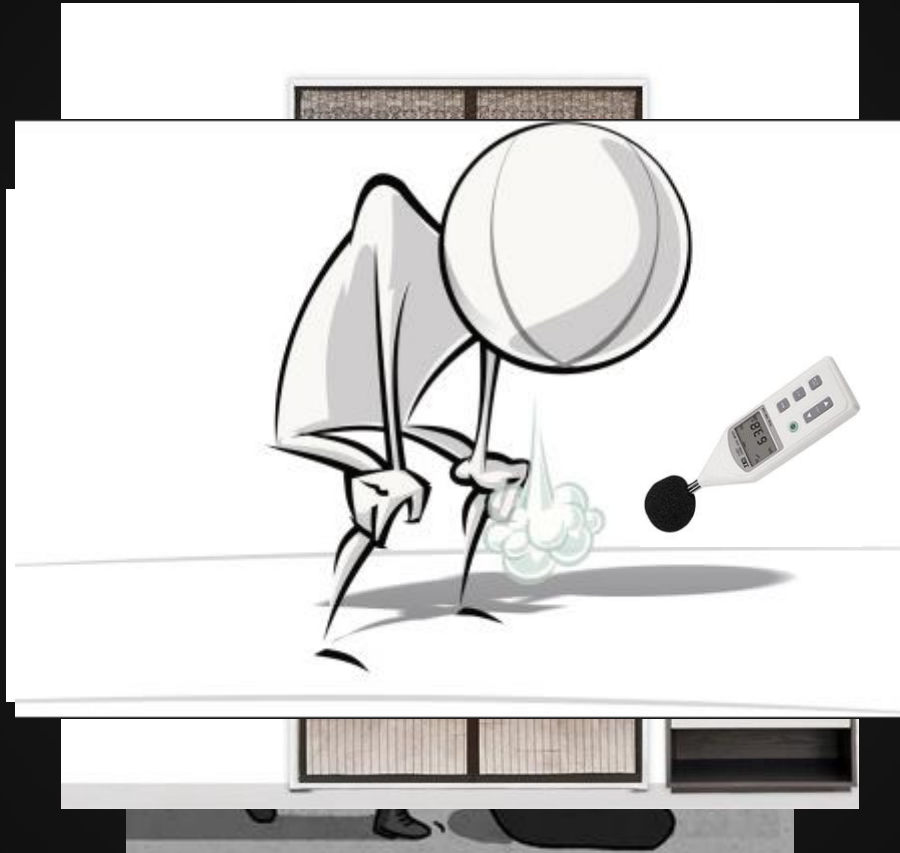


Kick off Tizen Project

Aug. 22, 2018

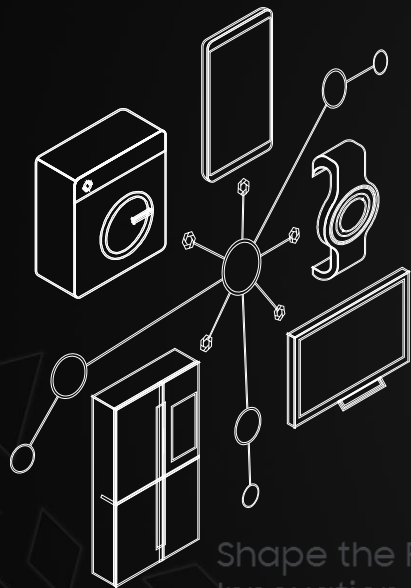


천리 길도 한걸음부터

걸기도 전에 뛰려고 한다

등고자비





Shape the Future with
Innovation and Intelligence

Contents

- I Shape of you
(Tizen Project 외부 구조)
- II Just the way you are
(Tizen Project 동작 방식)
- III Handclap
(Tizen Project 유용한 개발 Tip)

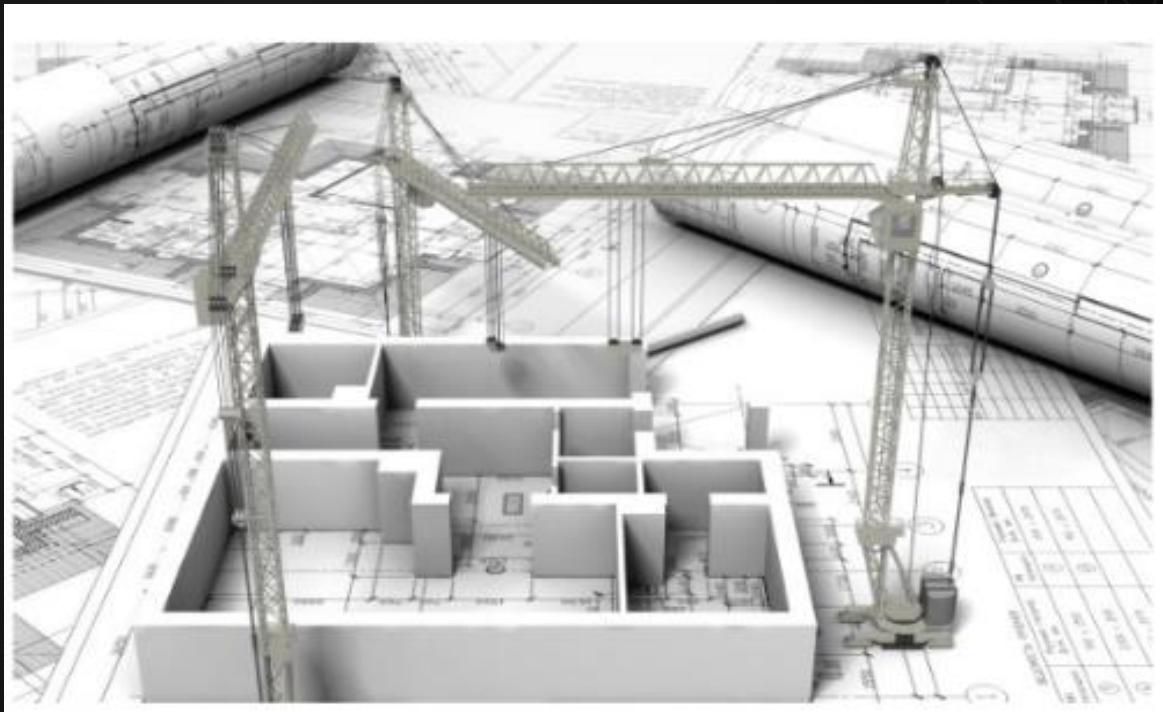
Tizen Project 외부 구조

SAMSUNG Research

🔸 Tizen Project 생성하기

Do it my self

- 🔸 폴더 구조
- 🔸 빌드 환경
- 🔸 패키징을 위한 링크



Tizen Project 외부 구조

SAMSUNG Research

🏠 Tizen Project 생성하기

Interior Tizen Project

- 🏠 Templates
- 🏠 Samples
- 🏠 기존 Tizen Project



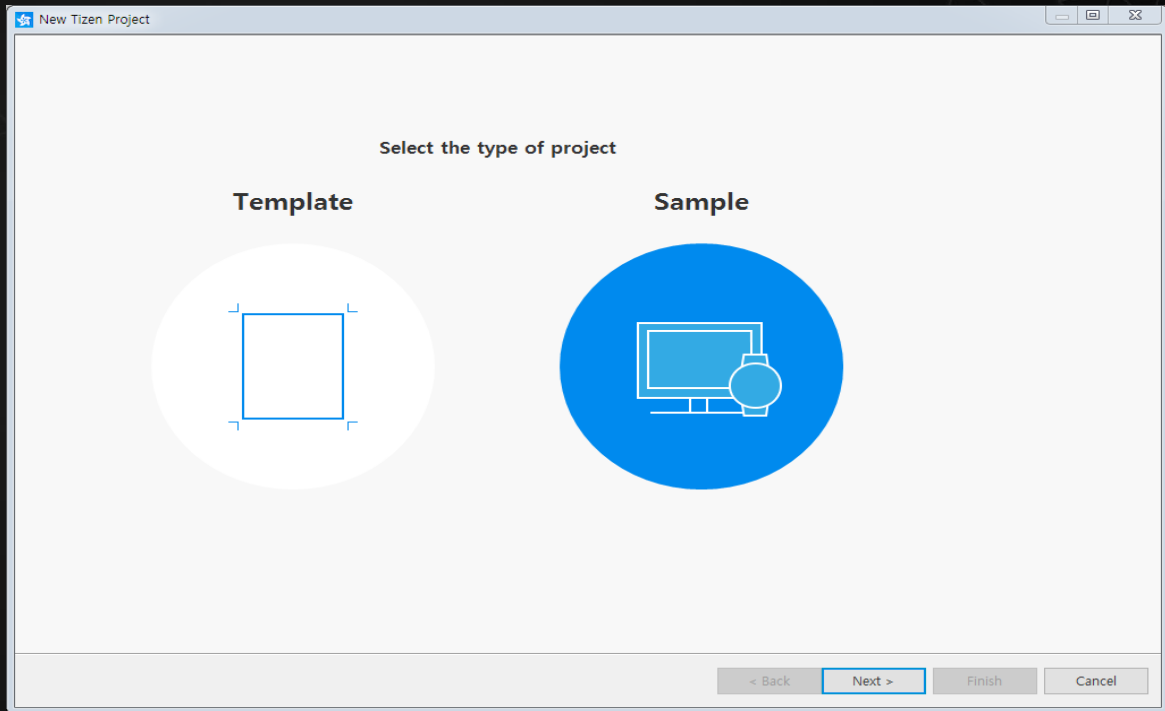
Tizen Project 외부 구조

SAMSUNG Research

🔗 Tizen Project 생성하기

Templates & Samples

- 🔗 좌측 상단 +아이콘
- 🔗 Project Explorer 창 가운데 +아이콘
- 🔗 File -> New -> Tizen Project



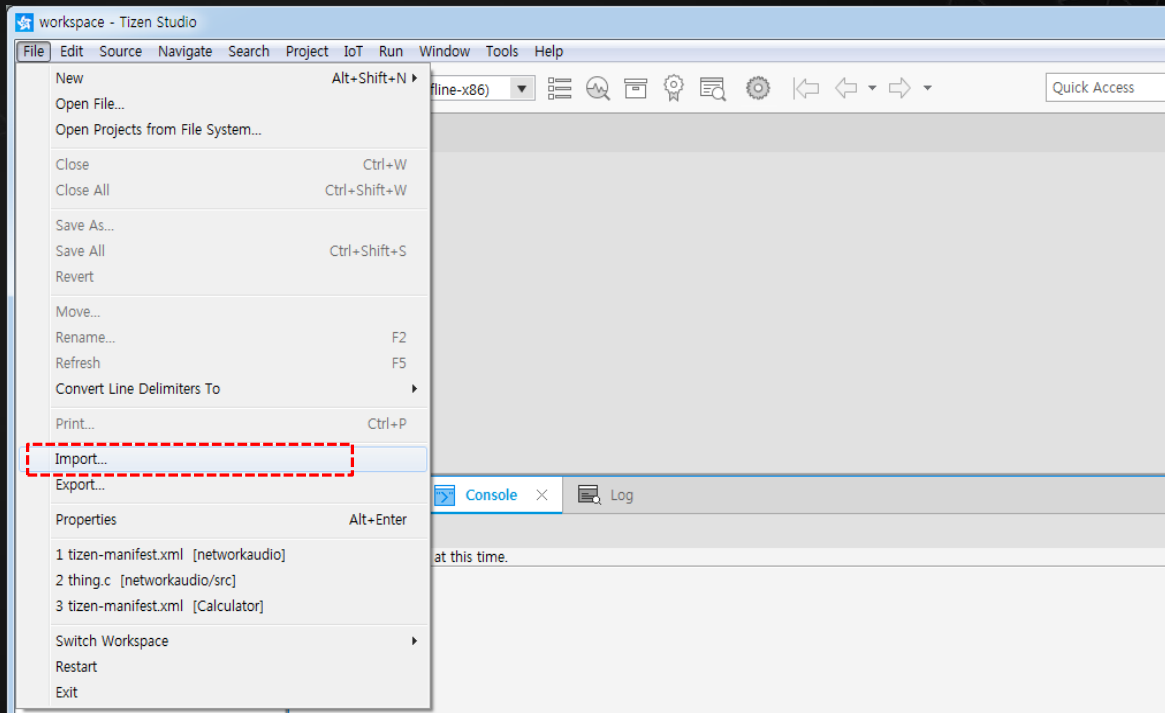
Tizen Project 외부 구조

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🔸 Tizen Project 생성하기

Existent Tizen Project

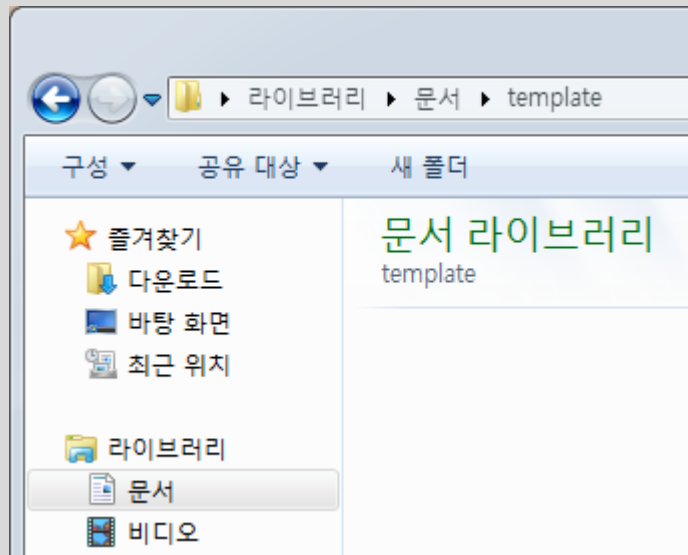
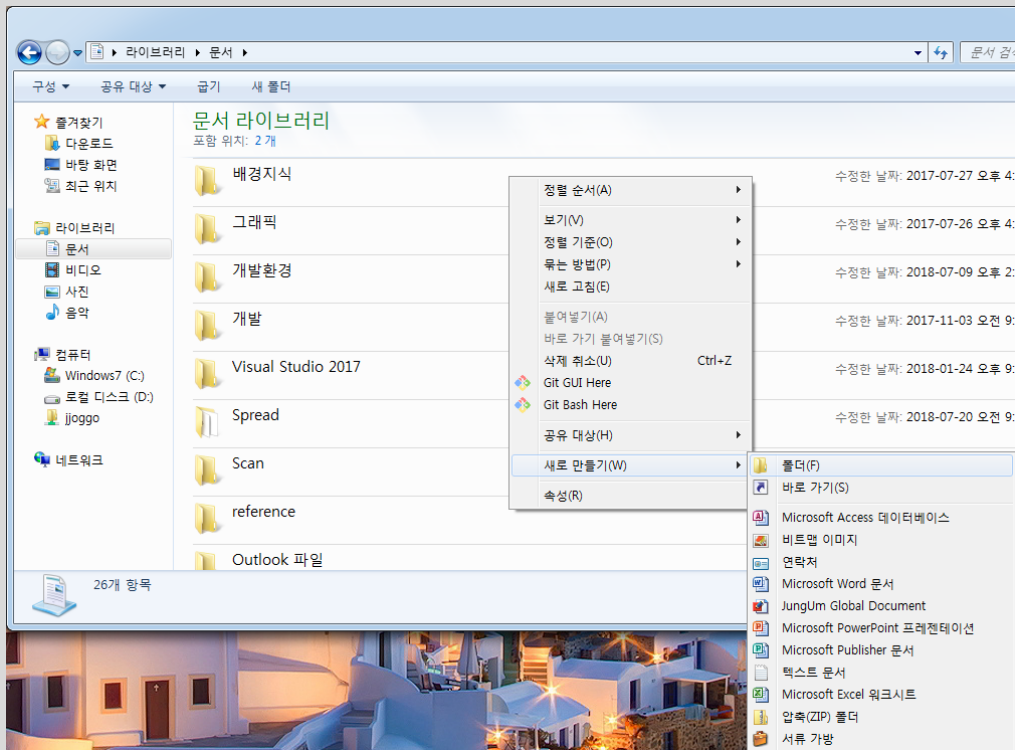
- 🔸 File -> Import
- 🔸 Git 으로부터 다양한 Tizen Project 들을 가져 올 수 있습니다



Tizen Project 외부 구조

SAMSUNG Research

📁 Tizen Project 생성하기



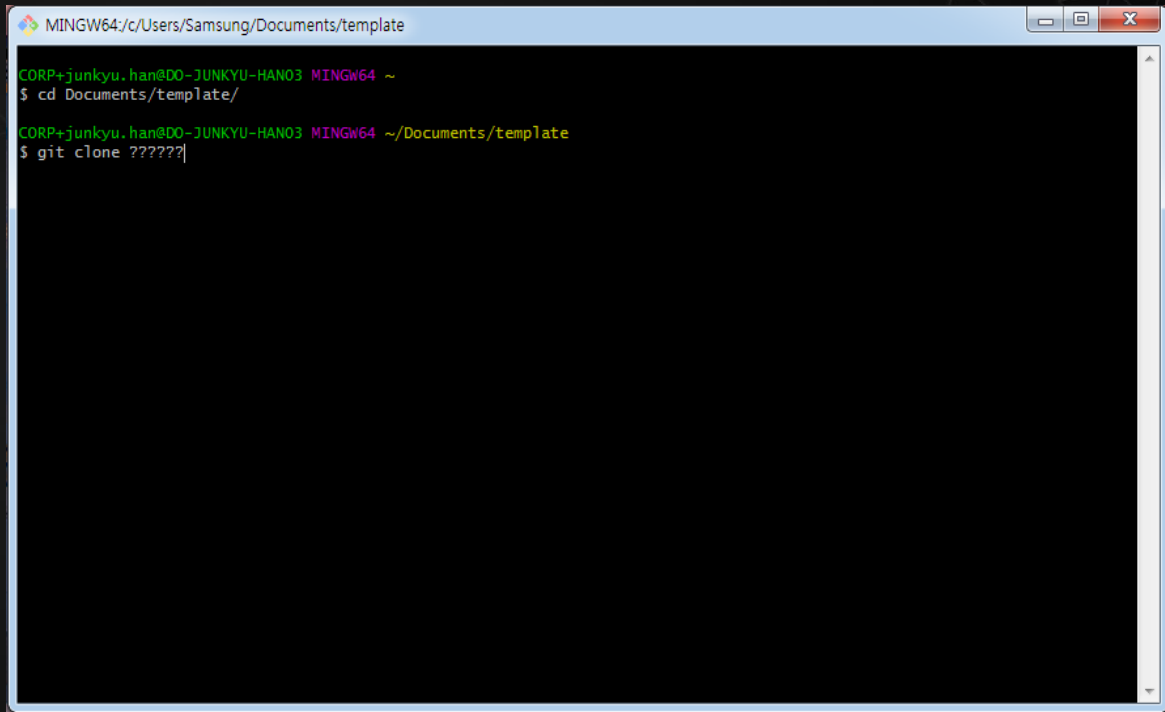
Tizen Project 외부 구조

SAMSUNG Research

🔸 Tizen Project 생성하기

Git 으로부터 가져오기

- 🔸 Git bash
- 🔸 Tizen Project 를 가져올 폴더로 이동해줍니다
- 🔸 폴더를 생성하는 명령어는 mkdir 입니다
- 🔸 git clone 명령어 뒤에 적어줄 project 의 주소는 어떻게 알 수 있을까요?



```
MINGW64:/c/Users/Samsung/Documents/template

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~
$ cd Documents/template/

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/template
$ git clone ??????
```

