

TIZEN™

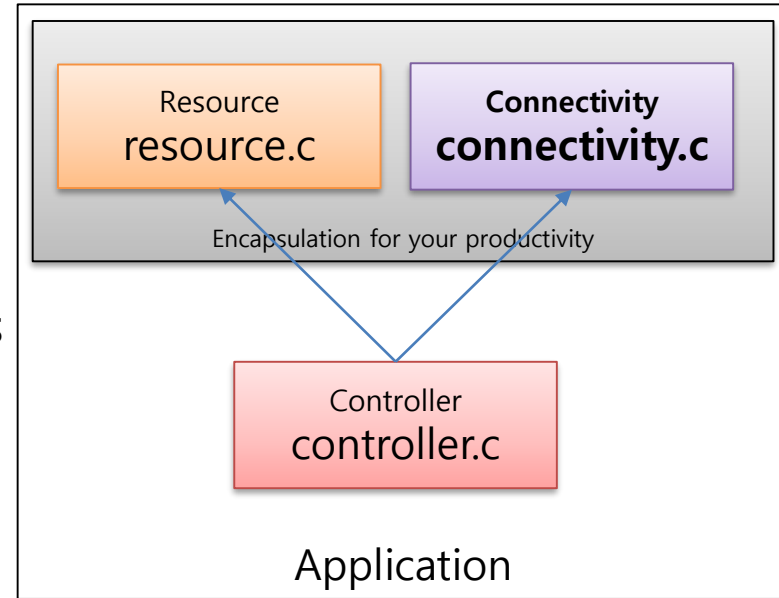
Tizen.IoTivity.Connectivity

w/ clouds

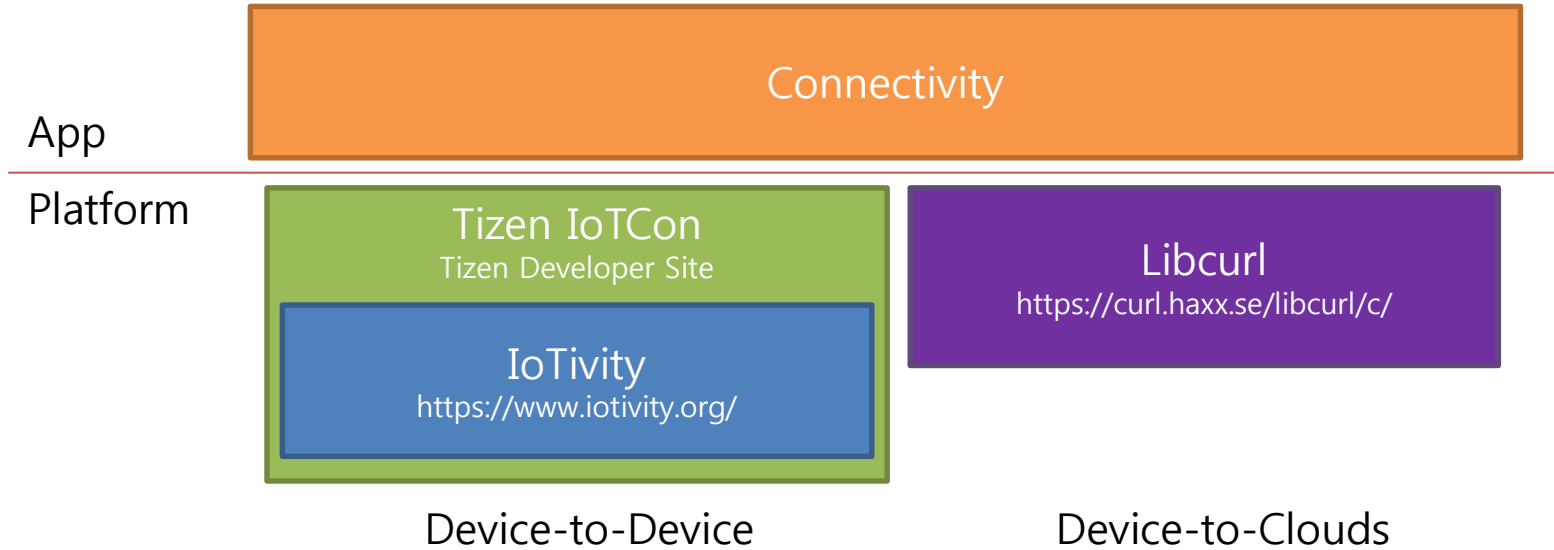
박정훈

Resource Connectivity Controller

- **Resource**
 - represents real state content
 - collects data
 - Sensors, LED, ...
- **Connectivity**
 - connectivity of devices
 - integrated into communication networks
 - local network or cloud network
- **Controller**
 - controls resources and connectivity
 - mainloop



