project-2 Scenario
 - Mini Project-2 Resource Design
 - Mini Project-2 Practice

Prerequisites



- S/W
 - Node.js
 - Visual Studio Code
 - <https://code.visualstudio.com/download>
 - cmdr(Terminal)
 - <https://cmdr.net/>
 - Mini Project Source
 - https://github.com/loTKETI/oneM2M-Mini_Project.git



Mini Project-1

Mini Project-1 Overview



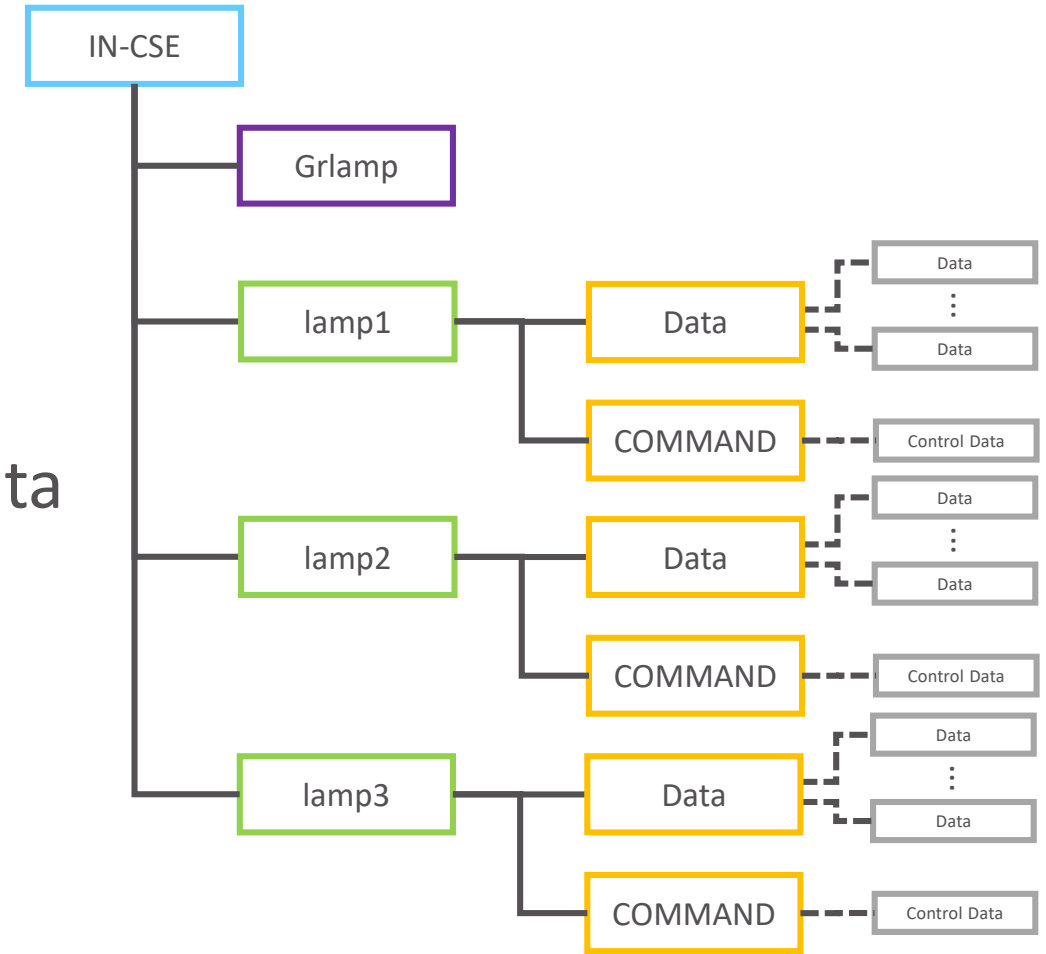
- We are going to perform a simple project using the Device simulator from the previous session
- In this project, we try to better understand oneM2M APIs with trials