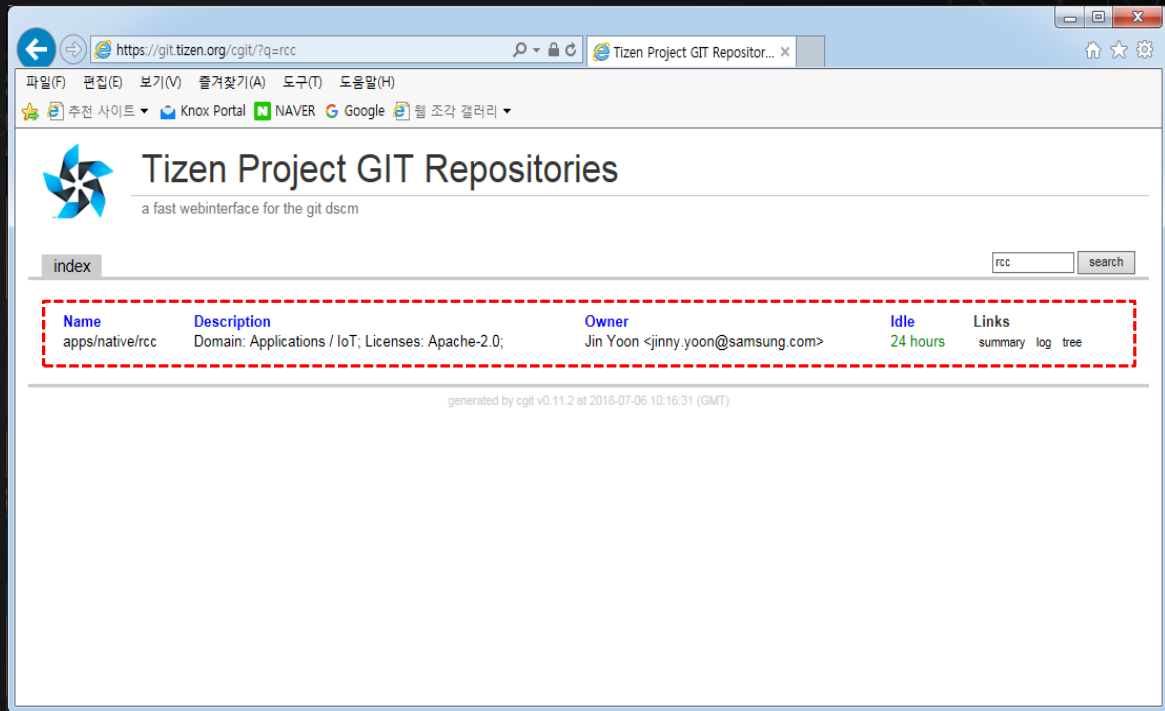
Tizen Project 외부 구조

SAMSUNG Research

🔸 Tizen Project 생성하기

Git 으로부터 가져오기

- 🔸 <https://git.tizen.org>
- 🔸 모든 profile 의 Tizen Project 들이 보입니다
- 🔸 스마트하게 search 를 사용해요
- 🔸 'rcc' 를 찾아줍니다
- 🔸 apps/native/rcc 라는 아이가 보여요
- 🔸 문제가 있으면 Owner에게....



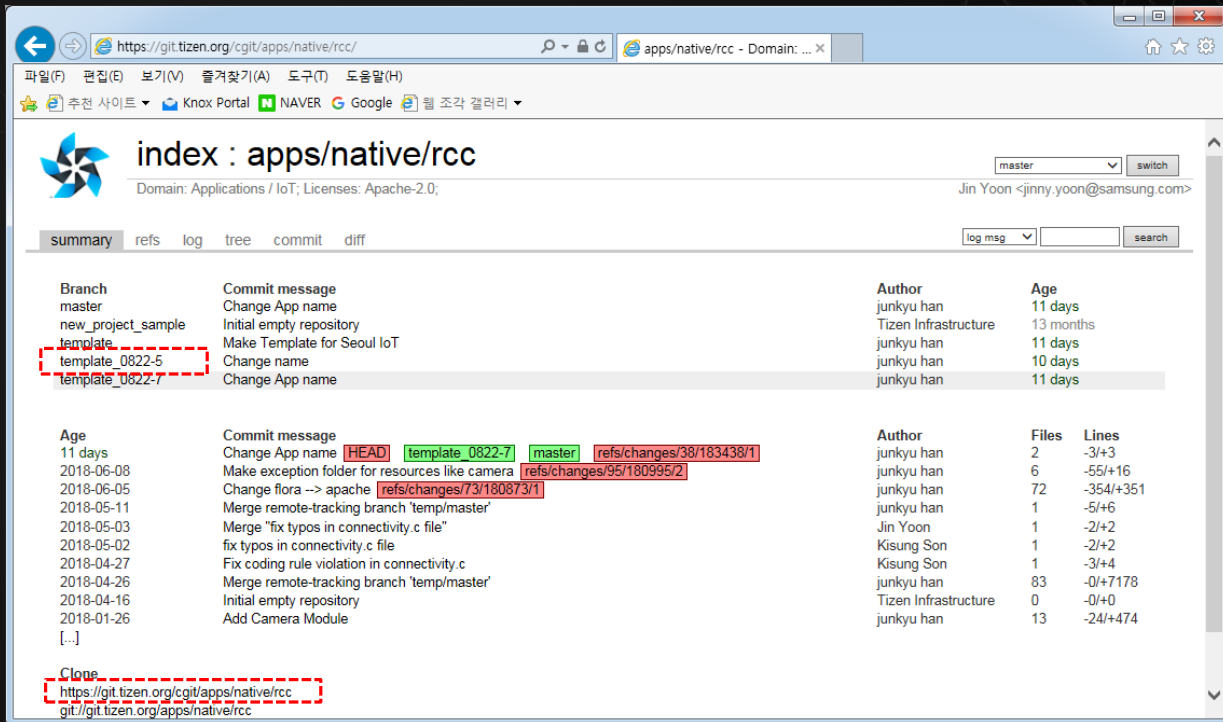
Tizen Project 외부 구조

SAMSUNG Research

🏠 Tizen Project 생성하기

Git 으로부터 가져오기

- 프로젝트 rcc 에 대한 많은 정보를 볼 수 있습니다
- Branch 와 Clone 에 집중하세요
- template_0822-5 라는 branch 만 가져오겠습니다
- Clone 에서는 https 를 사용할게요



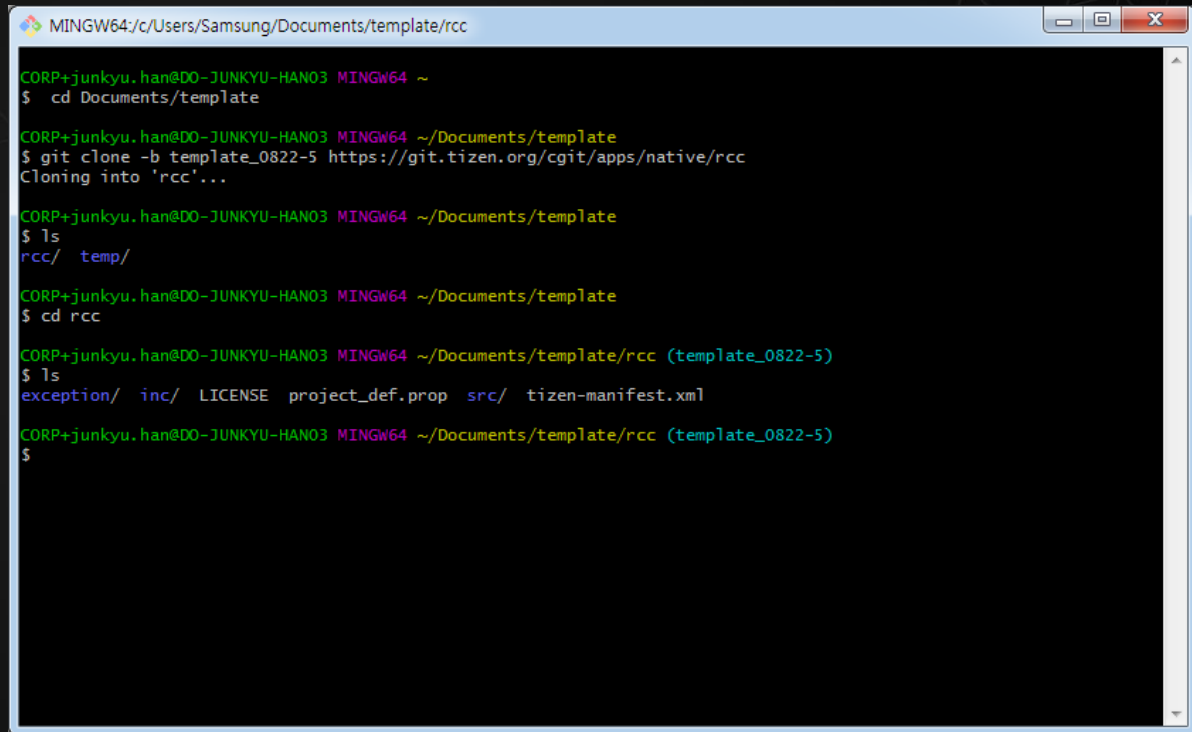
Tizen Project 외부 구조

SAMSUNG Research

📌 Tizen Project 생성하기

Git 으로부터 가져오기

- 📌 `git clone -b template_0822-5 https://git.tizen.org/cgit/apps/native/rcc`
- 📌 현재 폴더에 rcc/ 폴더가 생성 되었음을 확인합니다
- 📌 rcc 프로젝트로 이동해 볼게요
- 📌 무언가 들어있는 빈 폴더가 아님을 확인해줍니다



```
MINGW64/c/Users/Samsung/Documents/template/rcc

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~
$ cd Documents/template

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/template
$ git clone -b template_0822-5 https://git.tizen.org/cgit/apps/native/rcc
Cloning into 'rcc'...

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/template
$ ls
rcc/  temp/

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/template
$ cd rcc

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/template/rcc (template_0822-5)
$ ls
exception/  inc/  LICENSE  project_def.prop  src/  tizen-manifest.xml

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/template/rcc (template_0822-5)
$
```

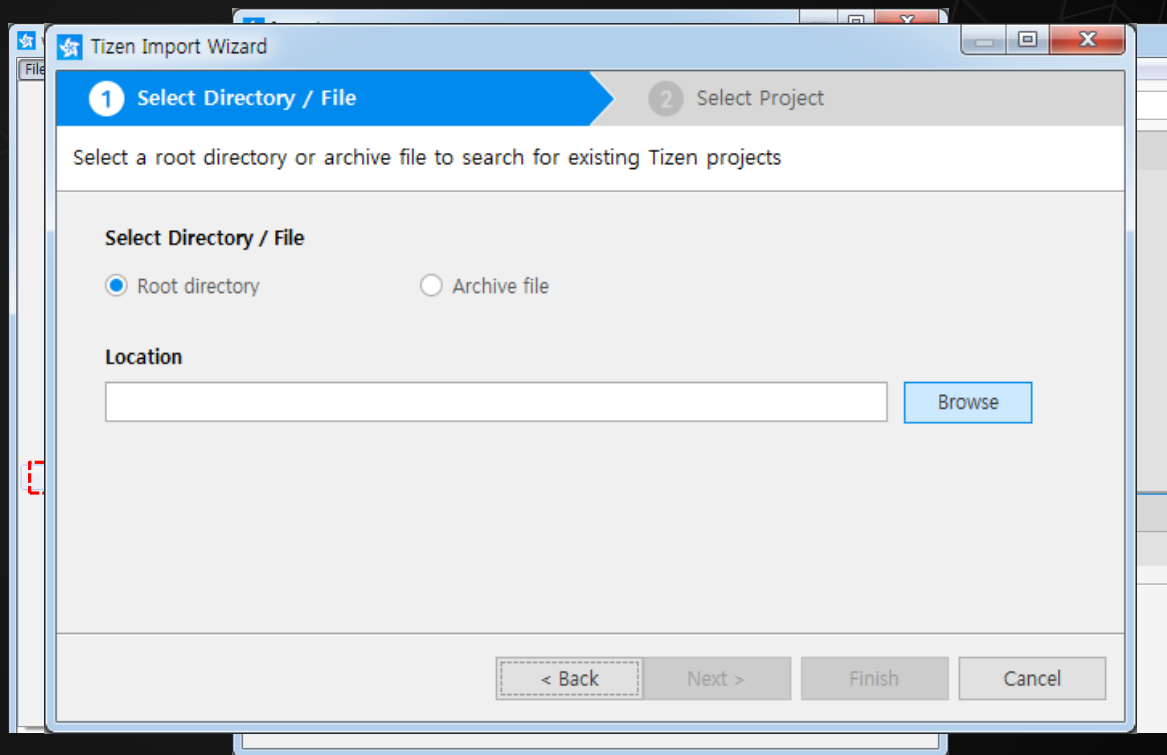
Tizen Project 외부 구조

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📌 Tizen Project 생성하기

rcc 프로젝트 가져오기

- 📌 File -> Import
- 📌 Tizen -> Tizen Project
- 📌 Root directory -> Browse



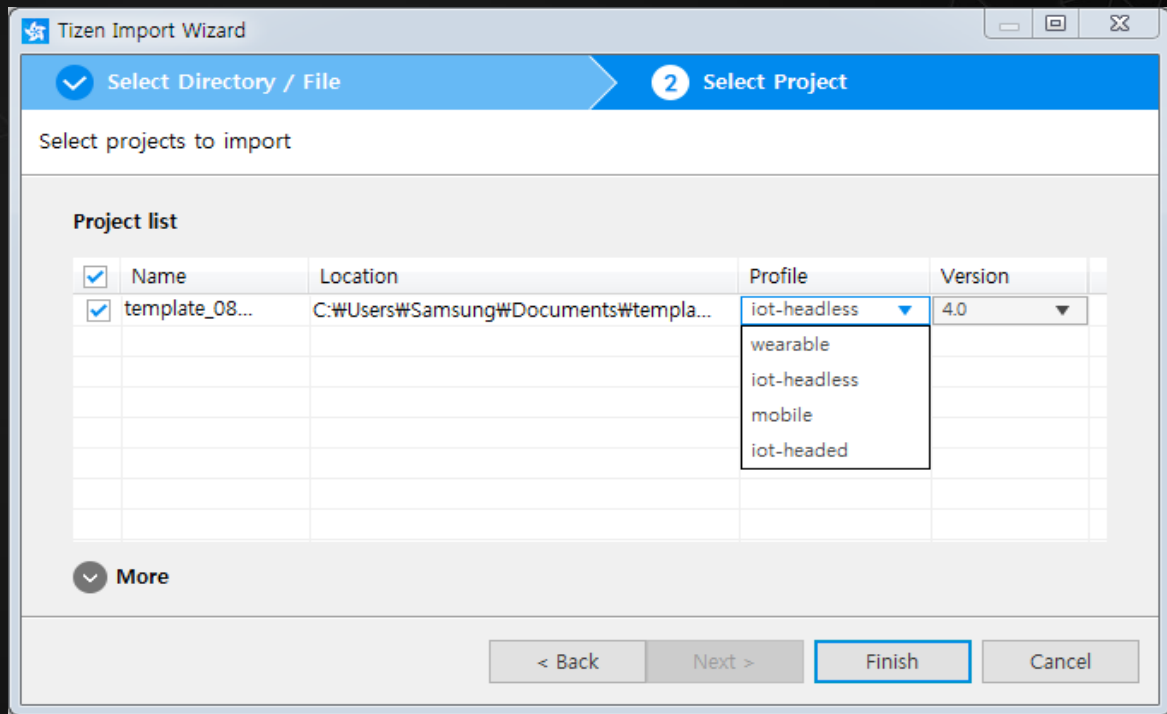
Tizen Project 외부 구조

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❖ Tizen Project 생성하기

rcc 프로젝트 가져오기

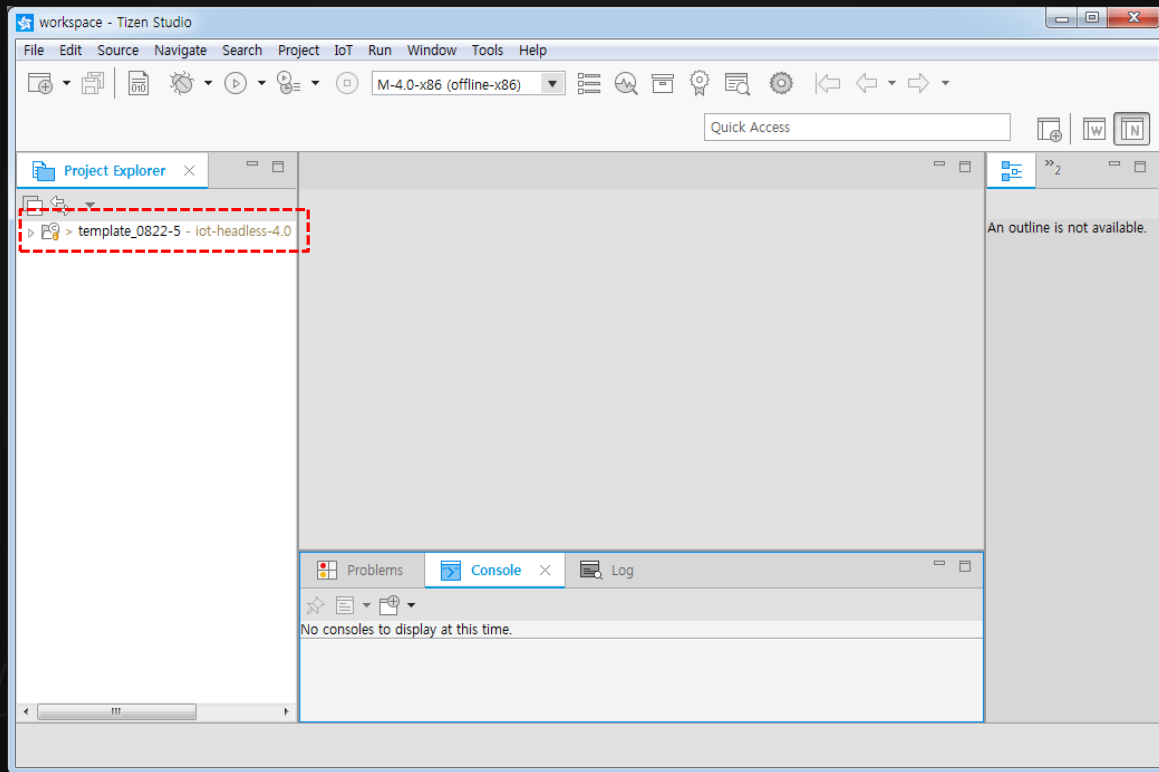
- ❖ rcc 프로젝트를 저장해 둔 위치로 가서 rcc 폴더를 선택합니다
- ❖ 위치를 다시 한번 확인하고 Next 를 눌러주세요
- ❖ 해당 프로젝트가 다양한 profile 을 지원한다면 원하는 profile 을 선택할 수 있습니다



Tizen Project 외부 구조

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Project 'template_0822-5' 가 땡!