Connectivity



Background

REST(REpresentational State Transfer) API

- (별도의 전송계층을 사용하지 않고) HTTP를 이용하여 서버와 클라이언트간 통신 방법
- 3가지 구성요소 (Resource, Method, Message)

1. Resource

“http://webserver/api” 같은 형태의 URI(Uniform Resource Identifier)

2. Method

HTTP 프로토콜의 4가지 method 사용 : CRUD (Create, Read, Update, Delete)

- POST(Create), GET(Read), PUT(Update), DELETE(Delete)

3. Message

text, file 등 다양한 형태가 가능하나 JSON, XML 등 형식의 메시지를 일반적으로 사용

Background

Libcurl

- URL기반의 데이터 전송 라이브러리
- HTTP, HTTPS, FILE, FTP, FTPS.... 등등 지원

- POST method 사용 예제

```
#include <curl/curl.h>

int web_util_noti_post(const char *url, const char *json_data)
{
    int ret = 0;
    CURL *curl = NULL;
    CURLcode response = CURLE_OK;
    struct curl_slist *headers = NULL;

    curl = curl_easy_init();

    headers = curl_slist_append(headers, "Accept: application/json");
    headers = curl_slist_append(headers, "Content-Type: application/json");

    curl_easy_setopt(curl, CURLOPT_URL, url);
    curl_easy_setopt(curl, CURLOPT_POST, 1L);
    curl_easy_setopt(curl, CURLOPT_HTTPHEADER, headers);
    curl_easy_setopt(curl, CURLOPT_POSTFIELDS, json_data);

    response = curl_easy_perform(curl);

    curl_slist_free_all(headers);
    curl_easy_cleanup(curl);

    return ret;
}
```

Background

Libcurl

- GET method 사용 예제

```
#include <curl/curl.h>
```

```
int web_util_noti_get(const char *url, char **response)
```

```
{
```

```
    int ret = 0;
```

```
    CURL *curl = NULL;
```

```
    CURLcode response = CURLE_OK;
```

```
    curl = curl_easy_init();
```

```
    curl_easy_setopt(curl, CURLOPT_URL, url);
```

```
    curl_easy_setopt(curl, CURLOPT_WRITEFUNCTION,  
                    _get_response_write_callback);
```

```
    curl_easy_setopt(curl, CURLOPT_WRITEDATA, (void *)response);
```

```
    response = curl_easy_perform(curl);
```

```
    curl_easy_cleanup(curl);
```

```
    return ret;
```

```
}
```

```
static size_t _get_response_write_callback(void *ptr, size_t size,  
                                           size_t nmemb, void *data)
```

```
{
```

```
    size_t res_size = 0;
```

```
    char **received = (char **)data;
```

```
    res_size = size*nmemb;
```

```
    if (received && res_size > 0)
```

```
        *received = strdup((char *)ptr, size*nmemb);
```

```
    return res_size;
```

```
}
```

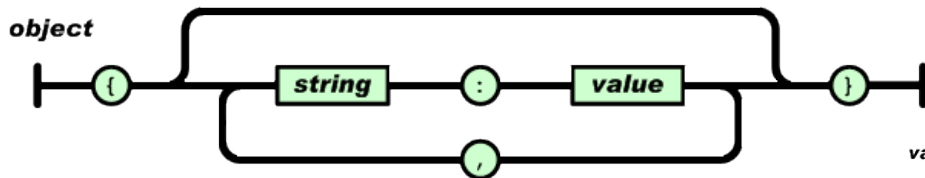


Background

JSON(JavaScript Object Notation)