Mini Project-1 Senario






- Firstly, create multiple actuators using the Device simulator, and then check the resources of the created actuators through the resource monitor
- Secondly, control all the actuators through a group fan-out API

Mini Project-1 Resource Design

- CSE => Mobius
- Group => Grlamp
- AE => Lamp 1,2,3,4,5
- Container => Data, COMMAND
- ContentInstance => lamp data, Control data



Mini Project-1 Praticice

				
<div>0</div>	<div>0</div>	<div>0</div>	<div>0</div>	<div>0</div>
<div><input type="text"/></div>	<div><input type="text"/></div>	<div><input type="text"/></div>	<div><input type="text"/></div>	<div><input type="text"/></div>
<div>Update</div>	<div>Update</div>	<div>Update</div>	<div>Update</div>	<div>Update</div>
<div>Lamp lamp1</div>	<div>Lamp lamp2</div>	<div>Lamp lamp3</div>	<div>Lamp lamp4</div>	<div>Lamp lamp5</div>
<div>Delete</div>	<div>Delete</div>	<div>Delete</div>	<div>Delete</div>	<div>Delete</div>

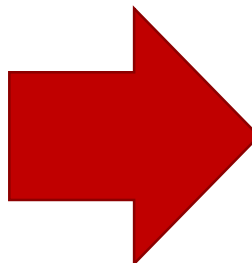
Mini Project-1 Praticice

- Request

► Group CREATE

```
POST http://127.0.0.1:7579/Mobius

{
  "m2m:grp" : {
    "rn": "Grlamp",
    "mid": [
      "Mobius/lamp1/COMMAND",
      "Mobius/lamp2/COMMAND",
      "Mobius/lamp3/COMMAND",
      "Mobius/lamp4/COMMAND",
      "Mobius/lamp5/COMMAND"
    ],
    "mnm": 10
  }
}
```



- Response

```
1 {
2   "m2m:grp": {
3     "rn": "Grlamp",
4     "ty": 9,
5     "pi": "5-20200916054852183",
6     "ri": "9-20200921070848647",
7     "ct": "20200921T070848",
8     "lt": "20200921T070848",
9     "et": "20220921T070848",
10    "mid": [
11      "Mobius/lamp1/COMMAND",
12      "Mobius/lamp2/COMMAND",
13      "Mobius/lamp3/COMMAND",
14      "Mobius/lamp4/COMMAND",
15      "Mobius/lamp5/COMMAND"
16    ],
17    "mnm": 10,
18    "cr": "S20170717074825768bp2l",
19    "mt": 0,
20    "csy": 1,
21    "cnm": 5,
22    "mtv": false
23  }
24 }
```

Mini Project-1 Praticice

- Request

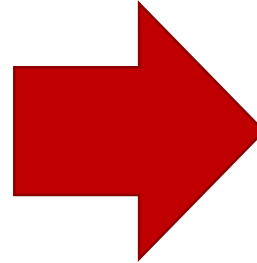
- ▶ ContentInstance CREATE

POST

▼

http://127.0.0.1:7579/Mobius/Grlamp/fopt

```
{  
  "m2m:cin": {  
    "con": "1"  
  }  
}
```



- Response

```
1 {  
2   "Mobius/lamp2/COMMAND": {  
3     "fr": "Mobius/lamp2/COMMAND",  
4     "rsc": "2001",  
5     "pc": {  
6       "m2m:cin": {  
7         "rn": "4-20200921071431954",  
8         "ty": 4,  
9         "pi": "3-20200921053723797",  
10        "ri": "4-20200921071431955",  
11        "ct": "20200921T071431",  
12        "lt": "20200921T071431",  
13        "st": 3,  
14        "et": "20220921T071431",  
15        "cs": 1,  
16        "con": "1",  
17        "cr": "S20170717074825768bp21"  
18      }  
19    }  
20  },  
21  "Mobius/lamp3/COMMAND": {  
22    "fr": "Mobius/lamp3/COMMAND",  
23    "rsc": "2001",  
24    "pc": {  
25      "m2m:cin": {  
26        "rn": "4-20200921071431962",  
27        "ty": 4,  
28        "pi": "3-20200921053728157",  
29        "ri": "4-20200921071431962",  
30        "ct": "20200921T071431",  
31        "lt": "20200921T071431",  
32        "st": 3,  
33        "et": "20220921T071431",  
34        "cs": 1,  
35        "con": "1",  
36        "cr": "S20170717074825768bp21"  
37      }  
38    }  
39  },  
}
```

