LAPORAN PRAKTIKUM INTERNET OF THINGS (IoT)
Praktik Akses API Melalui Simulasi WOKWI

Callysta Mahelina Ta'ek
Fakultas Vokasi, Universitas Brawijaya
Email: email@example.com

Abstract (Abstrak)

This practicum aims to simulate API access using the Wokwi simulator in an Internet of Things (IoT) environment. The experiment involves setting up a Laravel API and connecting it to an ESP32 microcontroller via the Wokwi simulation platform. The ESP32 is programmed to send HTTP requests to the Laravel API hosted on a local server and exposed using NGROK. Additionally, temperature and humidity sensor data from the DHT22 module is transmitted to the API. The results show successful data transmission and storage in the MySQL database, verifying the functionality of API integration with IoT devices.

Keywords—IoT, Wokwi Simulator, Laravel API, ESP32, NGROK, HTTP Requests

Introduction

1.1 Background

The rapid advancement of the Internet of Things (IoT) has enabled seamless connectivity between physical devices and cloud-based applications. API (Application Programming Interface) plays a crucial role in facilitating communication between IoT devices and web services. In this practicum, the Wokwi simulator is used to emulate IoT hardware interactions with a Laravel-based API. The ESP32 microcontroller acts as the client, making HTTP requests to send sensor data to a remote server. This simulation allows students to understand how IoT devices interact with APIs in real-time environments.

1.2 Objectives

The objectives of this practicum are as follows:

- To understand how to set up and access an API in an IoT environment using Wokwi simulation.
- To learn how to configure an ESP32 microcontroller to communicate with a Laravel API.
- To simulate data transmission from an ESP32 device to an API using HTTP requests.
- To store sensor data (temperature and humidity) from a DHT22 module into a MySQL database via an API.

Methodology

2.1 Tools & Materials

The following tools and materials are required for this practicum:

Software:
- Visual Studio Code (VS Code)
- PlatformIO Extension
- Laravel Framework
- NGROK
- Wokwi Simulator

Hardware (Simulated):
- ESP32 DevKit
- DHT22 Temperature & Humidity Sensor

2.2 Implementation Steps

1. Run the Laravel API using the command: php artisan serve --host=0.0.0.0 --port=8080
   This ensures the API is accessible from any IP address and runs on port 8080.
2. Generate an NGROK URL using the command: ngrok http --scheme=http 8080 Ensure that NGROK provides an HTTP (not HTTPS) URL since ESP32 only supports HTTP.
3. Create a new Wokwi simulator project in PlatformIO.
4. Add the main.cpp file and write the ESP32 connection script.
5. Configure the wokwi.toml and diagram.json files to define the ESP32 and DHT22 sensor setup.
6. Run the Wokwi simulator using the command: Wokwi Start Simulator
7. Verify API communication by checking the HTTP response code in the serial monitor.
8. Modify the simulation to include sensor data transmission.
9. Confirm data storage in the MySQL database.

Results and Discussion

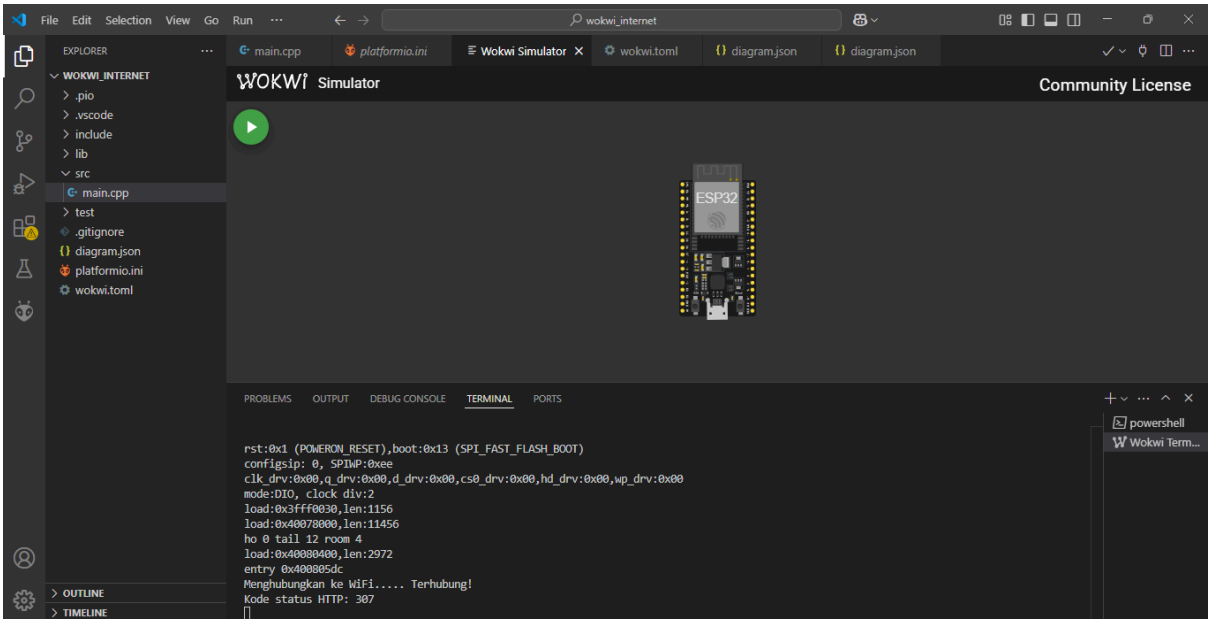
3.1 Experimental Results (Hasil Eksperimen)