- JavaScript에서 생겨났지만, Data 교환을 위해 언어 독립적으로 사용 중

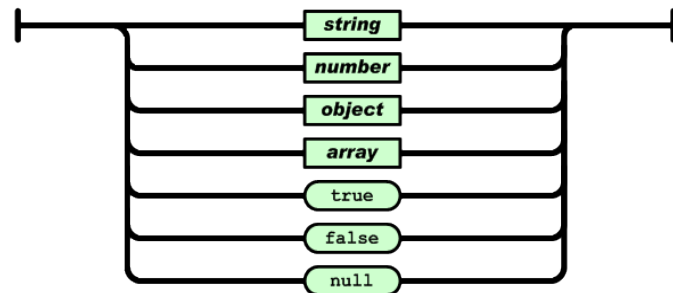
- 구조



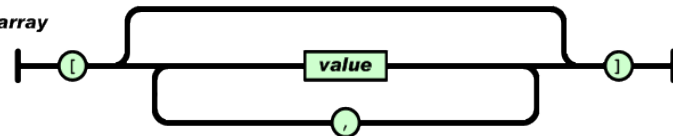
- 예제

```
{  
  이름 : 홍길동,  
  학과 : 컴퓨터공학과,  
  수강과목 : [인공지능, 알고리즘],  
}
```

value



array



Back to Connectivity

Connectivity APIs

- Initialize

```
int connectivity_set_protocol(connectivity_protocol_e protocol_type);
```

```
int connectivity_set_resource(const char *path, const char *type, connectivity_resource_s **out_resource_info);
```

controller.c

```
static bool service_app_create(void *data)
{
    app_data *ad = data;
    .....
    ret = connectivity_set_connectivity_type(CONNECTIVITY_TYPE);
    .....
    ret = connectivity_set_resource(PATH, TYPE, &ad->resource_info);
    .....
    return true;
}
```

CONNECTIVITY_PROTOCOL_HTTP

```
typedef enum {
    CONNECTIVITY_PROTOCOL_DEFAULT = 0,
    CONNECTIVITY_PROTOCOL_IOTIVITY,
    CONNECTIVITY_PROTOCOL_HTTP,
    CONNECTIVITY_PROTOCOL_MAX
} connectivity_protocol_e;
```

"/door/??"

"org.tizen.door"

※ finalize - void **connectivity_unset_resource**(connectivity_resource_s *resource);

Back to Connectivity

Connectivity APIs

- Notify sensing data

- API for simple data

```
int connectivity_notify_bool(connectivity_resource_s *resource_info, const char *key, bool value);  
int connectivity_notify_int(connectivity_resource_s *resource_info, const char *key, int value);  
int connectivity_notify_double(connectivity_resource_s *resource_info, const char *key, double value);  
int connectivity_notify_string(connectivity_resource_s *resource_info, const char *key, const char *value);
```

- API for complex data

```
int connectivity_attributes_add_bool(connectivity_resource_s *resource_info, const char *key, bool value);  
int connectivity_attributes_add_int(connectivity_resource_s *resource_info, const char *key, int value);  
int connectivity_attributes_add_double(connectivity_resource_s *resource_info, const char *key, double value);  
int connectivity_attributes_add_string(connectivity_resource_s *resource_info, const char *key, const char *value);  
int connectivity_attributes_notify_all(connectivity_resource_s *resource_info);  
int connectivity_attributes_remove_value_by_key(connectivity_resource_s *resource_info, const char *key);  
int connectivity_attributes_remove_all(connectivity_resource_s *resource_info);
```