Mini Project-1 Praticice



1

Update

Lamp
lamp1

Delete



1

Update

Lamp
lamp2

Delete



1

Update

Lamp
lamp3

Delete



1

Update

Lamp
lamp4

Delete



1

Update

Lamp
lamp5

Delete

Mini Project-1 Practice



- Build an application which creates a group resource referring the Postman oneM2M API collection
- Implement <contentInstance> resource create operation in the application



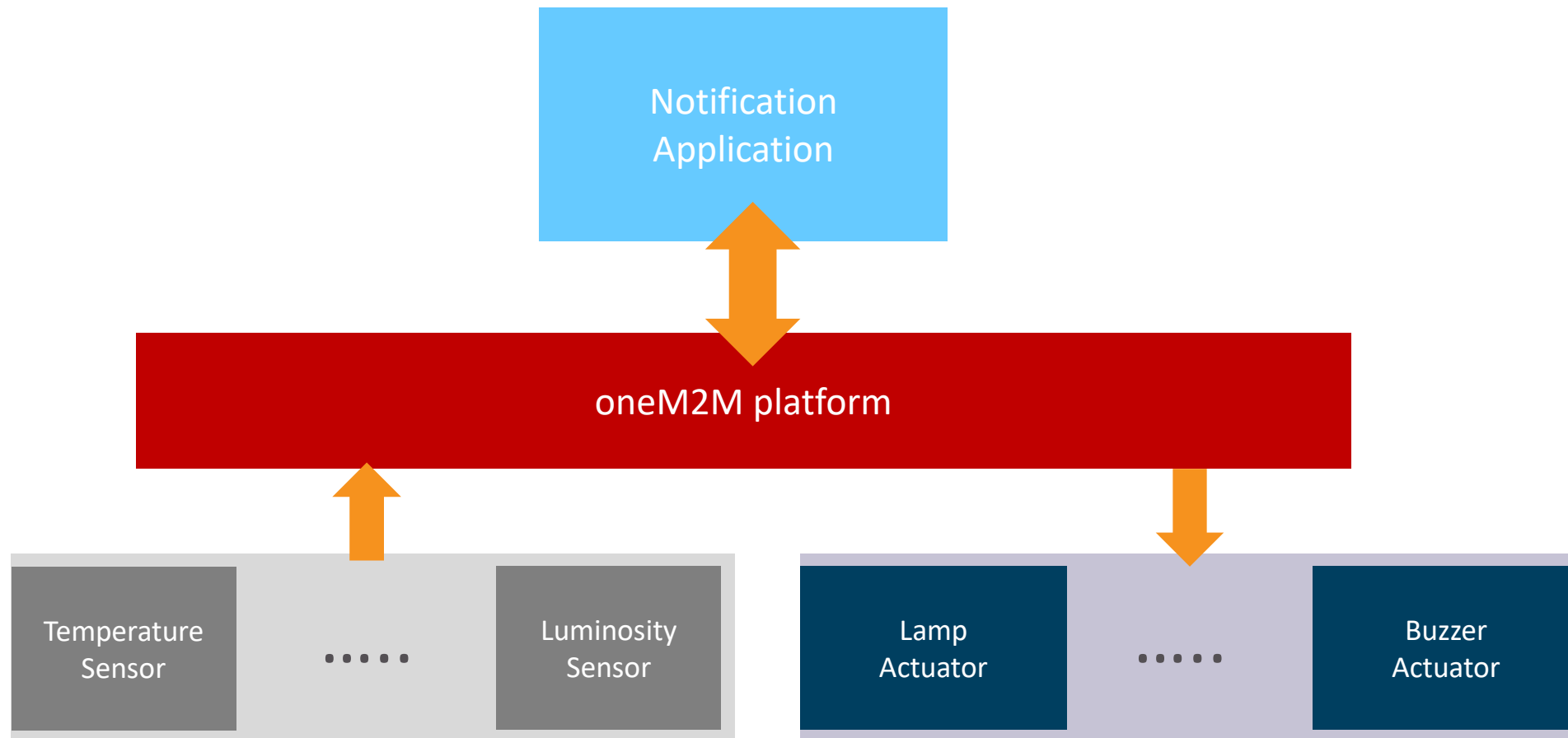
Mini Project-2

Mini Project-2 Overview



- Second mini project implements a simple home IoT automation service