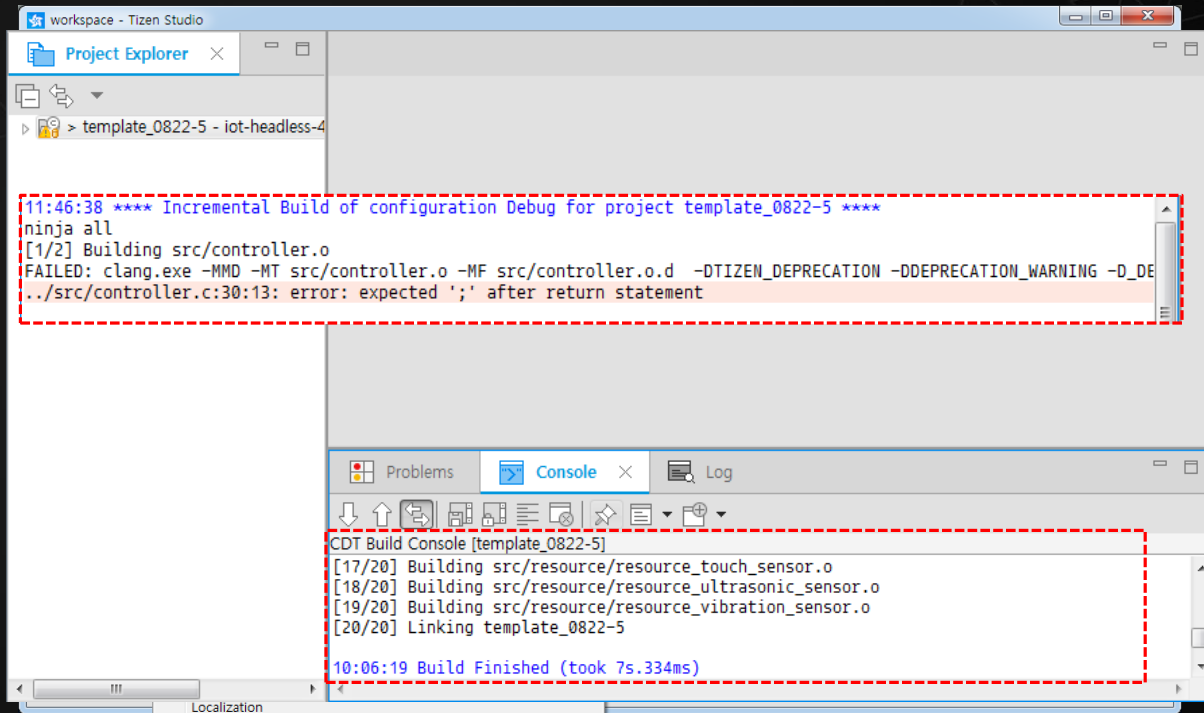
Tizen Project 외부 구조

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🔸 Tizen Project 폴더 구조

빌드로 유효성 확인

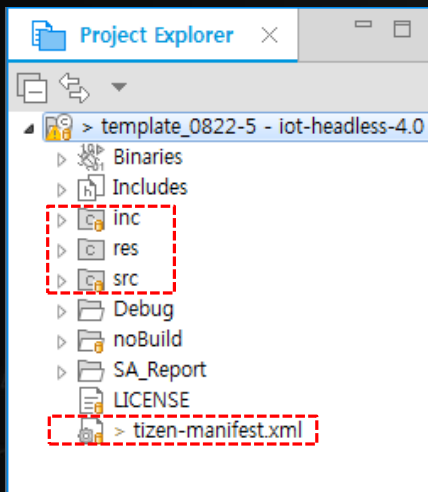
- 🔸 프로젝트 이름 우 클릭 -> Build Project
- 🔸 하단 Console 창에서 빌드 프로세스 로그 확인 가능합니다
- 🔸 FAILED 메시지 없이 Build Finished 가 보이면 해당 프로젝트가 성공적으로 빌드 된 것입니다



Tizen Project 외부 구조

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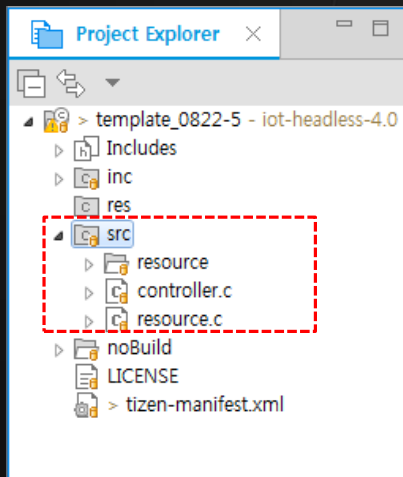
❖ Tizen Project 폴더 구조



src/

❖ Source file

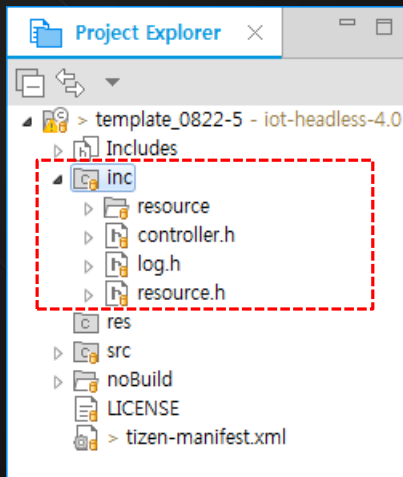
❖ *.c



inc/

❖ Header file

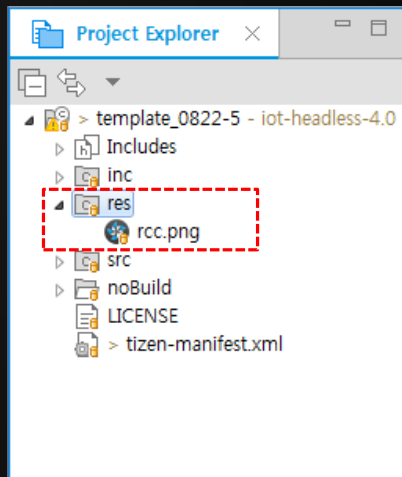
❖ *.h



res/

❖ Resource file

❖ Mp3, Image etc..



Tizen Project 외부 구조

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🔖 Tizen Project 특성 설정 – Overview 탭

Application ID 와 Package 이름
은 변경 가능하지만!!
Application ID 는 반드시
Package 명 + '. ' + 원하는 이름
으로 이루어져야 합니다.

API version 은 변경 가능하더
라도 매우 신중해주세요
자칫 호출에 실패할 수도 있습
니다

The screenshot shows the 'Tizen Manifest Editor' window with the 'Overview' tab selected. The 'General Information' section contains the following fields:

- Application ID: org.tizen.template_0822-5
- Package: org.tizen.template_0822-5
- Version: 1.0.0
- Api Version: 4.0 (dropdown menu)
- Label: Tizen Template for 0822-5
- Exec: template_0822-5
- Icon: (empty field)
- Source: (empty field) with a 'Browse...' button
- Launcher Icon: (empty field)
- Author: (empty field)
- Email: (empty field)
- Website: (empty field)
- Description: (empty text area)

Red dashed boxes highlight the Application ID, Package, Version, Api Version, and the Icon/Source/Launcher Icon section. Red arrows point from the Korean text annotations to these specific fields.

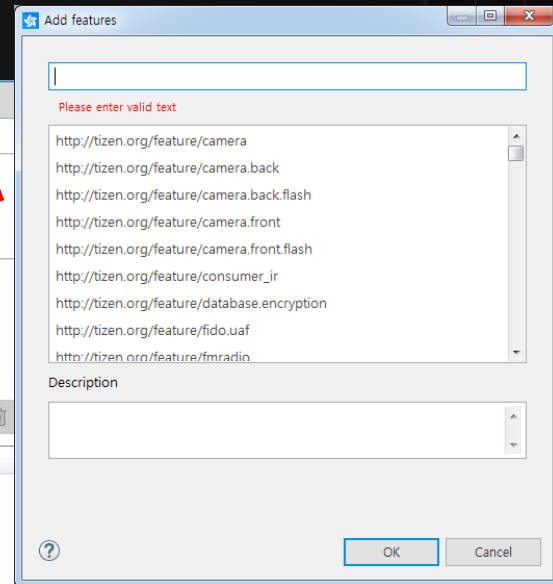
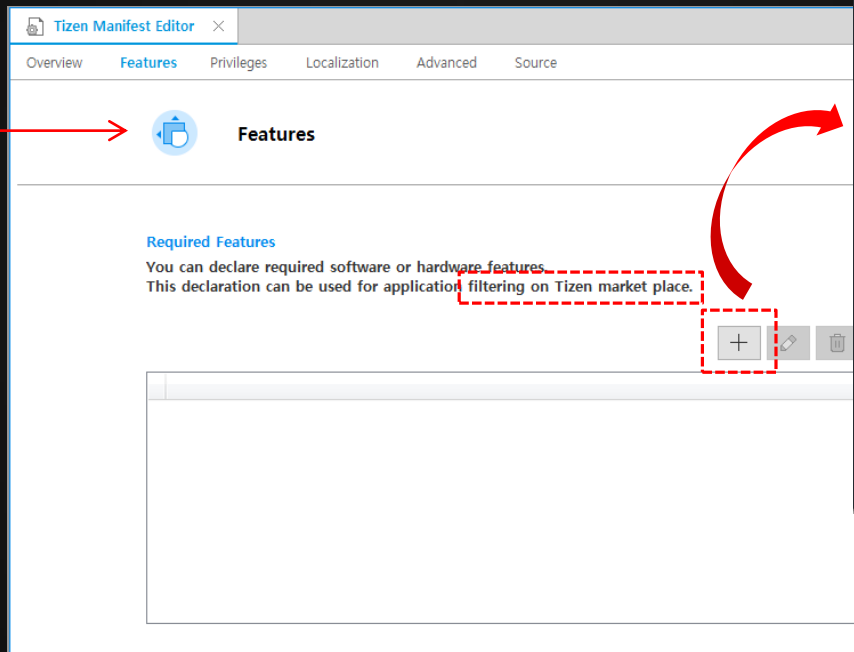
Icon 도 여기서 설정하실 수 있
습니다

Tizen Project 외부 구조

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🔗 Tizen Project 특성 – Features 탭

Feature의 경우 market에 올릴 때 어느 카테고리로 속하게 할 것인지를 정해주는 것입니다

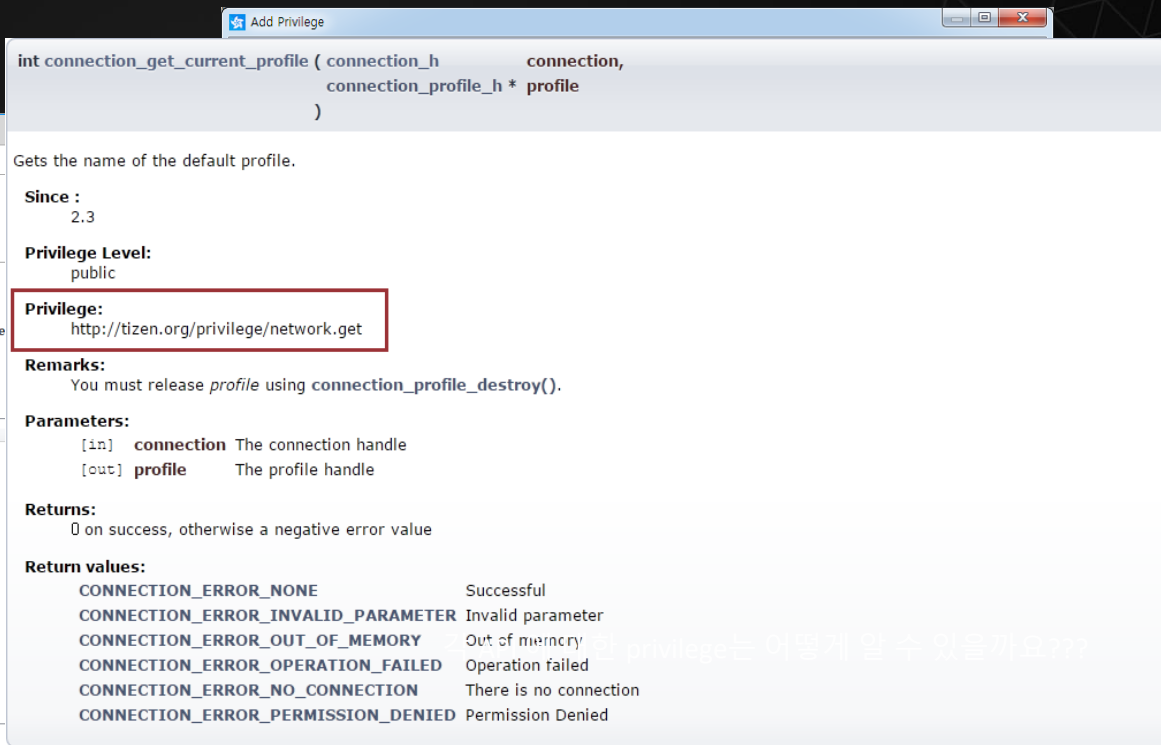
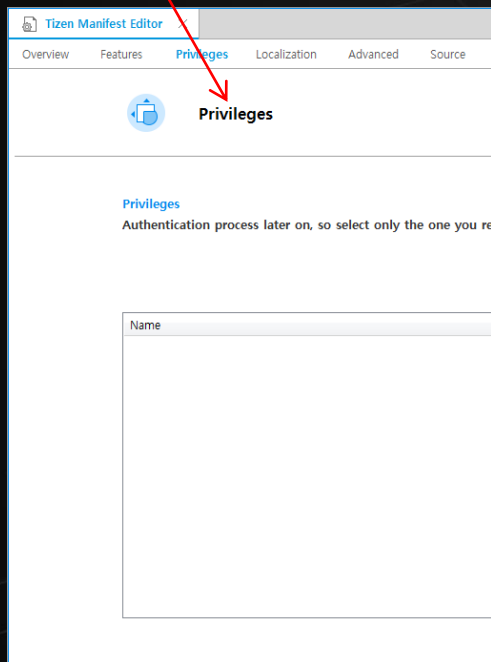


Tizen Project 외부 구조

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🔗 Tizen Project 특성 설정 – Privilege 탭

Runtime 시 API 호출에 대한 권한을 부여해줍니다



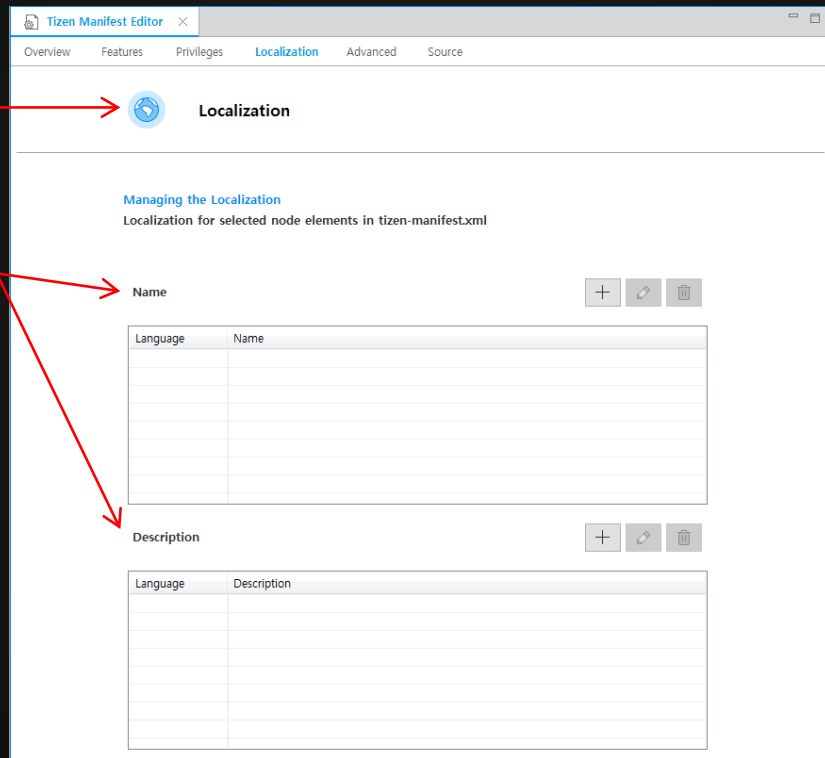
Tizen Project 외부 구조

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🔗 Tizen Project 특성 – Localization 탭

디스플레이 되는 텍스트의 언어를
추가할 수 있습니다

해당 언어의 이름과, 그에 대한 설명
을 추가 합니다



IoT Headless 의 경우 디스플레이 되
는 것은 없지만, 로그 또한 원하는 언
어로 남길 수 있습니다

A to Z of Tizen Project

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구조 of Tizen Project

key-value 쌍으로 지정 해 둔 값은 언제 어느 때고 meta data API 로 가져와서 사용할 수 있습니다

App 간 data share 를 가능하게 하는 부분입니다

집중해 주세요 여긴 좀 중요합니다

The screenshot shows the 'Tizen Manifest Editor' with the 'Advanced' tab selected. It features two main sections: 'Meta Data' and 'Data Control'. The 'Meta Data' section includes a table for adding user-defined key-value pairs. The 'Data Control' section includes a table for sharing service application data. A red arrow points from the text 'key-value 쌍으로 지정 해 둔 값은 언제 어느 때고 meta data API 로 가져와서 사용할 수 있습니다' to the 'Meta Data' section. Another red arrow points from the text 'App 간 data share 를 가능하게 하는 부분입니다' to the 'Data Control' section. A third red arrow points from the text '집중해 주세요 여긴 좀 중요합니다' to the 'Miscellaneous Options' section at the bottom.

| Key | Value |
|-----|-------|
| | |
| | |
| | |
| | |

| Provider ID | Type |
|-------------|------|
| | |
| | |
| | |
| | |

Miscellaneous Options

Manage task: false Auto restart: (None)

On boot: (None)

Table: Attribute combinations

| auto-restart | on-boot | After normal termination | On forced close | On Reboot | After package installation | After package update |
|--------------|---------|----------------------------|----------------------------|-------------------------------------|----------------------------|----------------------------|
| FALSE | FALSE | Not launched automatically | Not launched automatically | Not launched after reboot | Not launched | Not launched automatically |
| FALSE | TRUE | Not launched automatically | Not launched automatically | Launched automatically after reboot | Launched | Launched automatically |
| TRUE | FALSE | Launched automatically | Launched automatically | Not launched after reboot | Not launched | Launched automatically |
| TRUE | TRUE | Launched automatically | Launched automatically | Launched automatically after reboot | Launched | Launched automatically |

Tizen Project 외부 구조

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📌 Tizen Project 특성 – Advanced 탭

해당 App 을 통해 어떤 파일을 실행
시킬 수 있도록 할 것인가를 설정하
니다

예) 어떤 파일의 연결 프로그램에 해
당 App이 나오도록 할 것인가

어떤 기능을 Background 에서도 계속
동작하도록 할 것인지 설정해 줍니다

Application Control
You can export your application functionalities by defining an application control.

| Operation | Uri | Mime |
|-----------|-----|------|
| | | |
| | | |
| | | |
| | | |

Background Category
Background category types

| Category type |
|---------------|
| |
| |
| |
| |
| |

Trust Anchor
You can assign own SSL root for its HTTPS communication

Use System Certificates (None)

Media Data
You can add user defined key-value pairs to the application.

| Key | Value |
|-----|-------|
| | |

Data Control
You can share data of your service application.

| Provider ID | Type | Accessibility |
|-------------|------|---------------|
| | | |

Miscellaneous Options
Manage task:
On boot:

Application Control
You can export your application functionalities by defining an application control.

| Operation | Uri | Mime |
|-----------|-----|------|
| | | |

Background Category
Background category types

| Category type |
|---------------|
| |

Trust Anchor
You can assign own SSL root for its HTTPS communication

Use System Certificates (None)

Tizen Project 외부 구조

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🔗 Tizen Project 특성 – Source 탭

앞서 본 5개의 탭 내용 모두를 xml 코드로
확인 및 설정 할 수 있습니다만..



