

(IoT Network) Practice -3-

Open-Source Software for CoAP



Index

- I. jCoAP Introduction
- II. CoAP Messages & Methods
- III. jCoAP Basic Example



jCoAP Introduction

- **WS4D**

- XML, HTTP와 같은 웹 서비스 기술을 산업자동화, 스마트 홈, 자동차 시스템 등 IoT application 영역에 적용하는 것이 목표인 프로젝트
- 즉, 임베디드 장치의 인터넷 연결과 IoT application 개발을 위한 Tool을 제공
- University of Rostock, University of Dortmund, Materna 등 유럽 학교 및 기업에서 주도

- **WS4D-jCoAP**

- WS4D 프로젝트의 일환으로 Java 환경에서 CoAP 기능을 구현한 jCoAP이 개발됨
- Open Source Software로서 누구나 접근, 수정, 기여할 수 있음
 - ✓ <https://gitlab.amd.e-technik.uni-rostock.de/ws4d/jcoap>
- Java Project 형태로 제공됨

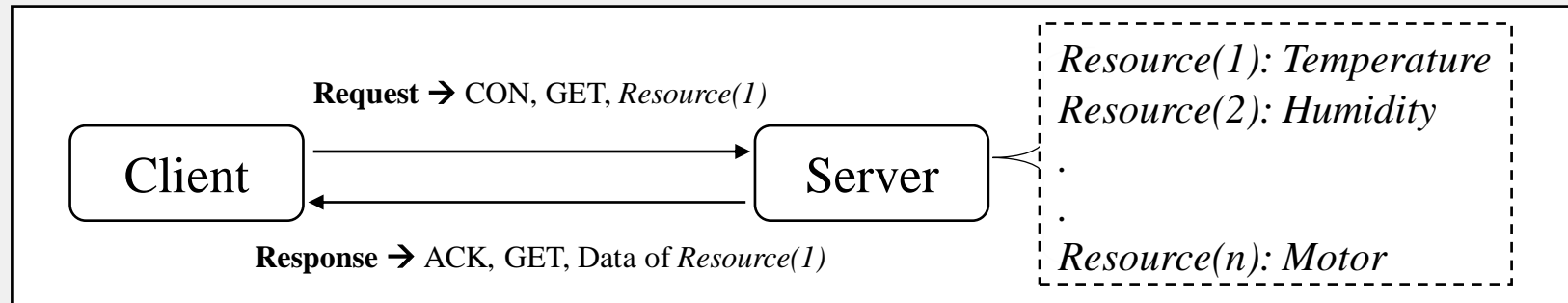
CoAP Messages & Methods

- **CoAP Messages**

- Confirmable (CON): 신뢰성을 보장하는 메시지
- Non-confirmable (NON): 신뢰성을 보장하지 않는 메시지
- Acknowledgement (ACK): CON 메시지에 대한 응답 메시지
- Reset (RST): 요청을 처리할 수 없을 때, 처리불가를 알리는 메시지