- In this chapter, we will make a notification application
- Through this project, we will look into the oneM2M APIs in detail

Mini Project-2 Architecture

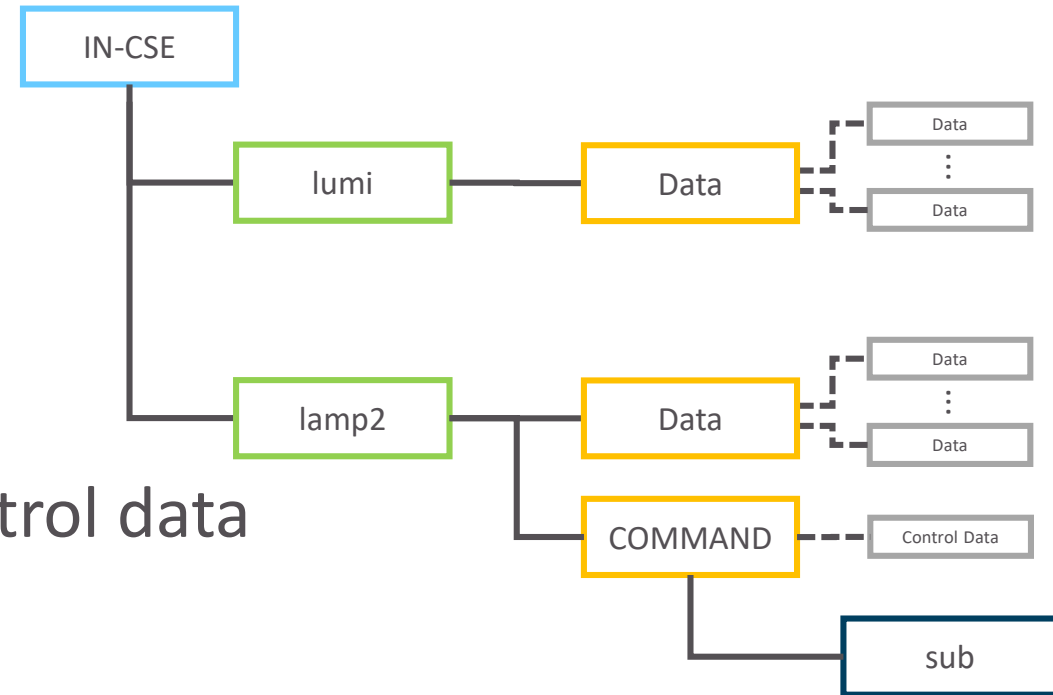


Mini Project-2 Senario

- Create a luminosity sensor and lamp actuator using a device simulator
- By changing in the data value of the luminosity sensor, it is possible to control the lamp actuator through a notification application

Mini Project-2 Resource Design

- CSE => Mobius
- AE => lumi, lamp
- Container => Data, COMMAND
- Subscription => sub
- ContentInstance => lamp data, Control data