굳이..이걸로 하신다면..



```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<manifest xmlns="http://tizen.org/ns/packages" api-version="4.0" package="org.tizen.template_0822-5" version="1.0.0">
  <profile name="iot-headless"/>
  <service-application appid="org.tizen.template_0822-5" exec="template_0822-5" multiple="false" nodisplay="true" taskmanage="false" type="capp">
    <label>Tizen Template for 0822-5</label>
  </service-application>
</manifest>
```

Tizen Project 외부 구조

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🔗 Tizen Project 특성 설정하기

General Information

This section describes general information about this project

Application ID

Package

Miscellaneous Options

Manage task

false

Auto restart

(None)

On boot

true

template_0822-5 - iot-headless-4.0 [rcc template_0822-5]

- Binaries
- Includes
- inc
- res
- src
- Debug
- noBuild
- SA_Report
- LICENSE
- tizen-manifest.xml

Problems

Console

Log

1 error, 1 warning, 0 others

Description

Resource

Path

Location

Type

Errors (1 item)

'appid' does not contain 'package' value

tizen-manifes... /Service

line 4

Tizen Manife...

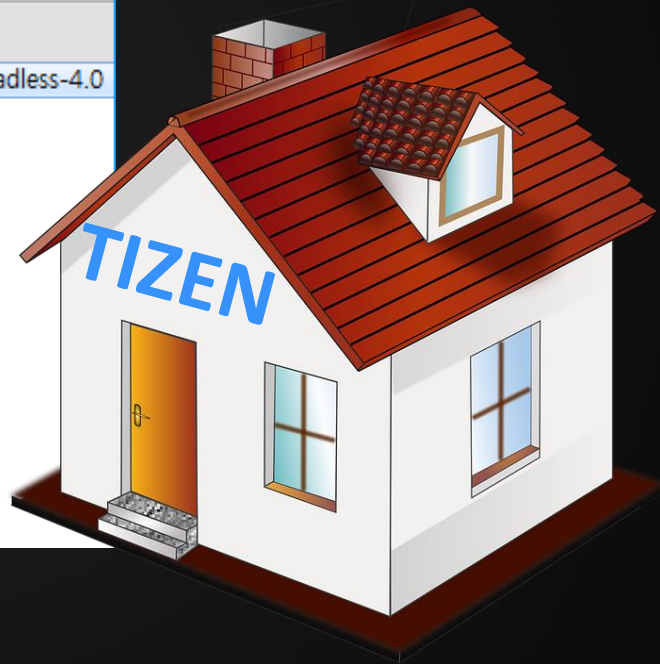
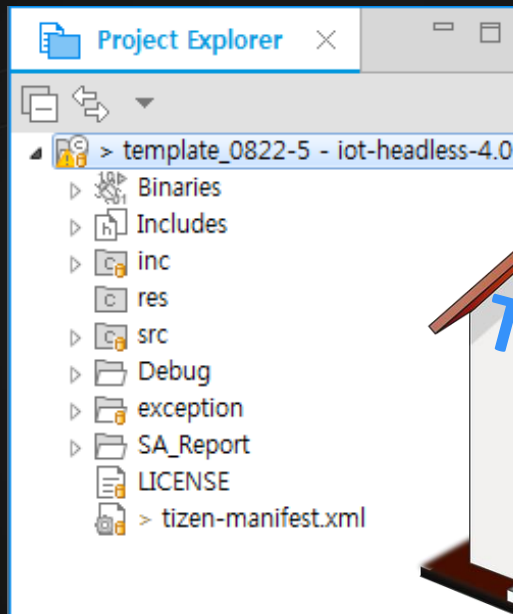
Tizen Project 외부 구조

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지금까지는 폴더 구조와 설정 파일에
대해서 알아 보았습니다
집의 외부 구조에 해당합니다

그러나 앞서 말씀 드렸듯이 우리의
목적은 인테리어!

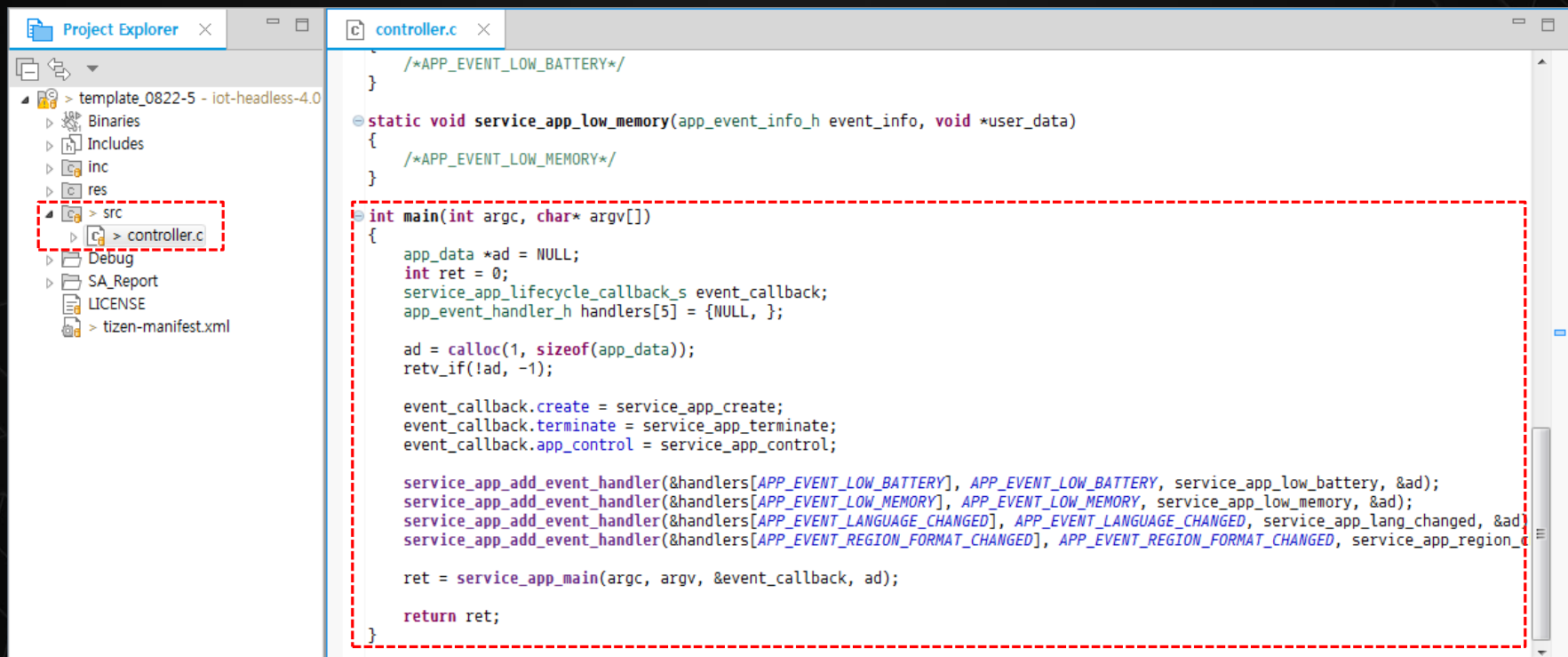
그럼 이제 안으로 들어가 볼까요?



Tizen Project 동작 방식

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Life Cycle of Tizen Project




Life Cycle of Tizen Project

Lifecycle callback

- App의 생애주기 단계마다
main loop 에 의해 자동으로
호출 됩니다

```
int main(int argc, char* argv[])
{
    app_data *ad = NULL;
    int ret = 0;
    service_app_lifecycle_callback_s event_callback;
    app_event_handler_n handlers[5] = {NULL, };

    ad = calloc(1, sizeof(app_data));
    retv if(!ad, -1);
}
```



```
/**
 * @brief The structure type containing the set of callback functions for handling application events.
 * @details It is one of the input parameters of the service_app_efl_main() function.
 * @since_tizen @if MOBILE 2.3 @elseif WEARABLE 2.3.1 @endif
 * @see service_app_main()
 * @see service_app_create_cb()
 * @see service_app_terminate_cb()
 * @see service_app_control_cb()
 */
typedef struct {
    service_app_create_cb create; /**< This callback function is called at the start of the application. */
    service_app_terminate_cb terminate; /**< This callback function is called once after the main loop of the application exits. */
    service_app_control_cb app_control; /**< This callback function is called when another application sends the launch request to the application. */
} service_app_lifecycle_callback_s;
```

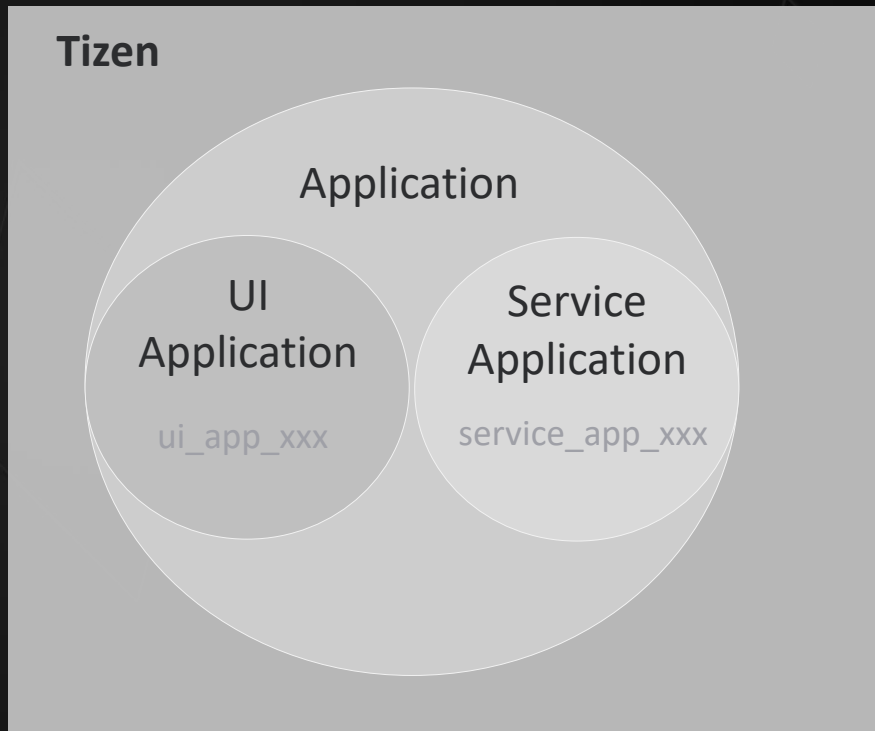
Tizen Project 동작 방식

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Life Cycle of Tizen Project

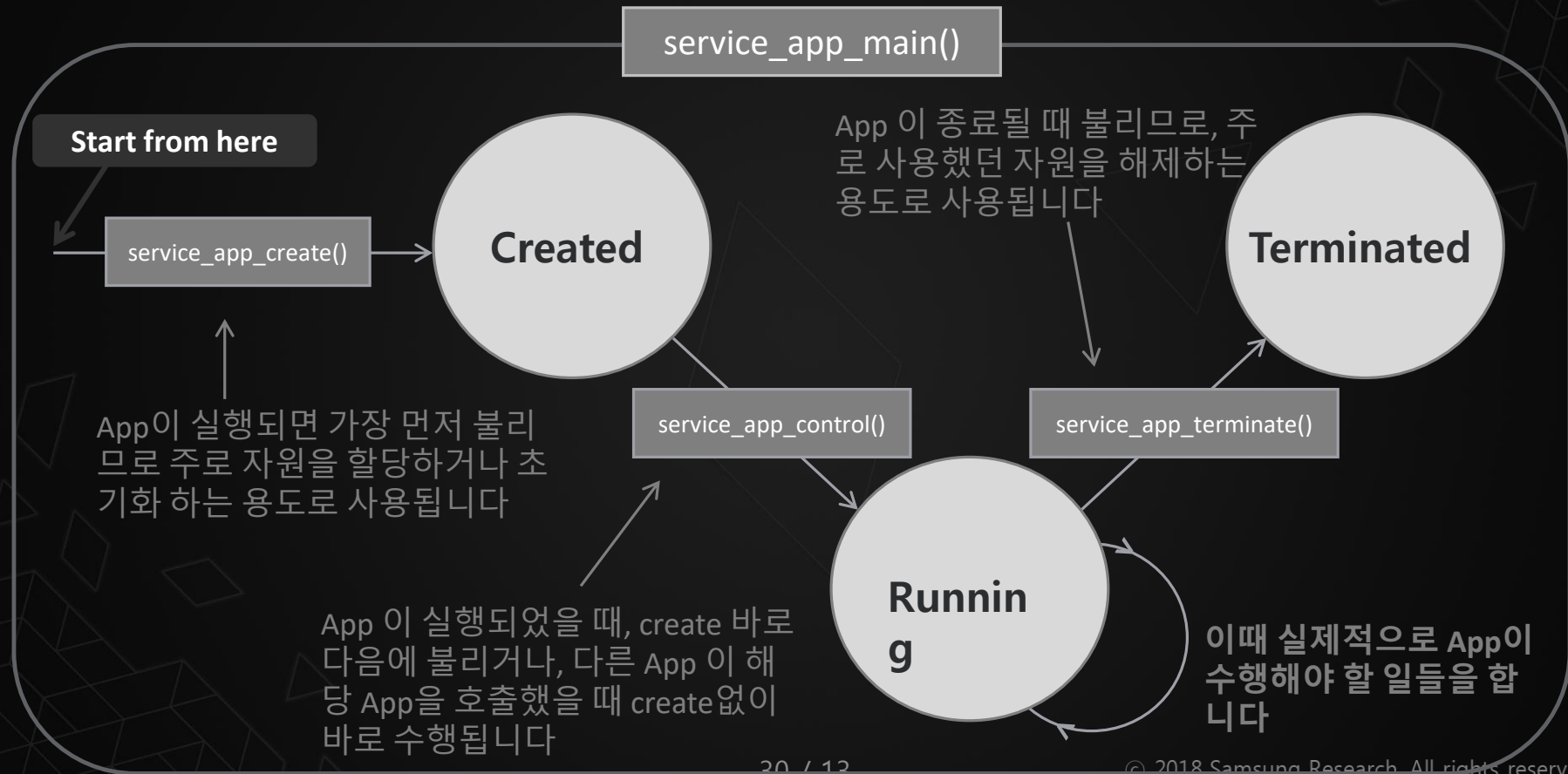
Tizen Application

- UI Application 은 화면에 무엇인가 그려지는 Application 입니다
- Service Application 은 무언가를 그리지는 않지만 항상 background 에서 돌아가고 있는 Application 입니다
- 그렇다면 IoT Headless 는??



Tizen Project 동작 방식

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Tizen Project 동작 방식

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Life Cycle of Tizen Project

Life Cycle 함수 호출 순서

- 호출되는 순서는 번호 순서와 같습니다
- 만약 service_app_create 의 return 이 false 라면??
- app_control_h 구조체는 어디에 쓸까요??
ctrl + click 해보세요~

```
static bool service_app_create(void *data) ①
{
    return true;
}

static void service_app_terminate(void *data) ③
{
}

static void service_app_control(app_control_h app_control, void *data) ②
{
}
```

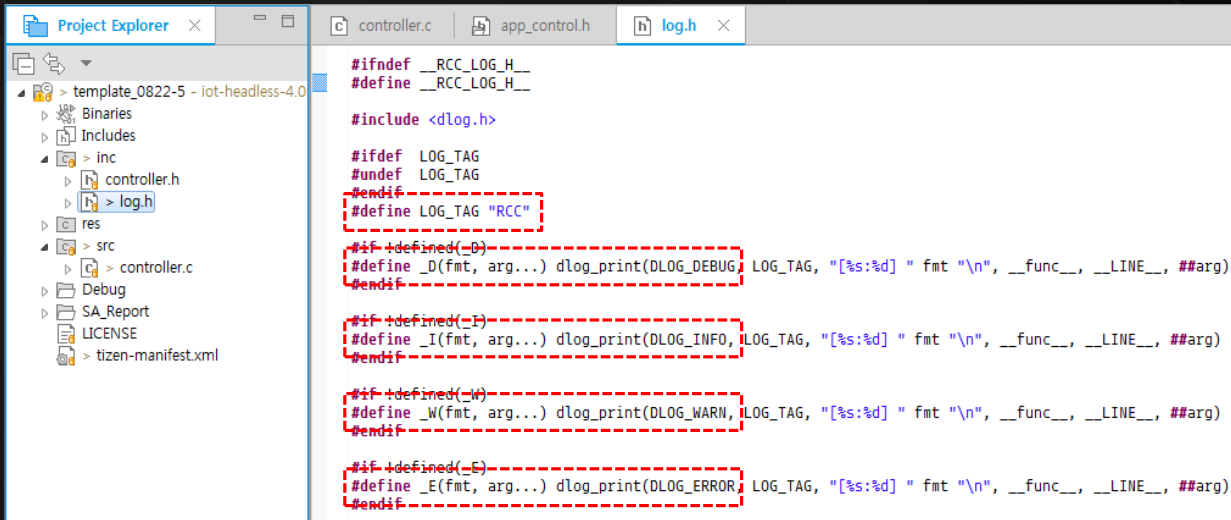

Tizen Project 동작 방식

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Life Cycle of Tizen Project

효과적인 로그 확인

- Log 를 보기 위해 printf ??
- 그러지 말고, inc/log.h 를 봅시다
- LOG_TAG 로 log 를 필터링 해서 볼 수 있습니다
- DLOG_DEBUG, DLOG_INFO, DLOG_WARN, DLOG_ERROR... 느낌 오시죠??



```
#ifndef __RCC_LOG_H__
#define __RCC_LOG_H__

#include <dlog.h>

#ifdef LOG_TAG
#undef LOG_TAG
#endif
#define LOG_TAG "RCC"

#ifdef __D__
#define _D(fmt, arg...) dlog_print(DLOG_DEBUG, LOG_TAG, "[%s:%d] " fmt "\n", __func__, __LINE__, ##arg)
#endif

#ifdef __I__
#define _I(fmt, arg...) dlog_print(DLOG_INFO, LOG_TAG, "[%s:%d] " fmt "\n", __func__, __LINE__, ##arg)
#endif

#ifdef __W__
#define _W(fmt, arg...) dlog_print(DLOG_WARN, LOG_TAG, "[%s:%d] " fmt "\n", __func__, __LINE__, ##arg)
#endif

#ifdef __E__
#define _E(fmt, arg...) dlog_print(DLOG_ERROR, LOG_TAG, "[%s:%d] " fmt "\n", __func__, __LINE__, ##arg)
#endif
```