Back to Connectivity

Connectivity APIs

- Notify sensing data

controller.c

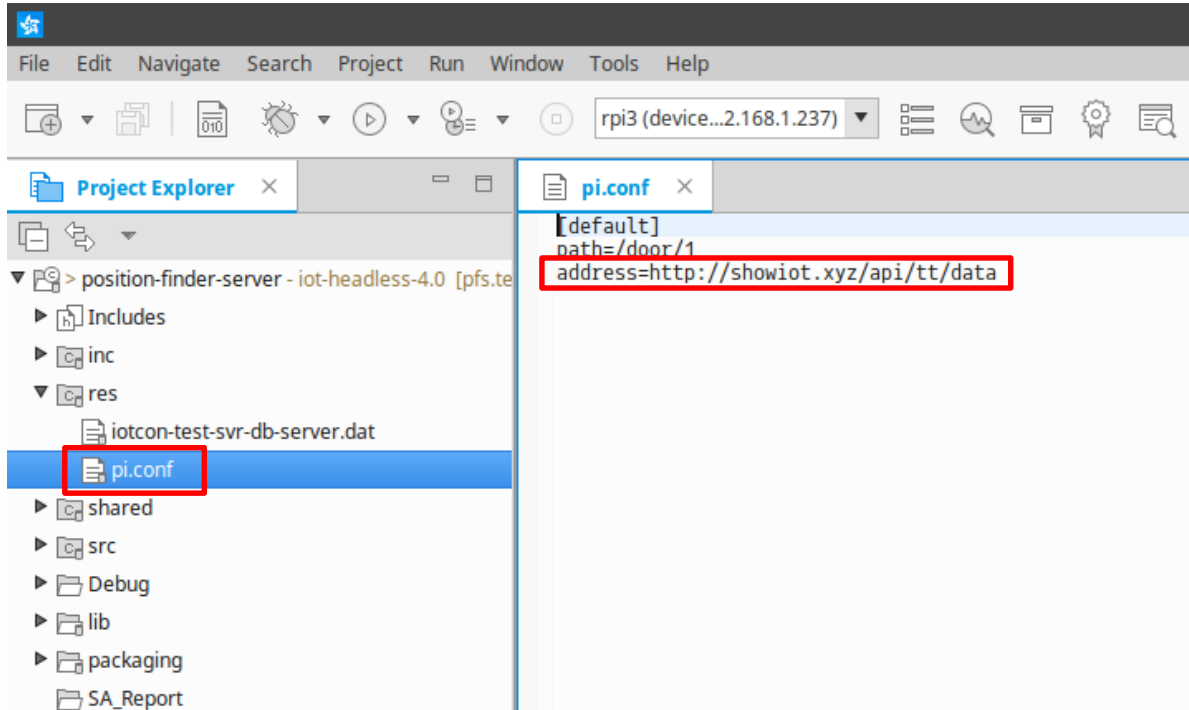
```
static Eina_Bool _control_sensors_cb(void *data)
{
    app_data *ad = data;
    int value = -1;
    .....
    ret = resource_read_infrared_motion_sensor(21, &value);
    .....
    ret = connectivity_notify_int(ad->resource_info, KEY, value);
    .....
    return ECORE_CALLBACK_RENEW;
}
```

↑
"Motion"

Back to Connectivity

URI for REST API

- pi.conf 파일의 address 항목에 정의

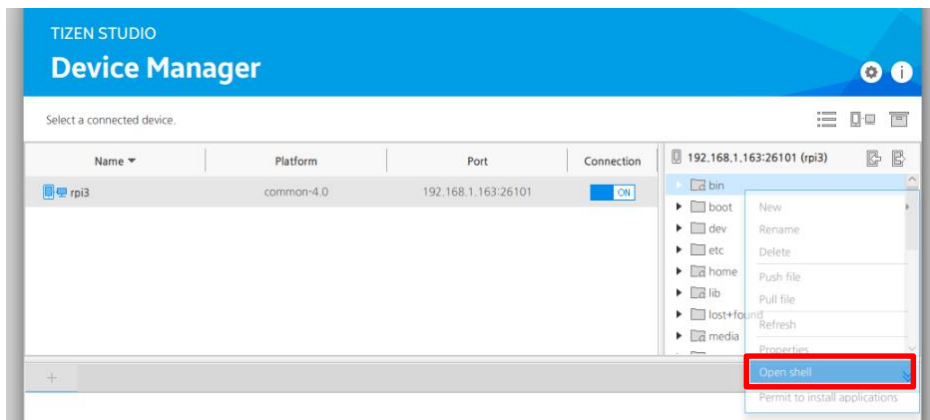


Runs your code on RPi3

1. Running the project on RPi3.

Run > Run As > ...

2. How to open the shell.



* **NOTE:** The password is not shown when you enter it.

3. How to view logs.

Execute *dlogutil* in the opened shell.

```
$ dlogutil <LOG_TAG> ex) dlogutil TT
```

```
[connectivity_notify_int:655] Notify key[Motion], value[10]
[web_util_noti_post:98] server : http://showiot.xyz/api/tt/data
[web_util_noti_post:99] json_data : {"SensorPiID":"/door/1", "SensorPiType":"org.tizen.door", "Motion":10}
[_post_response_write_callback:48] POST response : "values: {\\"SensorPiID\\":\\"/door/1\\",\\"SensorPiType\\":\\"org.tizen.door\\",\\"Motion\\":10}, time: 2017-11-07T06:30:38"
```

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Thank you