- **CoAP Methods**

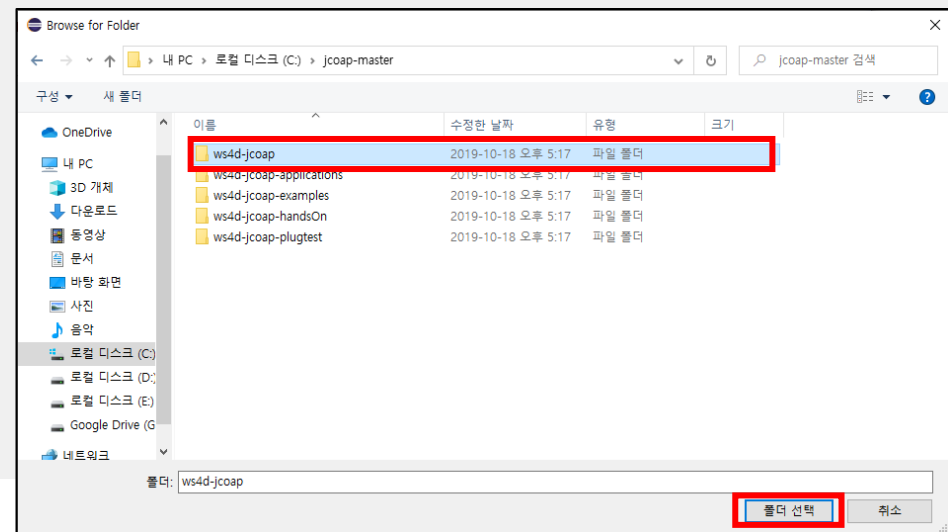
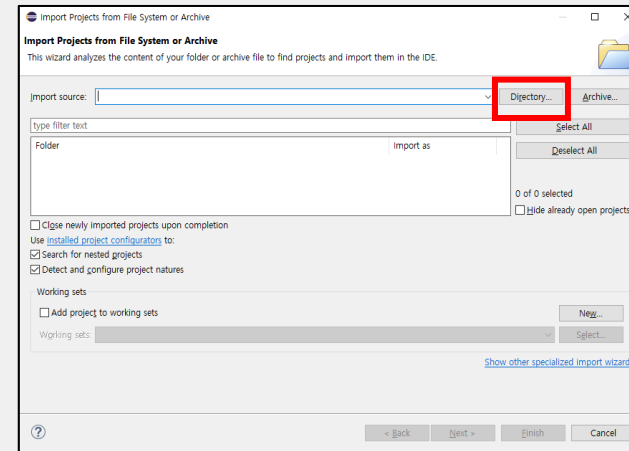
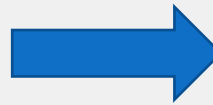
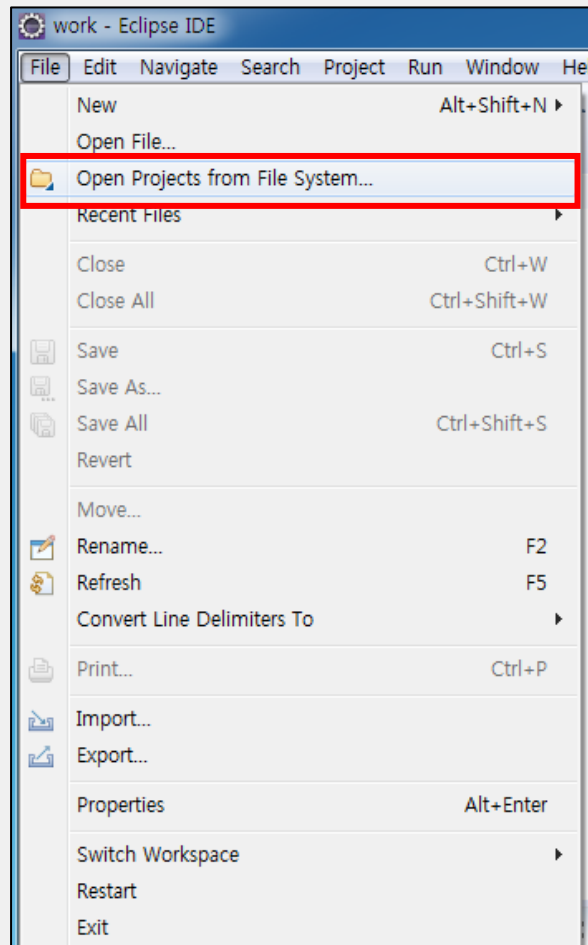
- GET: 리소스 값 읽어오기
- PUT: 리소스 값 변경하기
- POST: 새로운 리소스 생성
- DELETE: 리소스 삭제