Tizen Project 동작 방식

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Life Cycle of Tizen Project

Life Cycle 함수에 로그 넣기

- Create -> control -> terminate 순서를 확인하도록 로그를 넣습니다
- 그런데 이렇게만 하면 terminate 이 불릴까요??
- service_app_exit() 는 service_app.h 헤더파일에 있습니다

```
#include <stdlib.h>
#include <service_app.h>

#include "log.h"
#include "controller.h"

typedef struct app_data_s {
} app_data;

static bool service_app_create(void *data)
{
    _D("First");
    return true;
}

static void service_app_terminate(void *data)
{
    _D("Final");
}

static void service_app_control(app_control_h app_control, void *data)
{
    _D("Middle");
}
```

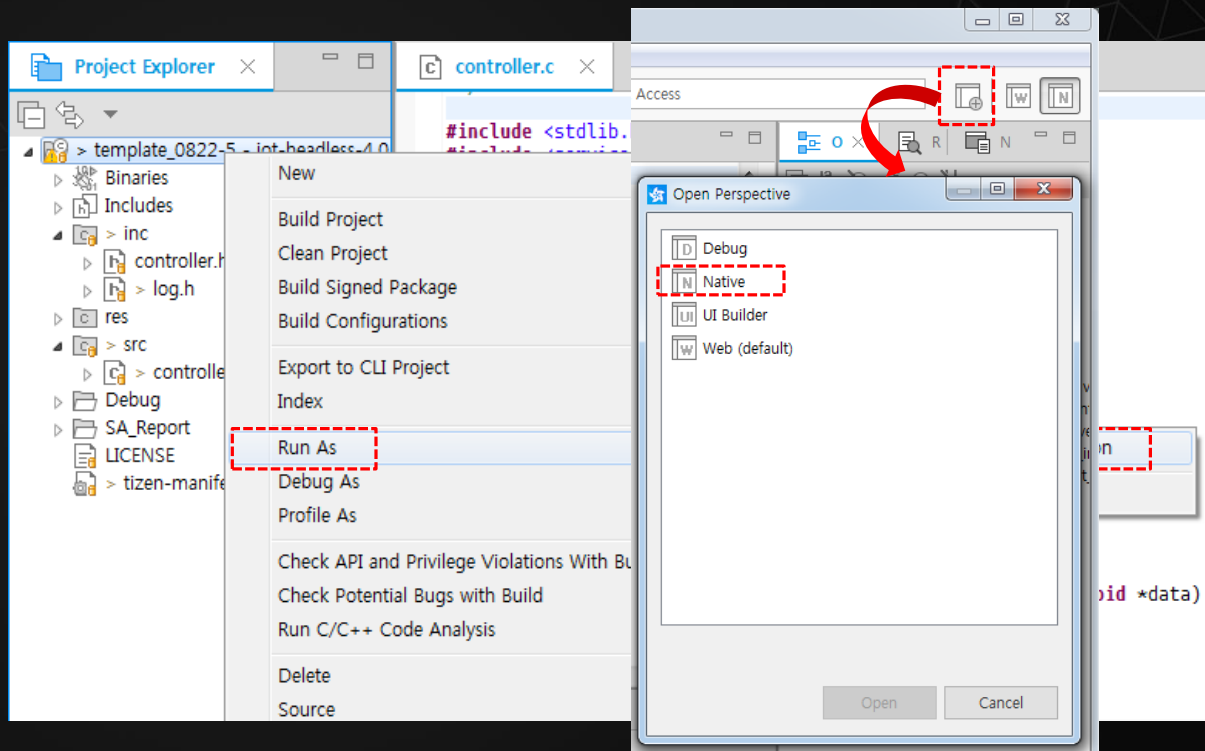
Tizen Project 동작 방식

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🔸 Tizen Project 실행하기

Run As Tizen Project

- 🔸 Project 이름 우 클릭 -> Run As -> Tizen Native Application
- 🔸 위 항목이 없다면 우측 상단 Open Perspective 에서 Native 선택해 주세요



Tizen Project 동작 방식

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🔸 Tizen Project 실행하기

Run As Tize Project

🔸 Run As 는

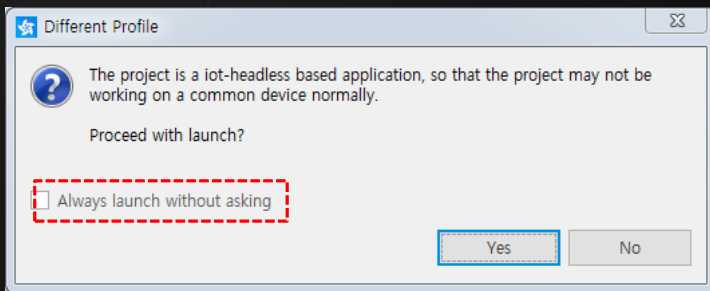
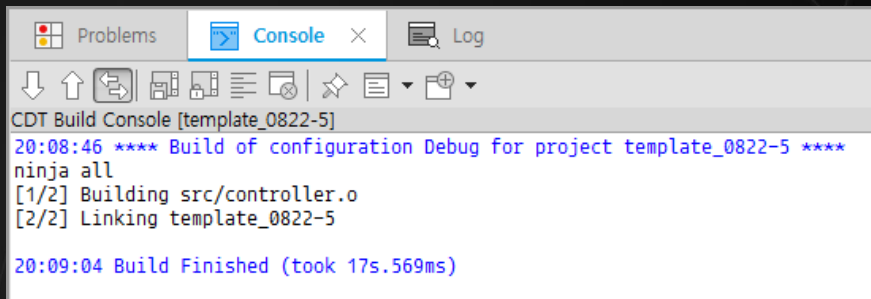
build

-> packaging

-> install

-> launch

를 순차적으로 수행합니다



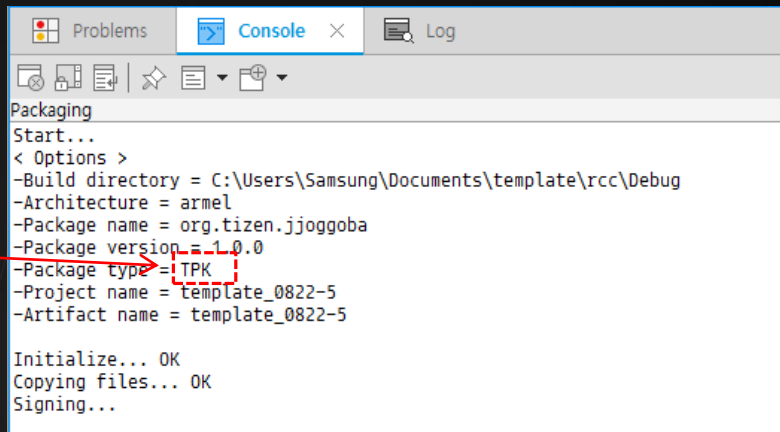
Tizen Project 동작 방식

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🔗 Tizen Project 실행하기

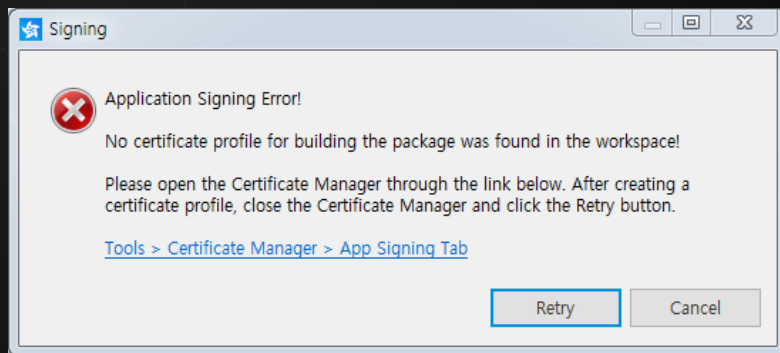
Certificate Profile

- 🔗 Packaging 을 통해 tpk(same as apk..) 파일이 생성됩니다
- 🔗 Tizen Project 는 packaging 단계에서 signing 을 위한 certificate 이 필요합니다



```
Problems Console Log
Packaging
Start...
< Options >
-Build directory = C:\Users\Samsung\Documents\template\rcc\Debug
-Architecture = armel
-Package name = org.tizen.jjoggoba
-Package version = 1.0.0
-Package type = TPK
-Project name = template_0822-5
-Artifact name = template_0822-5

Initialize... OK
Copying files... OK
Signing...
```



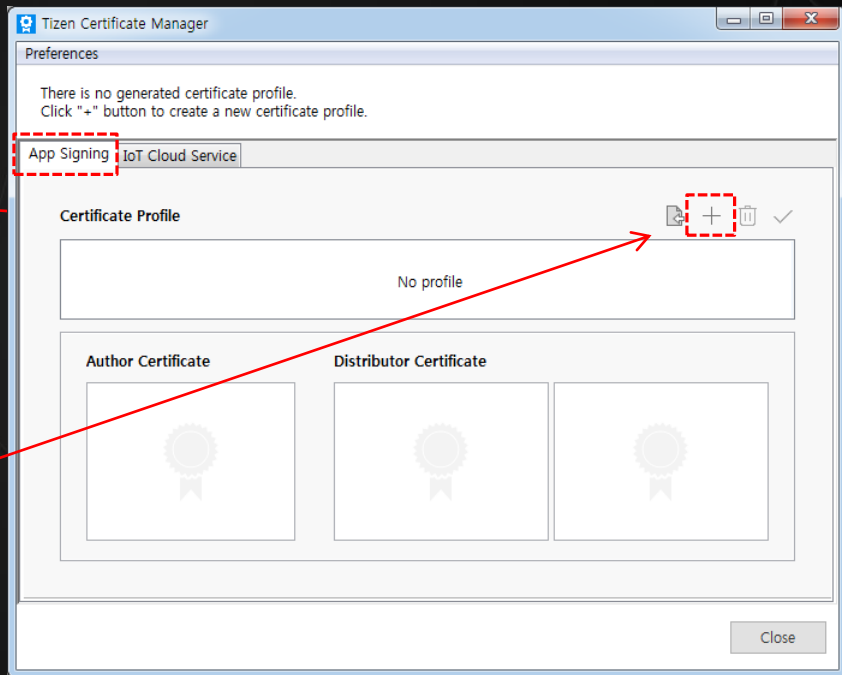
Tizen Project 동작 방식

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🔸 Tizen Project 실행하기

Certificate Profile

- 🔸 기존에 만들어 둔 certificate profile 이 있다면 해당 파일을 선택해 주세요
- 🔸 IoT Cloud Service 를 위한 Certificate 은 별도로 만들어 줘야 합니다
- 🔸 해당 Project로 생성 될 Application 에 대한 Certificate 을 만들어 줍니다



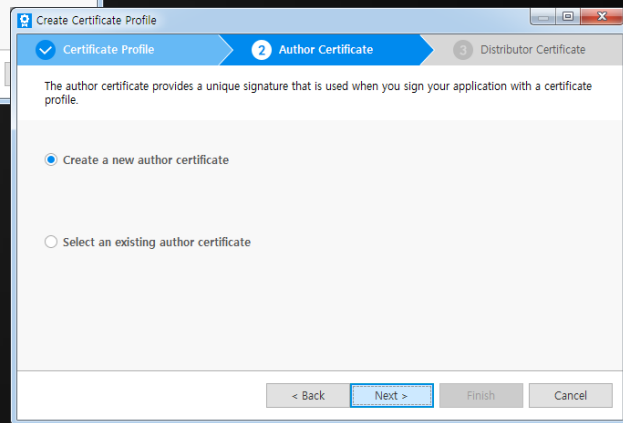
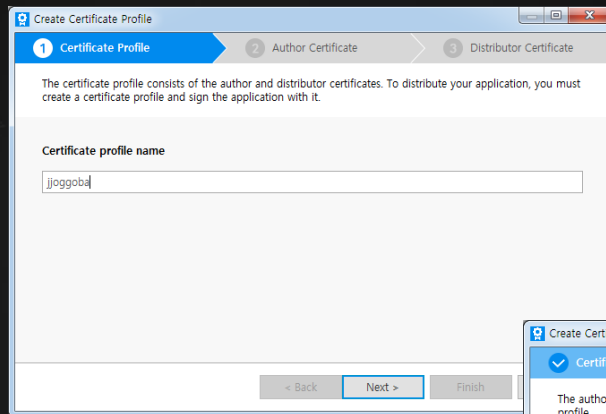
Tizen Project 동작 방식

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📌 Tizen Project 실행하기

Certificate Profile

- 📌 Certificate profile 의 이름을 적어 줍니다
- 📌 Author certificate 과 Distributor certificate 두 certificate 이 하나의 profile 을 구성합니다



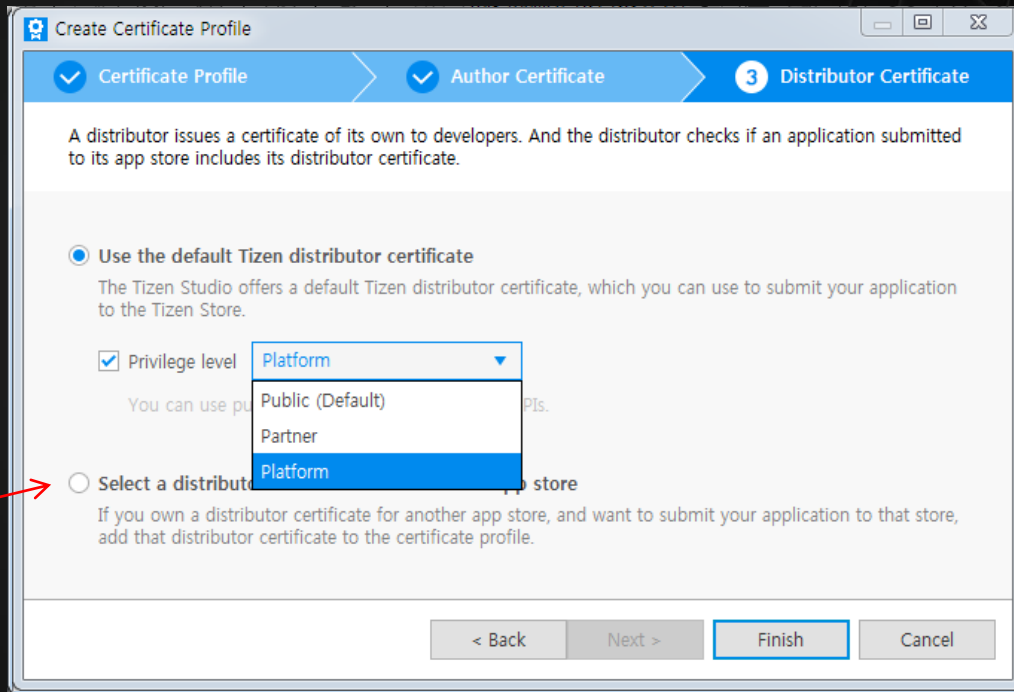
Tizen Project 동작 방식

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📌 Tizen Project 실행하기

Certificate Profile

- 📌 *는 모두 mandatory 입니다....
- 📌 Distributor certificate 에서는 Privilege level 이 중요합니다
- 📌 API 사용에 제한이 없도록 Platform level 을 선택해줍니다
- 📌 다른 App Store 를 위한 certificate 을 선택할 수도 있습니다



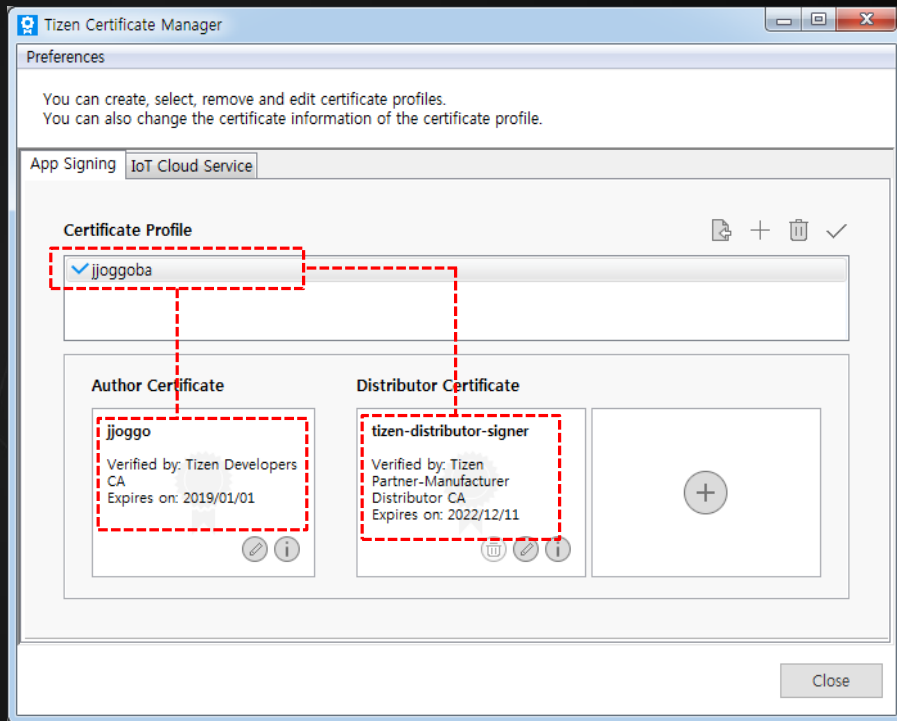
Tizen Project 동작 방식

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🔸 Tizen Project 실행하기

Certificate Profile

- 🔸 Certificate profile 이 만들어 졌습니다
- 🔸 Distributor certificate 은 사실 테스트 용입니다
- 🔸 Store 에 올라갈 때는 서버에 있는 실제 certificate 으로 패 키징 됩니다