Mini Project-2 Practice

- Discovery operation can be used to get the interested resource IDs
- For the next step, ID of the luminosity sensor data resources need to be noted
 - ex) **Mobius/lumi/DATA**
 - ex) **Mobius/lamp/COMMAND**

```
GET http://127.0.0.1:7579/Mobius/lumi?fu=1&ty=3

{
  "m2m:uril": [
    "Mobius/lumi/DATA"
  ]
}
```

```
GET http://127.0.0.1:7579/Mobius/lamp?fu=1&ty=3

{
  "m2m:uril": [
    "Mobius/lamp/DATA",
    "Mobius/lamp/COMMAND"
  ]
}
```

Mini Project-2 Practice

- Configure the Notification application
 - It can be skipped when the oneM2M platform runs on the local machine
 - Open the file "notiapplication.js" with a text editor
 - Change IP address and port if needed

```
////////////////Parameters////////////////////////////////////  
var cseUrl = "http://127.0.0.1:7579";  
var aeId = "S"+"notiapplication";  
var aeName = "notiapplication";  
var aeIp = "127.0.0.1";  
var aePort = 4000;  
var sub_Container = "/Mobius/lumi/DATA"; //  
var threshold = 300;  
var count = 0;  
var arr_container = [];  
arr_container[count] = {};  
arr_container[count++].path = "/Mobius/lamp/COMMAND";
```

Mini Project-2 Pratice

- Notification application features
 - The Notification application creates subscription resource(s)
 - It receives luminosity data notifications from the platform due to the subscription

- Subscription create function

```
function createSubscription(){
    console.log("\n[REQUEST]");
    var method = "POST";
    var url= cseUrl+sub_Container;
    var resourceType=23;
    var requestId = Math.floor( Math.random() * 10000);
    var representation = {
        "m2m:sub": {
            "rn": "sub",
            "nu": ["http://" + aeIp + ":" + aePort + "/" + aeId + "?ct=json"],
            "nct": 2,
            "enc": {
                "net": [3]
            }
        }
    };
};
```

- Notification function

```
app.post("/"+aeId, function (req, res) {
    console.log("\n[NOTIFICATION]")
    console.log(req.body);
    var content = req.body["m2m:sgn"].nev.rep["m2m:cin"].con;
    console.log("Receieved luminosity: "+content);
});
```

Mini Project-2 Pratice

- Install required node modules for Notification application
 - Install the required node modules using the following command and then run
 - > npm install
 - > node notiapplication.js

```
C:\Users\Parkyun\Desktop\oneM2M-Mini_Project
> npm install
npm WARN deprecated request@2.88.2: request has been deprecated, see https://github.com/request/request/issues/3142
npm WARN deprecated har-validator@5.1.5: this library is no longer supported
npm notice created a lockfile as package-lock.json. You should commit this file.
npm WARN onem2m-app@1.0.0 No description
npm WARN onem2m-app@1.0.0 No repository field.

added 96 packages from 91 contributors and audited 96 packages in 2.508s

1 package is looking for funding
  run `npm fund` for details

found 0 vulnerabilities
```

Mini Project-2 Praticice

- Change the actuator state according to the sensor device value through the Notification application

```
[NOTIFICATION]
{ 'm2m:sgn':
  { sur: 'Mobius/lumi/DATA/sub',
    nev: { rep: [Object], net: 3 },
    rvi: '2a' } }
Receieved luminosity: 375
Nothing to do
```

```
[NOTIFICATION]
{ 'm2m:sgn':
  { sur: 'Mobius/lumi/DATA/sub',
    nev: { rep: [Object], net: 3 },
    rvi: '2a' } }
Receieved luminosity: 270
Low luminosity => Switch lamp to 1
```



Mini Project-2 Praticice

- After creating the presence sensor and buzzer in the Device simulator, extend/finish the notification application to control the buzzer upon presence detection
 - create a subscription to get the presence event
 - handle the notification event data
 - actuate the buzzer