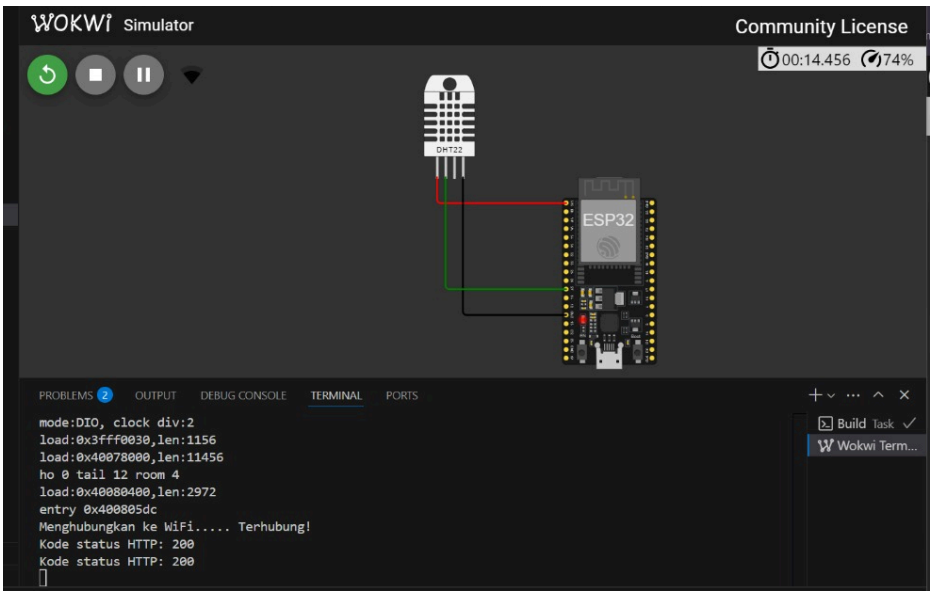
The experiment was successfully conducted, with the following observations:

- The ESP32 successfully connected to the Wi-Fi network Wokwi-GUEST.
- HTTP requests were sent from the ESP32 to the Laravel API using the provided NGROK URL.
- The server responded with HTTP status code 200, confirming successful request processing.
- When the DHT22 sensor was integrated, temperature and humidity data were successfully transmitted to the API.
- The transmitted sensor data was stored in the MySQL database, verifying the complete IoT-to-API data pipeline.

These results indicate that the Wokwi simulation effectively demonstrates IoT API communication and data storage mechanisms. The practical implementation provides a foundational understanding of integrating IoT devices with web-based applications.

4. Appendix (Lampiran, jika diperlukan)


File Edit Selection View Go Run
wokwi_internet
EXPLORER
main.cpp
platformio.ini
Wokwi Simulator
wokwi.toml
diagram.json
diagram.json
WOKWI_INTERNET
.pio
.vscode
include
lib
src
main.cpp
test
.gitignore
diagram.json
platformio.ini
wokwi.toml
WOKWI Simulator
Community License
ESP32
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
powershell
Wokwi Term...
rst:0x1 (POWERON_RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
configsip: 0, SPIWP:0xee
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
mode:DIO, clock div:2
load:0x3fff0030,len:1156
load:0x40078000,len:11456
ho 0 tail 12 room 4
load:0x40080400,len:2972
entry 0x400805dc
Menghubungkan ke WiFi..... Terhubung!
Kode status HTTP: 307
OUTLINE
TIMELINE


WOKWI Simulator
Community License
00:14.456
74%
DHT22
ESP32
PROBLEMS 2
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Build Task
Wokwi Term...
mode:DIO, clock div:2
load:0x3fff0030,len:1156
load:0x40078000,len:11456
ho 0 tail 12 room 4
load:0x40080400,len:2972
entry 0x400805dc
Menghubungkan ke WiFi..... Terhubung!
Kode status HTTP: 200
Kode status HTTP: 200