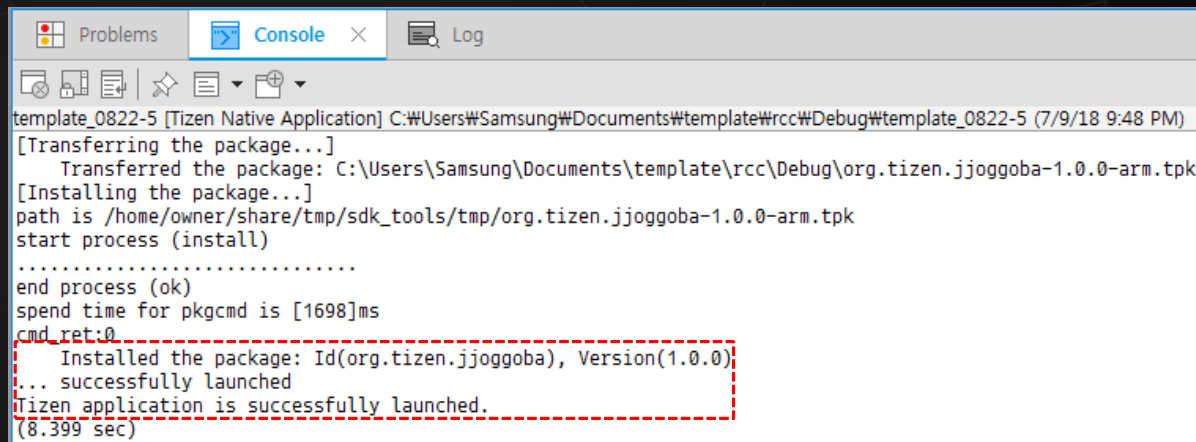
Tizen Project 동작 방식

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🔸 Tizen Project 실행하기

Install & Launch

- 🔸 이제 다시 Run As 해볼까요?
- 🔸 오른쪽 로그를 보셨다면
install 과 launch 모두 성공 !!
- 🔸 이제 우리의 처음 목표였던
우리가 남긴 로그를 확인할
수 있습니다



```
template_0822-5 [Tizen Native Application] C:\Users\Samsung\Documents\template\rcc\Debug\template_0822-5 (7/9/18 9:48 PM)
[Transferring the package...]
  Transferred the package: C:\Users\Samsung\Documents\template\rcc\Debug\org.tizen.jjoggoba-1.0.0-arm.tpk
[Installing the package...]
path is /home/owner/share/tmp/sdk_tools/tmp/org.tizen.jjoggoba-1.0.0-arm.tpk
start process (install)
.....
end process (ok)
spend time for pkgcmd is [1698]ms
cmd ret:0
  Installed the package: Id(org.tizen.jjoggoba), Version(1.0.0)
... successfully launched
Tizen application is successfully launched.
(8.399 sec)
```

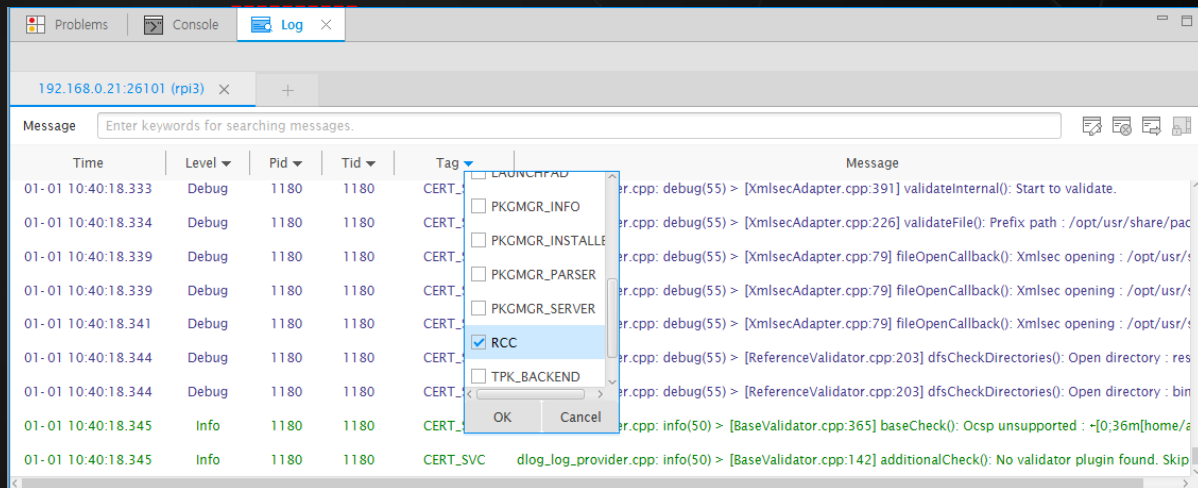
Tizen Project 동작 방식

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🔗 Tizen Project 실행하기

Log 확인하기

- 🔗 Console 옆 Log 탭으로 갑니다
- 🔗 혹시 log.h 파일의 LOG_TAG 기억하시나요??
- 🔗 보고 싶은 것만 보세요 ^^



Tizen Project 동작 방식

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🔗 Tizen Project 실행하기

Log 확인하기

🔗 계획대로 인가요??

🔗 왜 로그가 두 번씩 찍혔을까요??

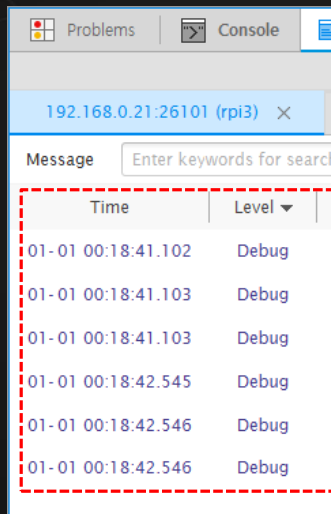


Table: Attribute combinations

| auto-restart | on-boot | After normal termination | On forced close | On Reboot | After package installation | After package update |
|--------------|---------|----------------------------|----------------------------|-------------------------------------|----------------------------|----------------------------|
| FALSE | FALSE | Not launched automatically | Not launched automatically | Not launched after reboot | Not launched | Not launched automatically |
| FALSE | TRUE | Not launched automatically | Not launched automatically | Launched automatically after reboot | Launched | Launched automatically |
| TRUE | FALSE | Launched automatically | Launched automatically | Not launched after reboot | Not launched | Launched automatically |
| TRUE | TRUE | Launched automatically | Launched automatically | Launched automatically after reboot | Launched | Launched automatically |



Tizen Project 유용한 개발 Tip

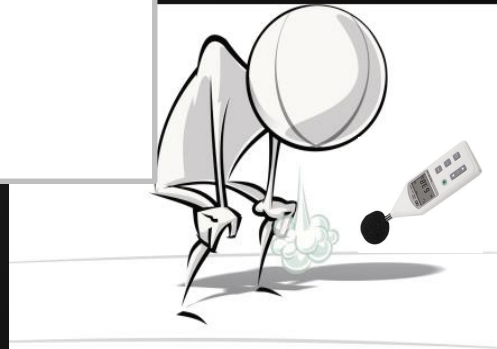
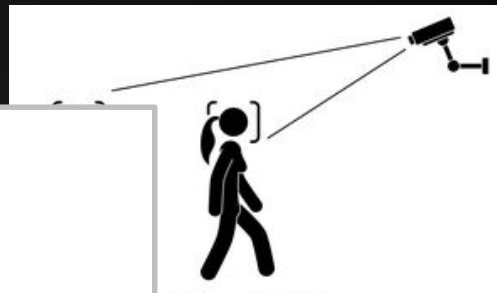
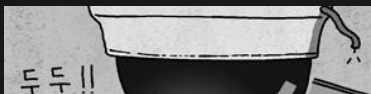
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“입 벌려, **Tip** 들어간다”

Tizen Project 유용한 개발 Tip

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정기적인, 주기적인, 지속적인, 반복적인,

Tizen Project 유용한 개발 Tip

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Timer 를 알아보자

Ecore_Timer * **ecore_timer_add** (double in, **Ecore_Task_Cb** func, const void *data)

Creates a timer to call the given function in the given period of time.

Ecore_Timer * **ecore_timer_loop_add** (double in, **Ecore_Task_Cb** func, const void *data)

Creates a timer to call the given function in the given period of time.

void * **ecore_timer_del** (**Ecore_Timer** *timer)

Deletes the specified timer from the timer list.

void **ecore_timer_interval_set** (**Ecore_Timer** *timer, double in)

Change the interval the timer ticks off.

double **ecore_timer_interval_get** (**Ecore_Timer** *timer)

Get the interval the timer ticks on.

void **ecore_timer_freeze** (**Ecore_Timer** *timer)

Pauses a running timer.

void **ecore_timer_thaw** (**Ecore_Timer** *timer)

Resumes a frozen (paused) timer.

void **ecore_timer_delay** (**Ecore_Timer** *timer, double add)

Add some delay for the next occurrence of a timer.

void **ecore_timer_reset** (**Ecore_Timer** *timer)

Reset a timer to its full interval. This effectively makes the timer start ticking off from zero now.

double **ecore_timer_pending_get** (**Ecore_Timer** *timer)

Get the pending time regarding a timer.

double **ecore_timer_precision_get** (void)

Retrieves the current precision used by timer infrastructure.

void **ecore_timer_precision_set** (double precision)

Sets the precision to be used by timer infrastructure.

char * **ecore_timer_dump** (void)

Dump the all timers.

Tizen Project 유용한 개발 Tip

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🔲 Timer를 알아보자

```
Ecore_Timer* ecore_timer_add(double in, Ecore_Task_Cb func, const void *data)
```

```
Ecore_Timer *timer = NULL;
```

```
timer = ecore_timer_add(5.0, __my_func, NULL);
```

넘겨 받은 timer 로 주기(얼마만에 한번), 멈추기, 늦추기 등등의 다른 API 들을 사용할 수 있게 됩니다.

Tizen Project 유용한 개발 Tip

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🔹 Timer를 알아보자

```
void * ecore_timer_del(Ecore_Timer *timer)
```

**** 반드시 유의해 주세요 ****

func 안에서 ECORE_CALLBACK_CANCEL 시 Timer 가 더 이상 func 를 호출하지 않게 할 뿐만 아니라, Timer 인스턴스를 제거해줍니다.

이 경우 제거 된 timer에 NULL을 넣어 ecore_timer_del 로 중복 제거 하지 않도록 조심 해주세요

```
Ecore_Timer *timer;  
Eina_Bool __my_func(void *data)  
{  
    timer = NULL;  
    return ECORE_CALLBACK_CANCEL;  
}
```

```
void main()  
{  
    if(timer)  
        ecore_timer_del(timer);  
}
```

Tizen Project 유용한 개발 Tip

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◈ Timer는 언제 불릴까요?

Timer 는
정교하고 엄격한 시간을 보장하지 않는다 !!

CPU 및 프로세스 에 따른 지연 호출 발생
아시겠지만, Tizen 만 그런 것이 아닙니다



Tizen Project 유용한 개발 Tip

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🔹 Timer는 언제 불릴까요?



Main Loop

중요한 건 뭐다??!!

main loop 안에서 너무 많은 일들을 하게 하면 안 된다!!

즉, timer 의 시간 정확도는 depend on you

명심하자 ! 모든 건 내 탓일지도?!

Tizen Project 유용한 개발 Tip

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⬠ Timer를 알아보자

실제로 timer를 돌려봅시다

- ⬠ Timer 변수를 선언합니다
- ⬠ service_app_control 함수 안에서 Timer 를 추가해줘요
- ⬠ Interval 의 단위는 초 입니다!

```
#include "resource.h"
#include "controller.h"

typedef struct app_data_s {
    } app_data;

Ecore_Timer *timer;
```

```
static void service_app_control(app_control_h app_control, void *data)
{
    // Todo: add your code here.

    timer = ecore_timer_add(3.0, __my_timer_func, NULL);
}
```

Tizen Project 유용한 개발 Tip

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⬢ Timer를 알아보자

실제로 timer를 돌려봅시다

- ⬢ Timer 변수를 선언합니다
- ⬢ service_app_control 함수 안에서 Timer 를 추가해줘요
- ⬢ Interval 의 단위는 초 입니다!
- ⬢ 여기서 중요한 건 두 개 !!

```
#include "resource.h"
#include "controller.h"

typedef struct app_data_s {
    } app_data;

Ecore_Timer *timer;
```

```
static void service_app_control(app_control_h app_control, void *data)
{
    // Todo: add your code here.
    timer = ecore_timer_add(3.0, __my_timer_func, NULL);
}
```

Tizen Project 유용한 개발 Tip

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⬠ Timer를 알아보자

실제로 timer를 돌려봅시다

- ⬠ 계속 계속 호출되도록 합니다
- ⬠ App 이 종료 될 때는 삭제해 줍니다
- ⬠ Ecore_Timer 는 Ecore.h 에 있어요 !!

```
⊖ Eina_Bool __my_timer_func(void *data)
{
    _D("My Timer is called !!");

    return ECORE_CALLBACK_RENEW;
}
```

```
⊖ static void service_app_terminate(void *data)
{
    app_data *ad = (app_data *)data;

    ecore_timer_del(timer);

    free(ad);
}
```

```
#include <tizen.h>
#include <stdlib.h>
#include <service_app.h>
#include <Ecore.h>
```

Tizen Project 유용한 개발 Tip

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🔍 Timer를 알아보자

192.168.0.21:26101 (rpi3) ×

+

Message

Enter keywords for searching messages.

| Time | Level ▼ | Pid ▼ | Tid ▼ | Tag ▼ | Message |
|--------------------|---------|-------|-------|-------|--|
| 01-01 00:31:28.334 | Debug | 1194 | 1194 | RCC | [__my_timer_func:38] My timer is called !! |
| 01-01 00:31:29.334 | Debug | 1194 | 1194 | RCC | [__my_timer_func:38] My Timer is called !! |
| 01-01 00:31:32.334 | Debug | 1194 | 1194 | RCC | [__my_timer_func:38] My Timer is called !! |
| 01-01 00:31:35.334 | Debug | 1194 | 1194 | RCC | [__my_timer_func:38] My Timer is called !! |
| 01-01 00:31:38.334 | Debug | 1194 | 1194 | RCC | [__my_timer_func:38] My Timer is called !! |

Tizen Project 유용한 개발 Tip

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📌 IoT 의 핵심은 바로 이곳입니다

```
Eina_Bool __my_timer_func(void *data)
{
    _D("My Timer is called !!");
    바로 여기 ! Here !
    return ECORE_CALLBACK_RENEW;
}
```

확인 하고

가져오고

보내고

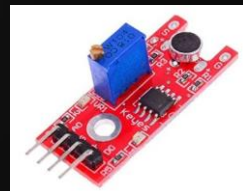
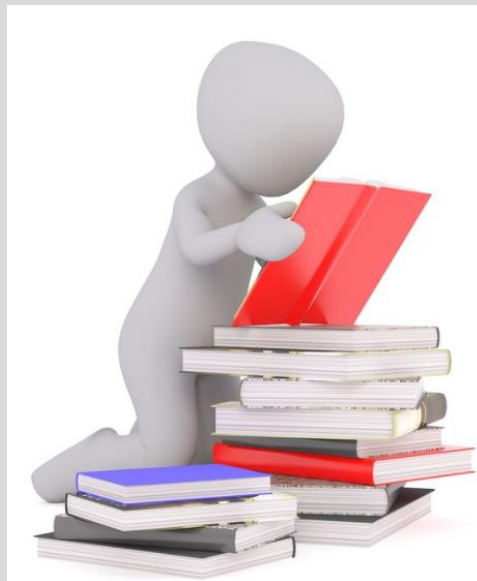
Tizen Project 유용한 개발 Tip

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IoT의 어...

다양성의 역습 !! $\pi \pi$

Protocol 이 너무 많아요...



확인 하고

가져오고

Tizen Project 유용한 개발 Tip

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IoT 의 어려운 점..

보내고

어떤 형태??
어떻게??



Tizen Project 유용한 개발 Tip

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◈ 강력한 Reference !!

RCC master 브랜치

- ◈ 다양한 프로토콜에 대한 대응
- ◈ 다양한 센서들의 HW 스펙 충족
- ◈ Cloud 와의 전송 데이터 포맷 파악



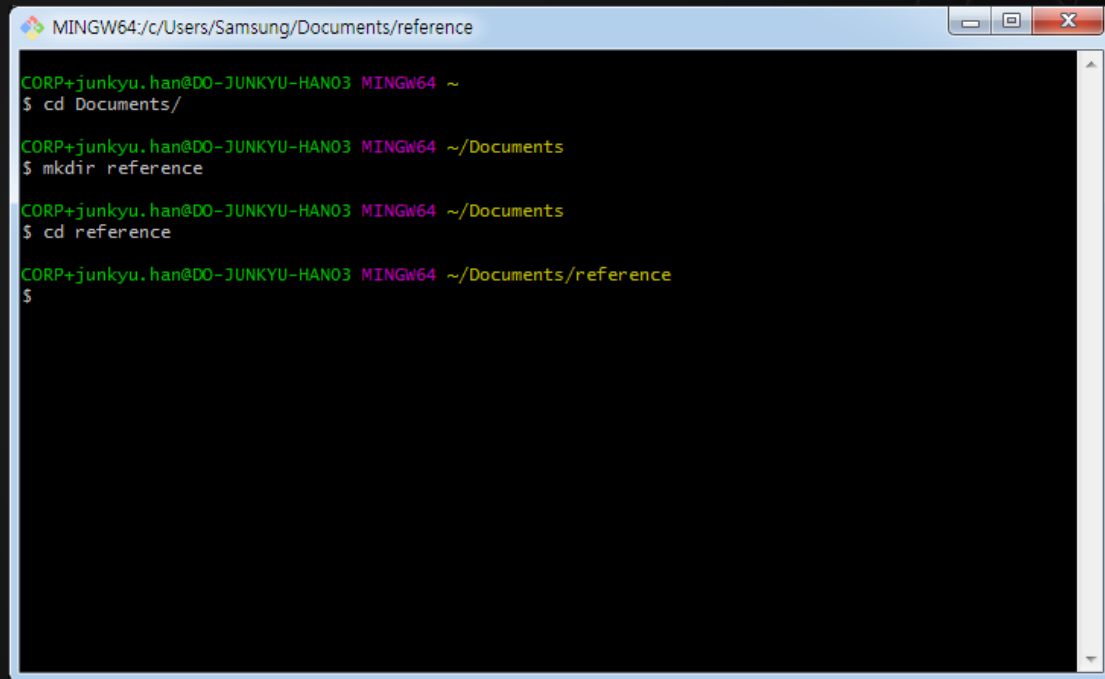
Tizen Project 유용한 개발 Tip

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📌 강력한 Reference !!

Git 으로부터 가져오기

- 📌 Git bash
- 📌 Tizen Project 를 가져올 폴더로 이동해줍니다
- 📌 기존의 rcc 프로젝트가 있으면 이름이 같아서 좋지 않아요
- 📌 다른 폴더를 하나 만들어 줍니다
- 📌 Clone 받을 프로젝트 주소 확인하러 가 볼까요?



```
MINGW64:/c/Users/Samsung/Documents/reference
CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~
$ cd Documents/
CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents
$ mkdir reference
CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents
$ cd reference
CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/reference
$
```

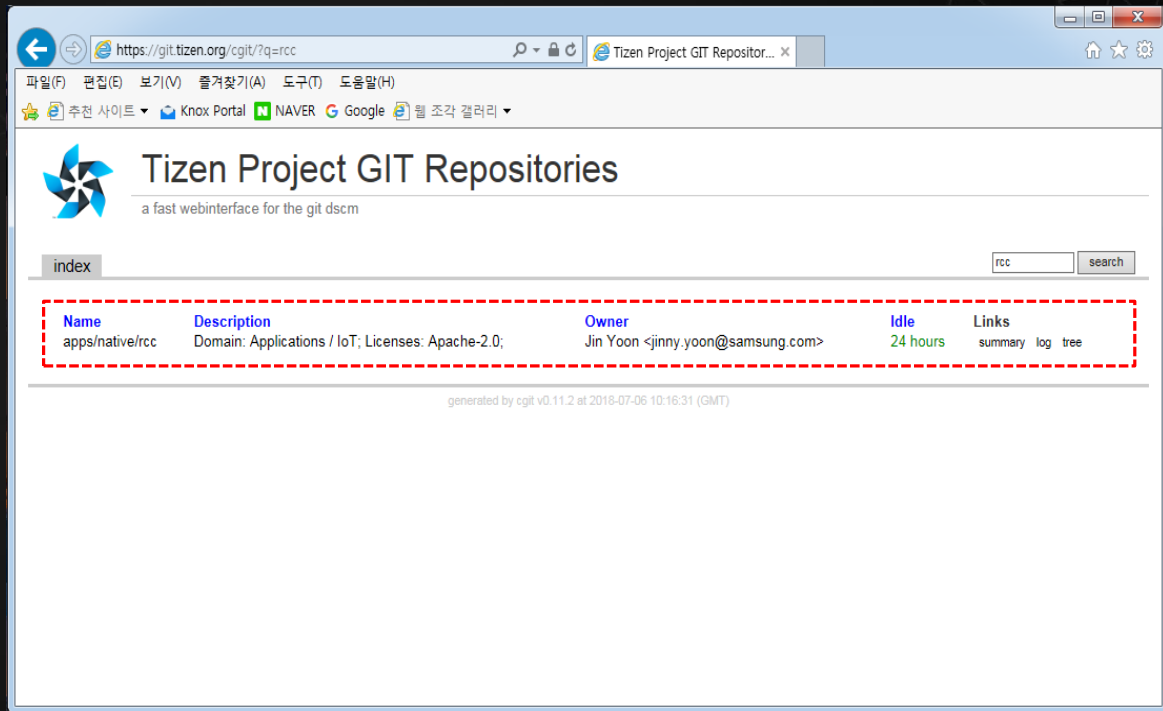
Tizen Project 유용한 개발 Tip

SAMSUNG Research

📌 강력한 Reference !!