<CoAP 통신 간단한 예시>

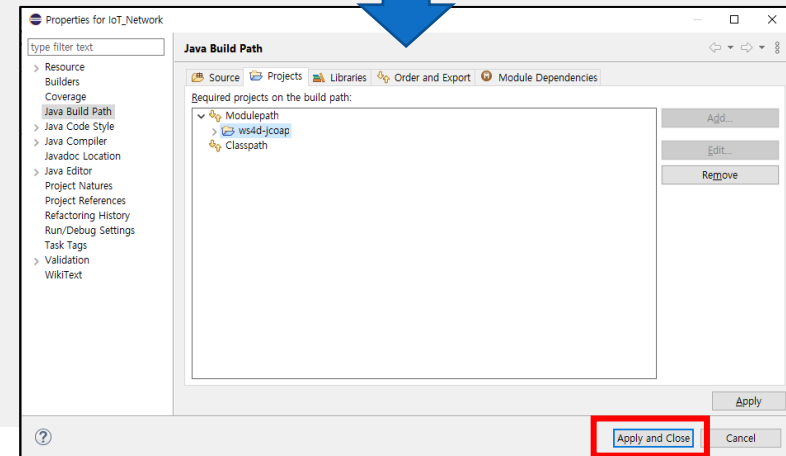
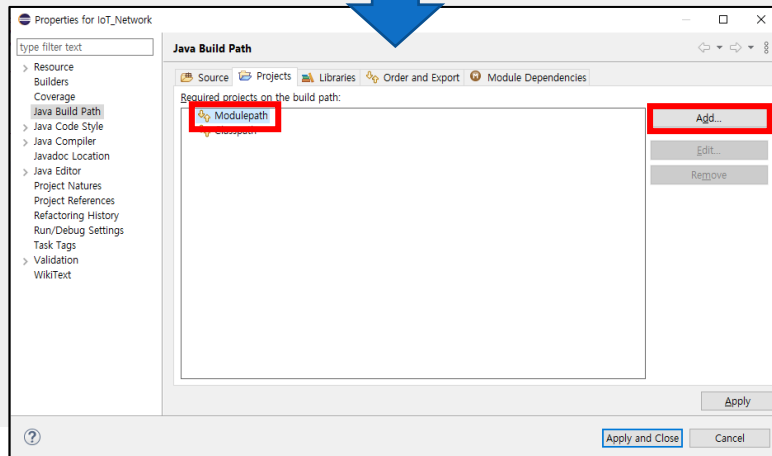
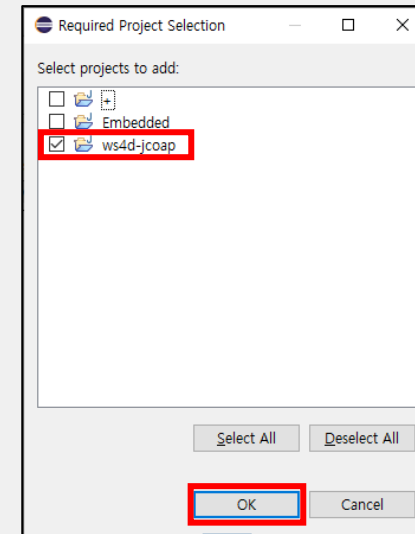
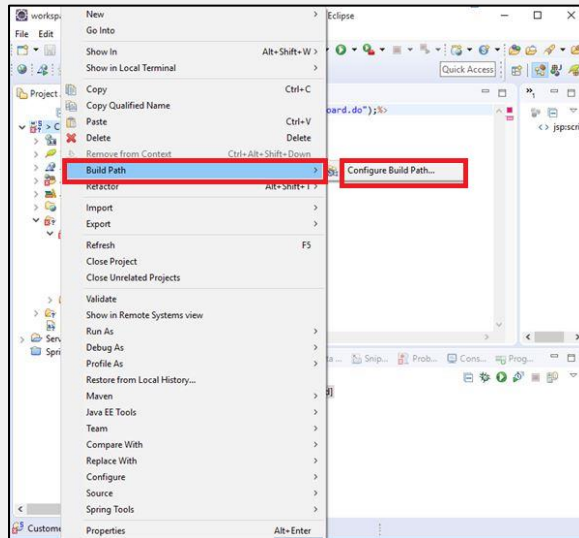
jCoAP Basic Example