Git 으로부터 가져오기

- 📌 <https://git.tizen.org>
- 📌 모든 profile 의 Tizen Project 들이 보입니다
- 📌 스마트하게 search 를 사용해요
- 📌 'rcc' 를 찾아줍니다
- 📌 apps/native/rcc 라는 아이가 보여요
- 📌 문제가 있으면 Owner에게....



Tizen Project 유용한 개발 Tip

SAMSUNG Research

강력한 Reference !!

Git 으로부터 가져오기

- 전체 branch 를 가지고 올 겁니다
- Clone 에서는 https 를 사용할 게요

The screenshot shows the Git repository page for `apps/native/rcc` on the Tizen Project. The page includes a navigation bar with tabs for `summary`, `refs`, `log`, `tree`, `commit`, and `diff`. The `summary` tab is selected. The page displays the following information:

- Branches:** A list of branches including `master`, `new_project_sample`, `template`, `template_0822-5`, and `template_0822-7`. The `template_0822-5` and `template_0822-7` branches are highlighted with a red dashed box.
- Commit messages:** A list of commit messages including "Change App name", "Initial empty repository", "Make Template for Seoul IoT", "Change name", and "Change App name".
- Commit details:** A table showing commit details for the `HEAD` commit, including the commit message, author, age, files, and lines. The commit message is "Make exception folder for resources like camera". The author is "junkyun han". The age is "11 days". The files are "2" and the lines are "-3/+3".
- Clone:** A section at the bottom showing the clone command: `https://git.tizen.org/cgit/apps/native/rcc` and `git://git.tizen.org/apps/native/rcc`. This section is also highlighted with a red dashed box.

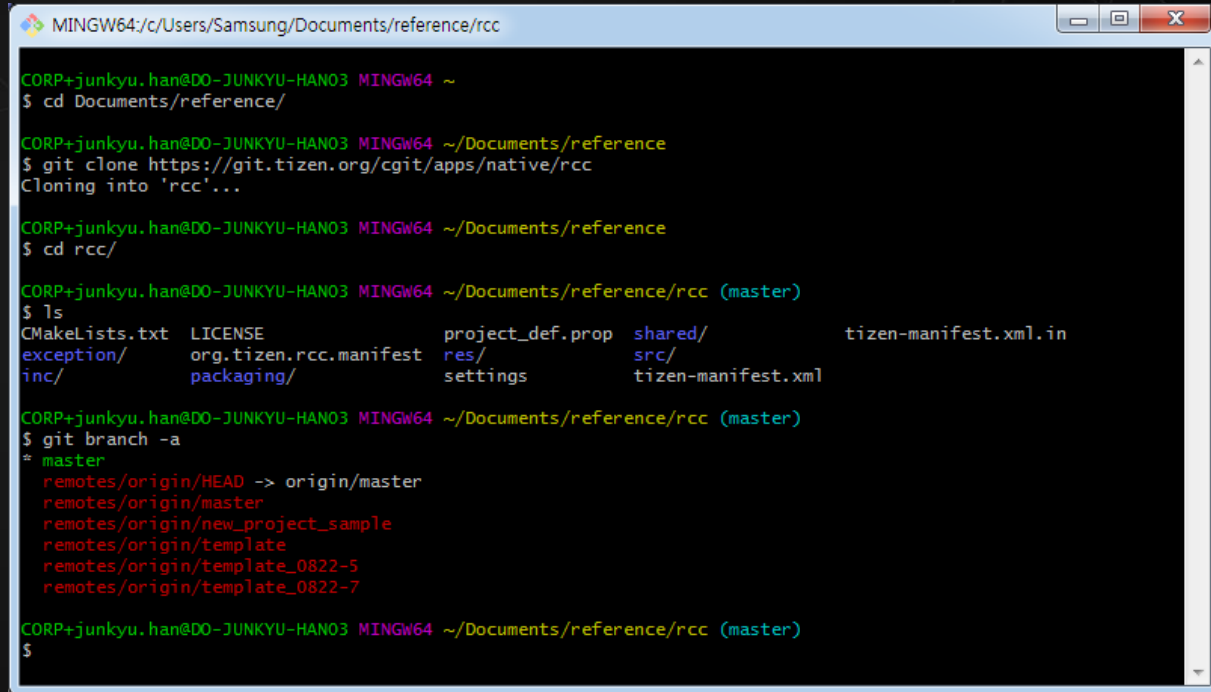
Tizen Project 유용한 개발 Tip

SAMSUNG Research

◈ 강력한 Reference !!

Git 으로부터 가져오기

- ◈ git clone
<https://git.tizen.org/cgit/apps/native/rcc>
- ◈ 현재 폴더에 rcc/ 폴더가 생성되었음을 확인합니다
- ◈ rcc 프로젝트로 이동해 볼게요
- ◈ git branch -a 를 통해 모든 branch 를 볼 수 있습니다



```
MINGW64/c/Users/Samsung/Documents/reference/rcc

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~
$ cd Documents/reference/

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/reference
$ git clone https://git.tizen.org/cgit/apps/native/rcc
Cloning into 'rcc'...

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/reference
$ cd rcc/

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/reference/rcc (master)
$ ls
CMakeLists.txt  LICENSE          project_def.prop  shared/          tizen-manifest.xml.in
exception/      org.tizen.rcc.manifest  res/              src/
inc/            packaging/        settings          tizen-manifest.xml

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/reference/rcc (master)
$ git branch -a
* master
remotes/origin/HEAD -> origin/master
remotes/origin/master
remotes/origin/new_project_sample
remotes/origin/template
remotes/origin/template_0822-5
remotes/origin/template_0822-7

CORP+junkyu.han@DO-JUNKYU-HAN03 MINGW64 ~/Documents/reference/rcc (master)
$
```

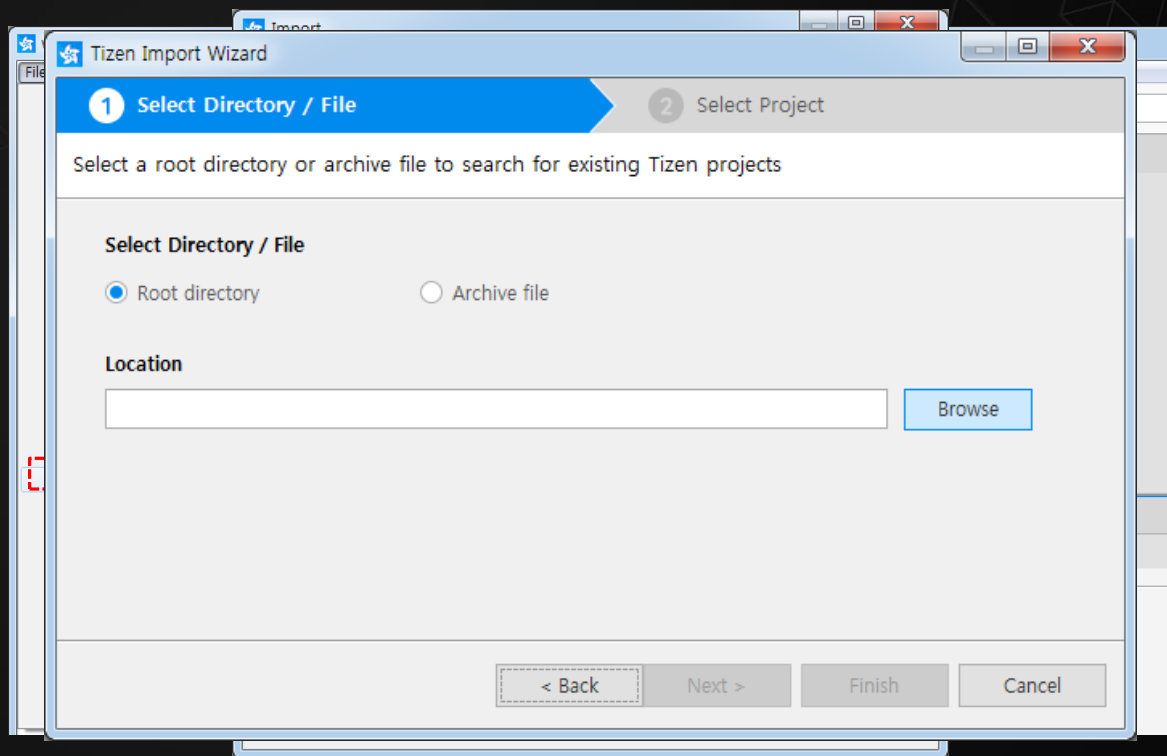
Tizen Project 유용한 개발 Tip

SAMSUNG Research

❖ 강력한 Reference !!

rcc 프로젝트 가져오기

- ❖ File -> Import
- ❖ Tizen -> Tizen Project
- ❖ Root directory -> Browse



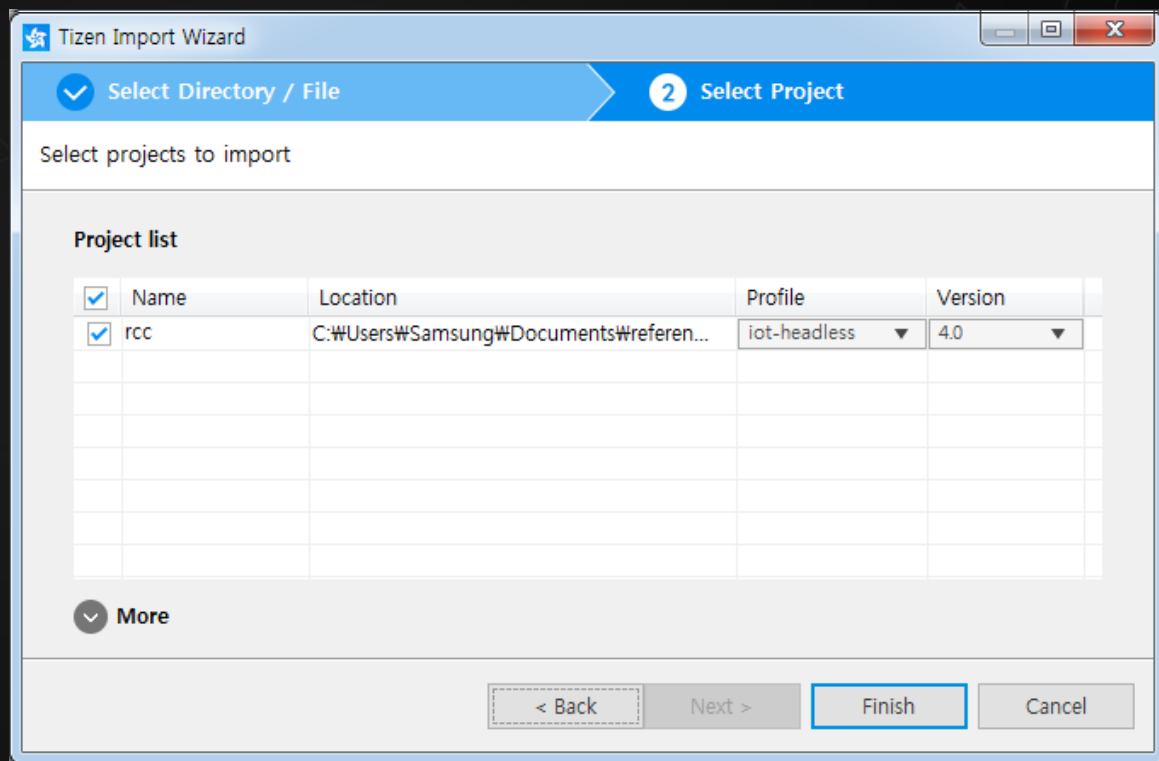
Tizen Project 유용한 개발 Tip

SAMSUNG Research

◈ 강력한 Reference !!

rcc 프로젝트 가져오기

- ◈ rcc 프로젝트를 저장해 둔 위치로 가서 rcc 폴더를 선택합니다
- ◈ 위치를 다시 한번 확인하고 Next 를 눌러주세요
- ◈ 해당 프로젝트가 다양한 profile 을 지원한다면 원하는 profile 을 선택할 수 있습니다



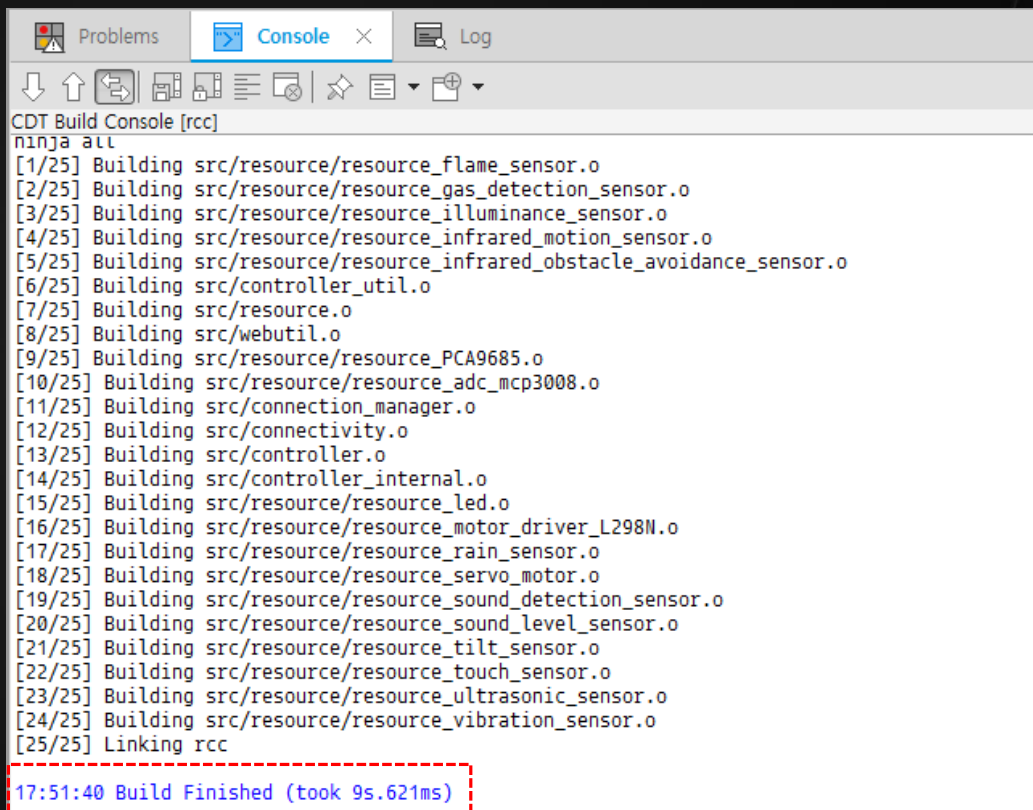
Tizen Project 유용한 개발 Tip

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◈ 강력한 Reference !!

빌드로 유효성 확인

- ◈ 프로젝트 이름 우 클릭 -> Build Project
- ◈ 하단 Console 창에서 빌드 프로세스 로그 확인 가능합니다
- ◈ FAILED 메시지 없이 Build Finished 가 보이면 해당 프로젝트가 성공적으로 빌드 된 것입니다



```
CDT Build Console [rcc]
ninja all
[1/25] Building src/resource/resource_flame_sensor.o
[2/25] Building src/resource/resource_gas_detection_sensor.o
[3/25] Building src/resource/resource_illuminance_sensor.o
[4/25] Building src/resource/resource_infrared_motion_sensor.o
[5/25] Building src/resource/resource_infrared_obstacle_avoidance_sensor.o
[6/25] Building src/controller_util.o
[7/25] Building src/resource.o
[8/25] Building src/webutil.o
[9/25] Building src/resource/resource_PCA9685.o
[10/25] Building src/resource/resource_adc_mcp3008.o
[11/25] Building src/connection_manager.o
[12/25] Building src/connectivity.o
[13/25] Building src/controller.o
[14/25] Building src/controller_internal.o
[15/25] Building src/resource/resource_led.o
[16/25] Building src/resource/resource_motor_driver_L298N.o
[17/25] Building src/resource/resource_rain_sensor.o
[18/25] Building src/resource/resource_servo_motor.o
[19/25] Building src/resource/resource_sound_detection_sensor.o
[20/25] Building src/resource/resource_sound_level_sensor.o
[21/25] Building src/resource/resource_tilt_sensor.o
[22/25] Building src/resource/resource_touch_sensor.o
[23/25] Building src/resource/resource_ultrasonic_sensor.o
[24/25] Building src/resource/resource_vibration_sensor.o
[25/25] Linking rcc
17:51:40 Build Finished (took 9s.621ms)
```

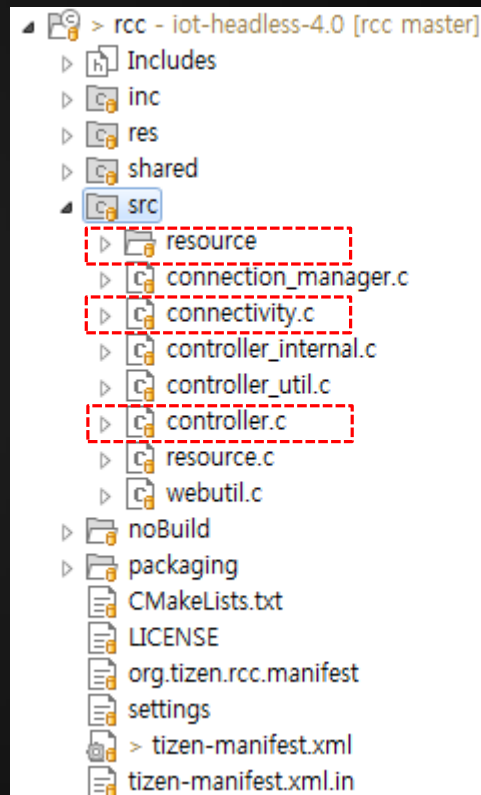
Tizen Project 유용한 개발 Tip

SAMSUNG Research

◈ 강력한 Reference !!

src 폴더에 집중해 주세요

- ◈ 앞서 말씀 드렸던 src, inc, res, tizen-manifest.xml 외에는 local build 를 위한 것들입니다. 무시해 주세요.
- ◈ src 에서도 3개만 봐주세요
resource/
connectivity.c
controller.c



A to Z of Tizen Project

SAMSUNG Research

각 종 센서나 LED 와 같이 주변 환경에
대한 정보를 얻거나 그에 반응할 수 있
는 모든 것들....



resource/

로컬 네트워크나 cloud 서버에 데
이터를 보내는 것과 관련 된 코드



connectivity.c



controller.c

Resource 들을 connectivity 를 사용하여 연결하기

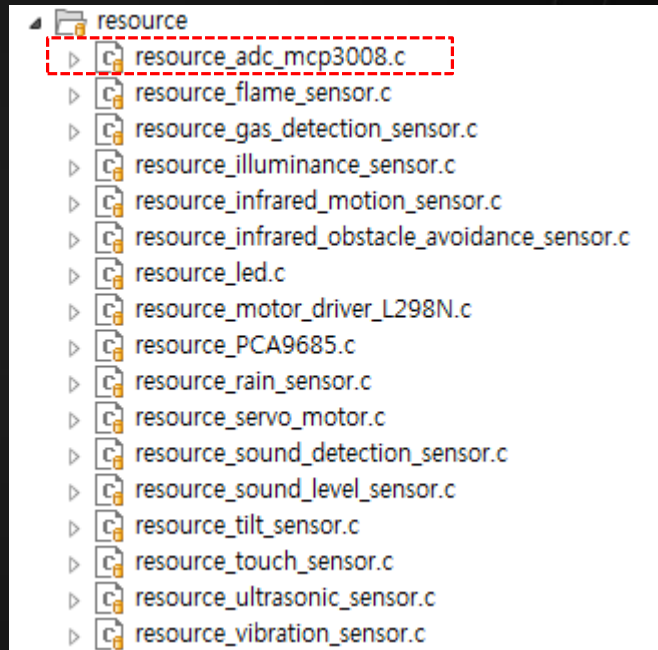
Tizen Project 유용한 개발 Tip

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◈ 강력한 Reference !!

resource/

- ◈ 여러가지 IoT 환경에서 사용 될 resource 들
- ◈ 모델 명 확인 필요 !!
- ◈ Protocol 확인 필요 !!



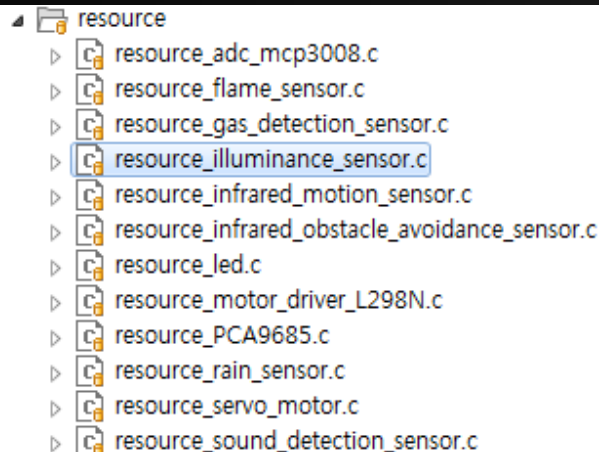
Tizen Project 유용한 개발 Tip

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◈ 강력한 Reference !!

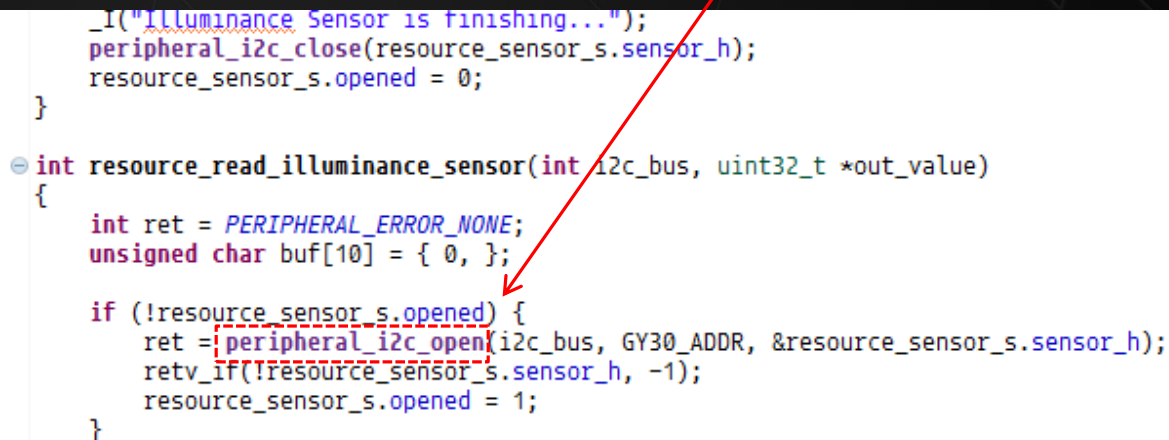
Protocol 확인

I2C 를 사용한다면 OK !



resource

- resource_adc_mcp3008.c
- resource_flame_sensor.c
- resource_gas_detection_sensor.c
- resource_illuminance_sensor.c
- resource_infrared_motion_sensor.c
- resource_infrared_obstacle_avoidance_sensor.c
- resource_led.c
- resource_motor_driver_L298N.c
- resource_PCA9685.c
- resource_rain_sensor.c
- resource_servo_motor.c
- resource_sound_detection_sensor.c



```
_I("Illuminance Sensor is finishing...");
peripheral_i2c_close(resource_sensor_s.sensor_h);
resource_sensor_s.opened = 0;
}

int resource_read_illuminance_sensor(int i2c_bus, uint32_t *out_value)
{
    int ret = PERIPHERAL_ERROR_NONE;
    unsigned char buf[10] = { 0, };

    if (!resource_sensor_s.opened) {
        ret = peripheral_i2c_open(i2c_bus, GY30_ADDR, &resource_sensor_s.sensor_h);
        retv_if(!resource_sensor_s.sensor_h, -1);
        resource_sensor_s.opened = 1;
    }
}
```

Tizen Project 유용한 개발 Tip

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📌 강력한 Reference !!

꼭 체크합시다 !!

HW 스펙에서 반드시 확인해줘야 합니다

- ▶ resource_illuminance_sensor.c
- ▶ resource_infrared_motion_sensor.c
- ▶ resource_infrared_obstacle_avoidance_sensor.c
- ▶ resource_led.c
- ▶ resource_motor_driver_L298N.c
- ▶ resource_PCA9685.c
- ▶ resource_rain_sensor.c
- ▶ resource_servo_motor.c

```
#include "log.h"
#include "resource_internal.h"

#define I2C_PIN_MAX 28
/* I2C */
#define GY30_ADDR 0x23 /* Address of GY30 light sensor */
#define GY30_CONT_HIGH_RES_MODE 0x10 /* Start measurement at 11x resolution.
#define GY30_CONSTANT_NUM (1.2)
```

Tizen Project 유용한 개발 Tip

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◈ 강력한 Reference !!

직관적이고 명료한 함수

```
int resource_read_illuminance_sensor(int i2c_bus, uint32_t *out_value)
```

```
void resource_close_illuminance_sensor(void)
```

```
int resource_write_led(int pin_num, int write_value)
```



Tizen

강력한

내부적으로

int res

```
int resource_read_ultrasonic_sensor(int trig_pin_num, int echo_pin_num, resource_read_cb cb, void *data)
{
    int ret = 0;

    triggered_time = 0;

    if (resource_read_info == NULL) {
        resource_read_info = calloc(1, sizeof(resource_read_s));
        retv_if(!resource_read_info, -1);
    } else {
        peripheral_gpio_unset_interrupted_cb(resource_get_info(resource_read_info->pin_num)->sensor_h);
    }
    resource_read_info->cb = cb;
    resource_read_info->data = data;
    resource_read_info->pin_num = echo_pin_num;

    if (!resource_get_info(trig_pin_num)->opened) {
        _I("Ultrasonic sensor's trig is initializing...");

        ret = peripheral_gpio_open(trig_pin_num, &resource_get_info(trig_pin_num)->sensor_h);
        retv_if(!resource_get_info(trig_pin_num)->sensor_h, -1);

        ret = peripheral_gpio_set_direction(resource_get_info(trig_pin_num)->sensor_h, PERIPHERAL_GPIO_DIRECTION_OUT_INITIAL);
        retv_if(ret != 0, -1);

        resource_get_info(trig_pin_num)->opened = 1;
        resource_get_info(trig_pin_num)->close = resource_close_ultrasonic_sensor_trig;
    }

    if (!resource_get_info(echo_pin_num)->opened) {
        _I("Ultrasonic sensor's echo is initializing...");

        ret = peripheral_gpio_open(echo_pin_num, &resource_get_info(echo_pin_num)->sensor_h);
        retv_if(!resource_get_info(echo_pin_num)->sensor_h, -1);

        ret = peripheral_gpio_set_direction(resource_get_info(echo_pin_num)->sensor_h, PERIPHERAL_GPIO_DIRECTION_IN);
        retv_if(ret != 0, -1);

        ret = peripheral_gpio_set_edge_mode(resource_get_info(echo_pin_num)->sensor_h, PERIPHERAL_GPIO_EDGE_BOTH);
        retv_if(ret != 0, -1);

        resource_get_info(echo_pin_num)->opened = 1;
        resource_get_info(echo_pin_num)->close = resource_close_ultrasonic_sensor_echo;
    }

    if (resource_get_info(echo_pin_num)->sensor_h) {
        ret = peripheral_gpio_set_interrupted_cb(resource_get_info(echo_pin_num)->sensor_h, _resource_read_ultrasonic_sensor);
        retv_if(ret != 0, -1);
    }
}
```

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*data)

arch. All rights reserved.

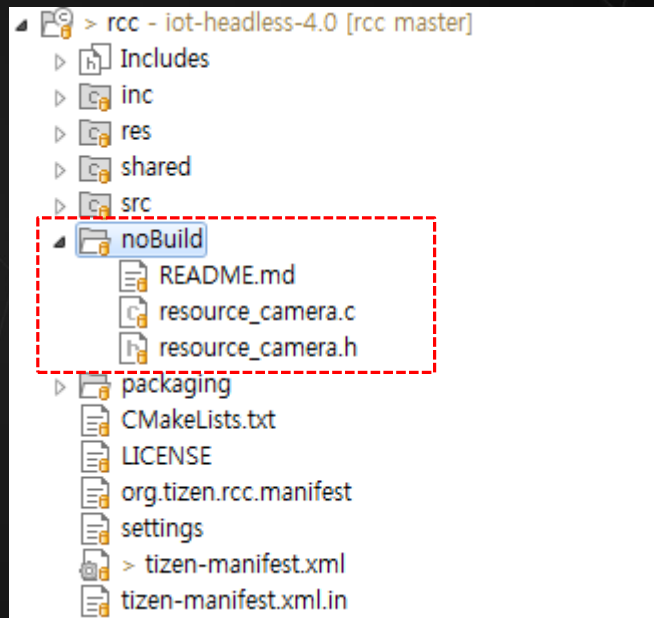
Tizen Project 유용한 개발 Tip

SAMSUNG Research

📌 강력한 Reference !!

custom 이미지용 resource

- 📌 현재 IoT preview 이미지에서는 빌드 되지 않는 resource 들이 있습니다
- 📌 사용하고자 하는 resource 들에 맞춰 custom 한 이미지를 만들어줘야 빌드가 가능합니다
- 📌 Build 되지 않도록 noBuild 란 폴더를 만들어서 관리하고 있습니다



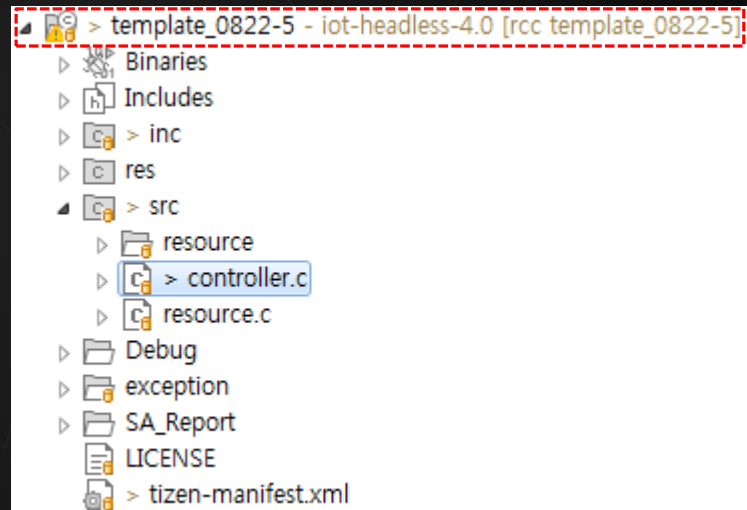
Tizen Project 유용한 개발 Tip

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◈ 강력한 Reference !!

사용 시나리오

적외선 동작 감지



Tizen Project 유용한 개발 Tip

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```
int resource_read_infrared_motion_sensor(int pin_num, uint32_t *out_value)
{
    int ret = PERIPHERAL_ERROR_NONE;

    if (!resource_get_info(pin_num)->opened) {
        ret = peripheral_gpio_open(pin_num, &resource_get_info(pin_num)->sensor_h);
        retv_if(!resource_get_info(pin_num)->sensor_h, -1);

        ret = peripheral_gpio_set_direction(resource_get_info(pin_num)->sensor_h, PERIPHERAL_GPIO_DIRECTION_IN);
        retv_if(ret != 0, -1);

        resource_get_info(pin_num)->opened = 1;
        resource_get_info(pin_num)->close = resource_close_infrared_motion_sensor;
    }

    ret = peripheral_gpio_read(resource_get_info(pin_num)->sensor_h, out_value);
    retv_if(ret < 0, -1);

    return 0;
}
```

지 되었는지

요??

n_sensor.c

- ▶ resource_rain_sensor.c
- ▶ resource_servo_motor.c
- ▶ resource_sound_detection_sensor.c
- ▶ resource_sound_level_sensor.c
- ▶ resource_tilt_sensor.c

```
int resource_read_infrared_motion_sensor(int pin_num, uint32_t *out_value)
```

- ▶ resource_ultrasonic_sensor.c
- ▶ resource_vibration_sensor.c

너무나 직관적인 이름의 함수가 보입니다

Tizen Project 유용한 개발 Tip

SAMSUNG Research

◇ 강력한 Reference !!

사용 시나리오

센서와 연결할 GPIO 번호

```
int resource_read_infrared_motion_sensor(int pin_num, uint32_t *out_value)
{
    int ret = PERIPHERAL_ERROR_NONE;

    if (!resource_get_info(pin_num)->opened) {
        ret = peripheral_gpio_open(pin_num, &resource_get_info(pin_num)->sensor_h);
        retv_if(!resource_get_info(pin_num)->sensor_h, -1);

        ret = peripheral_gpio_set_direction(resource_get_info(pin_num)->sensor_h, PERIPHERAL_GPIO_DIRECTION_IN);
        retv_if(ret != 0, -1);

        resource_get_info(pin_num)->opened = 1;
        resource_get_info(pin_num)->close = resource_close_infrared_motion_sensor;
    }

    ret = peripheral_gpio_read(resource_get_info(pin_num)->sensor_h, out_value);
    retv_if(ret < 0, -1);

    return 0;
}
```

이 변수에 동작이
있는지 없는지 1 또는
0의 값을 씁니다

Tizen Project 유용한 개발 Tip

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◈ 강력한 Reference !!

사용 시나리오

```
Eina_Bool __my_timer_func(void *data)
{
    _D("My Timer is called !!");

    return ECORE_CALLBACK_RENEW;
}
```

```
static Eina_Bool __my_timer_func(void *data)
{
    _D("My Timer is called !!");
    int ret = 0;
    int value = 0;

    ret = resource_read_infrared_motion_sensor(11, &value);
    if (ret < 0)
        return ECORE_CALLBACK_CANCEL;

    if (value == 1)
        _D("Someone is there");
    else
        _D("No one is there");

    return ECORE_CALLBACK_RENEW;
}
```

0 or 1

Tizen Project 유용한 개발 Tip

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◈ 강력한 Reference !!

사용 시나리오

- ◈ 3초에 한번씩 !!
- ◈ 동작 센서를 읽어와 라고 명령을 내리고 !!
- ◈ 명령 하달에 실패 시 `_my_timer_func` 가 더 이상 불리지 않도록 합니다
- ◈ 읽어 온 값에 따라 원하는 동작을 수행합니다

```
static void service_app_control(app_control_h app_control, void *data)
{
    // Todo: add your code here.

    timer = ecore_timer_add(3.0, __my_timer_func, NULL);
}
```

```
static Eina_Bool __my_timer_func(void *data)
{
    _D("My Timer is called !!");
    int ret = 0;
    int value = 0;

    ret = resource_read_infrared_motion_sensor(11, &value);
    if (ret < 0)
        return ECORE_CALLBACK_CANCEL;

    if (value == 1)
        _D("Someone is there");
    else
        _D("No one is there");

    return ECORE_CALLBACK_RENEW;
}
```

Tizen Project 유용한 개발 Tip

SAMSUNG Research

◈ 강력한 Reference !!

사용 시나리오

```
int resource_read_infrared_motion_sensor(int pin_num, uint32_t *out_value)
{
    int ret = PERIPHERAL_ERROR_NONE;

    if (!resource_get_info(pin_num)->opened) {
        ret = peripheral_gpio_open(pin_num, &resource_get_info(pin_num)->sensor_h);
        retv_if(!resource_get_info(pin_num)->sensor_h, -1);

        ret = peripheral_gpio_set_direction(resource_get_info(pin_num)->sensor_h, PERIPHERAL_GPIO_DIRECTION_IN);
        retv_if(ret != 0, -1);

        resource_get_info(pin_num)->opened = 1;
        resource_get_info(pin_num)->close = resource_close_infrared_motion_sensor;
    }

    ret = peripheral_gpio_read(resource_get_info(pin_num)->sensor_h, out_value);
    retv_if(ret < 0, -1);

    return 0;
}
```



```
int resource_read_infrared_motion_sensor(int pin_num, uint32_t *out_value)
```



참 쉽죠잉~

Tizen Project 유용한 개발 Tip

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📍 Callback 과 Thread

자주 쓰이는 callback...

Asynchronous

```
int resource_read_ultrasonic_sensor(int trig_pin_num, int echo_pin_num, resource_read_cb cb, void *data);
```

```
int resource_capture_camera(capture_completed_cb capture_completed, void *user_data);
```

```
int st_things_register_request_cb(st_things_get_request_cb get_cb, st_things_set_request_cb set_cb);
```



Tizen Project 유용한 개발 Tip

SAMSUNG Research

❖ Callback 과 Thread

체크 포인트 !!

- ❖ Asynchronous
- ❖ Timing
- ❖ Collision
- ❖ Mutex



Thank you