- jCoAP 프로젝트 Import



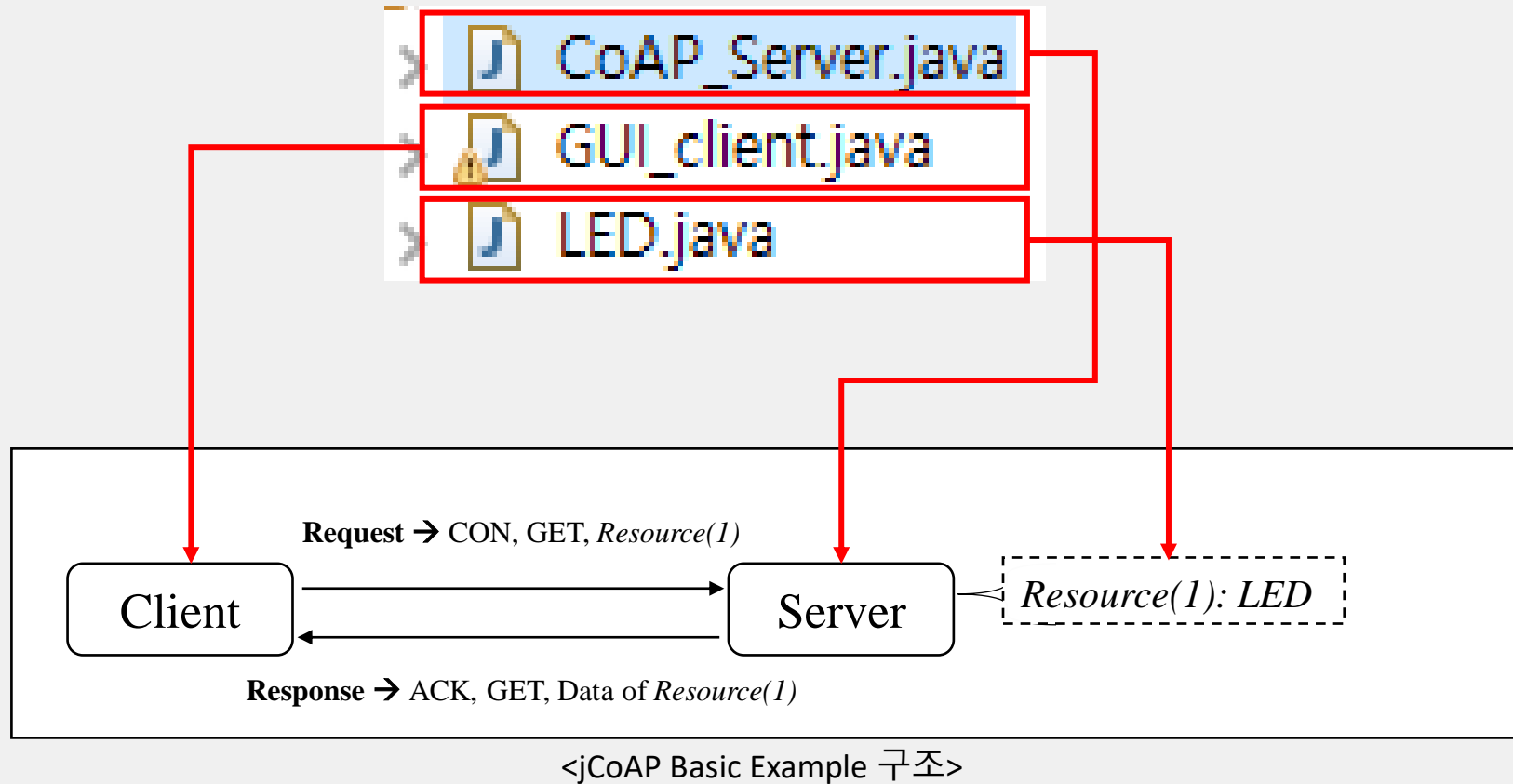
jCoAP Basic Example

- jCoAP 프로젝트 Import



jCoAP Basic Example

- jCoAP Basic Example 구조



jCoAP Basic Example

- jCoAP Basic Example – **CoAP_Server.java**

```
import org.ws4d.coap.core.rest.CoapResourceServer;

public class CoAP_Server {
    private static CoAP_Server coapServer;
    private CoapResourceServer resourceServer;

    public static void main(String[] args) {
        coapServer = new CoAP_Server();
        coapServer.start();
    }

    public void start() {
        System.out.println("===Run Test Server ===");

        // create server
        if (this.resourceServer != null)    this.resourceServer.stop();
        this.resourceServer = new CoapResourceServer();

        // initialize resource
        LED led = new LED();

        // add resource to server
        this.resourceServer.createResource(led);

        // run the server
        try {
            this.resourceServer.start();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```


jCoAP Basic Example

- jCoAP Basic Example – **LED.java**

```
public class LED extends BasicCoapResource{
    private String state = "off";

    private LED(String path, String value, CoapMediaType mediaType) {
        super(path, value, mediaType);
    }

    public LED() {
        this("/led", "off", CoapMediaType.text_plain);
    }

    @Override
    public synchronized CoapData get(List<String> query, List<CoapMediaType> mediaTypesAccepted) {
        return get(mediaTypesAccepted);
    }

    @Override
    public synchronized CoapData get(List<CoapMediaType> mediaTypesAccepted) {
        return new CoapData(Encoder.StringToByte(this.state), CoapMediaType.text_plain);
    }

    @Override
    public synchronized boolean setValue(byte[] value) {
        this.state = Encoder.ByteToString(value);
        return true;
    }

    @Override
    public synchronized boolean post(byte[] data, CoapMediaType type) {
        return this.setValue(data);
    }

    @Override
    public synchronized boolean put(byte[] data, CoapMediaType type) {
        return this.setValue(data);
    }

    @Override
    public synchronized String getResourceType() {
        return "LED";
    }
}
```

jCoAP Basic Example

- jCoAP Basic Example – **GUI_client.java**

```
btn_get.addActionListener(new ActionListener() {
    @Override
    public void actionPerformed(ActionEvent e) {
        // TODO Auto-generated method stub
        String path = path_text.getText();
        String payload = payload_text.getText();
        CoapRequest request = clientChannel.createRequest(CoapRequestCode.GET, path, true);
        request.setPayload(new CoapData(payload, CoapMediaType.text_plain));
        displayRequest(request);
        clientChannel.sendMessage(request);
    }
});

btn_put.addActionListener(new ActionListener() {
    @Override
    public void actionPerformed(ActionEvent e) {
        // TODO Auto-generated method stub
        String path = path_text.getText();
        String payload = payload_text.getText();
        CoapRequest request = clientChannel.createRequest(CoapRequestCode.PUT, path, true);
        request.setPayload(new CoapData(payload, CoapMediaType.text_plain));
        displayRequest(request);
        clientChannel.sendMessage(request);
    }
});

btn_post.addActionListener(new ActionListener() {
    @Override
    public void actionPerformed(ActionEvent e) {
        // TODO Auto-generated method stub
        String path = path_text.getText();
        String payload = payload_text.getText();
        CoapRequest request = clientChannel.createRequest(CoapRequestCode.POST, path, true);
        request.setPayload(new CoapData(payload, CoapMediaType.text_plain));
        displayRequest(request);
        clientChannel.sendMessage(request);
    }
});

btn_delete.addActionListener(new ActionListener() {
    @Override
    public void actionPerformed(ActionEvent e) {
        // TODO Auto-generated method stub
        String path = path_text.getText();
        String payload = payload_text.getText();
        CoapRequest request = clientChannel.createRequest(CoapRequestCode.DELETE, path, true);
        displayRequest(request);
        clientChannel.sendMessage(request);
    }
});
```