KelasRobot
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Meningkatkan Keamanan:

Aplikasi IoT Berbasis Web PHP MySQL Dalam Komunikasi dengan Device IoT

ESP32 / ESP8266

Ajang Rahmat

www.kelasrobot.com

Kegiatan sebelumnya_

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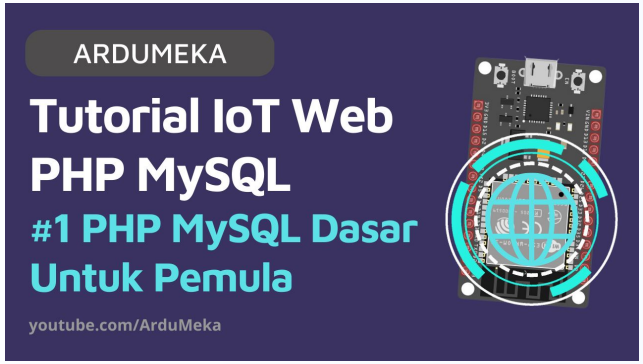

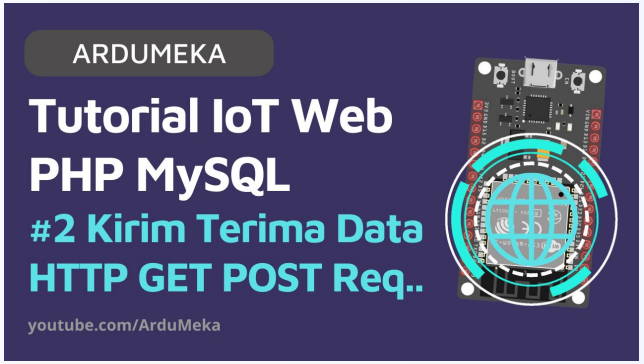

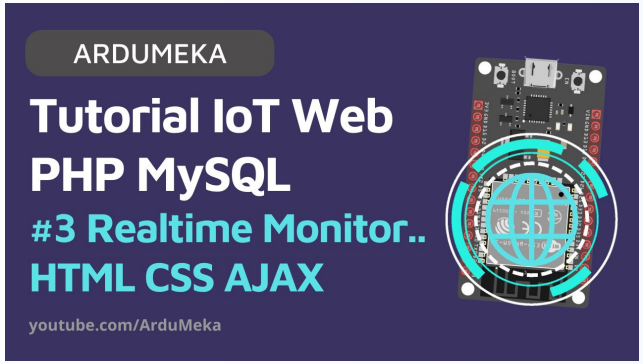

Link Rekaman:

https://www.youtube.com/playlist?list=PL8XDpsd-Yx8Hch_kw15E1JTdMtGjrgXyC

Kegiatan sebelumnya_

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Link Rekaman:

https://www.youtube.com/watch?v=FG9dR95XoQ0

—

Gabung grup ArduMeka:
Rutin mengadakan *Webinar* tiap *Weekend*.

https://linktr.ee/ardumeka

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Pesan Mas **Dyan Galih**

Di dunia cyber itu tidak ada yang aman.

Yang kita perlukan kehati-hatian kita, dalam pengelolaan apapun, implementasi apapun.

Dan setiap hari kita harus pantau, dan lebih hati-hati saja.

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Salam Kenal

Nama	:	Ajang Rahmat
Kesibukan	:	Author KelasRobot.com
	:	Mahasiswa Informatika UNSIA
Asal	:	Sumedang, Jawa Barat
Hobi	:	Microcontroller
	:	Internet of Things
	:	Artificial Intelligence

Pembahasan_

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- Pengenalan Dasar *MVC PDO* Pada *PHP*
- *HTTPS*, *SSL*, and *HTTP Responses*
- *Authentication API Key*
- Menampilkan Data Terbaru dan Tabel
- *MQTT Private Broker + Webhook*

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Pengenalan Dasar *MVC PDO* Pada *PHP* _

Pengertian *MVC*_

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Model-View-Controller

Konsep untuk mempermudah pengembangan Aplikasi *WEB*.

1. **Pengelolaan *database*** disimpan di ***Model***.
2. **Tampilan** disimpan di ***View***.
3. Yang **menghubungkan *Model*** dan ***View*** disimpan di ***Controller***.

Konsep *MVC* digunakan di berbagai *PHP Framework*:

Laravel, **CodeIgniter**, Yii, Symfony dll

Cara Kerja *MVC*_

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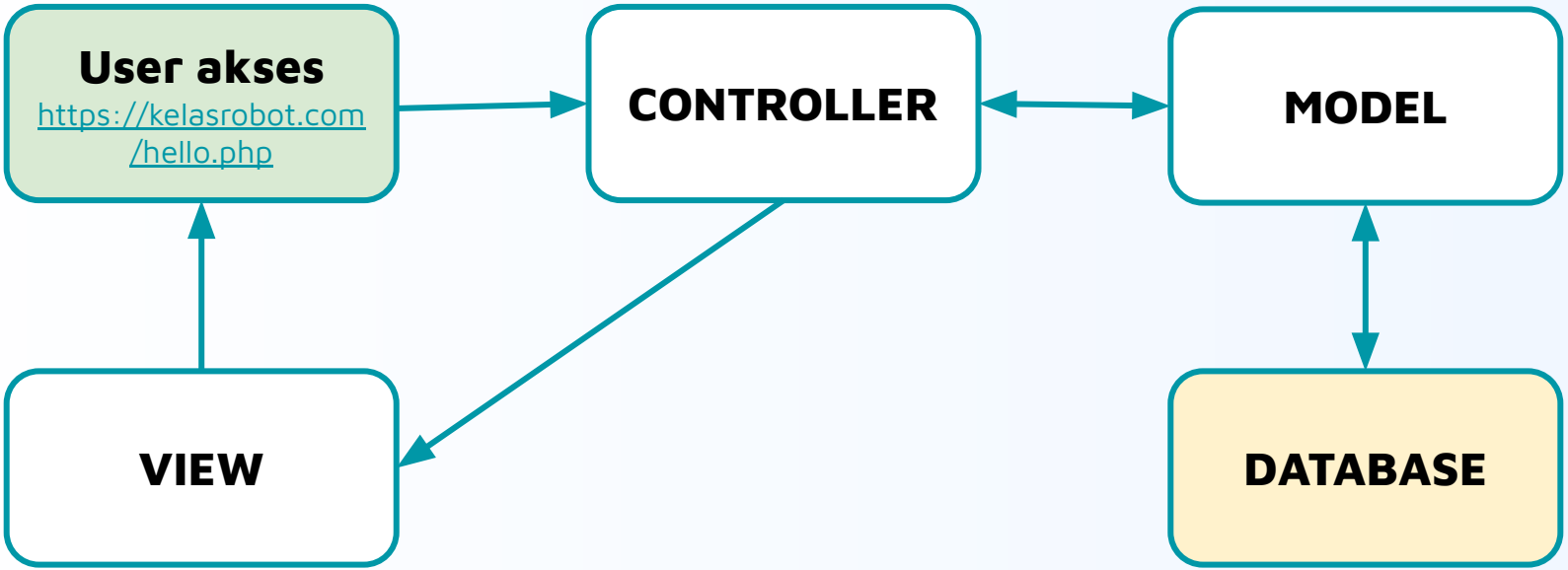

Sumber gambar:
https://www.altexsoft.com/blog/micro-frontend/

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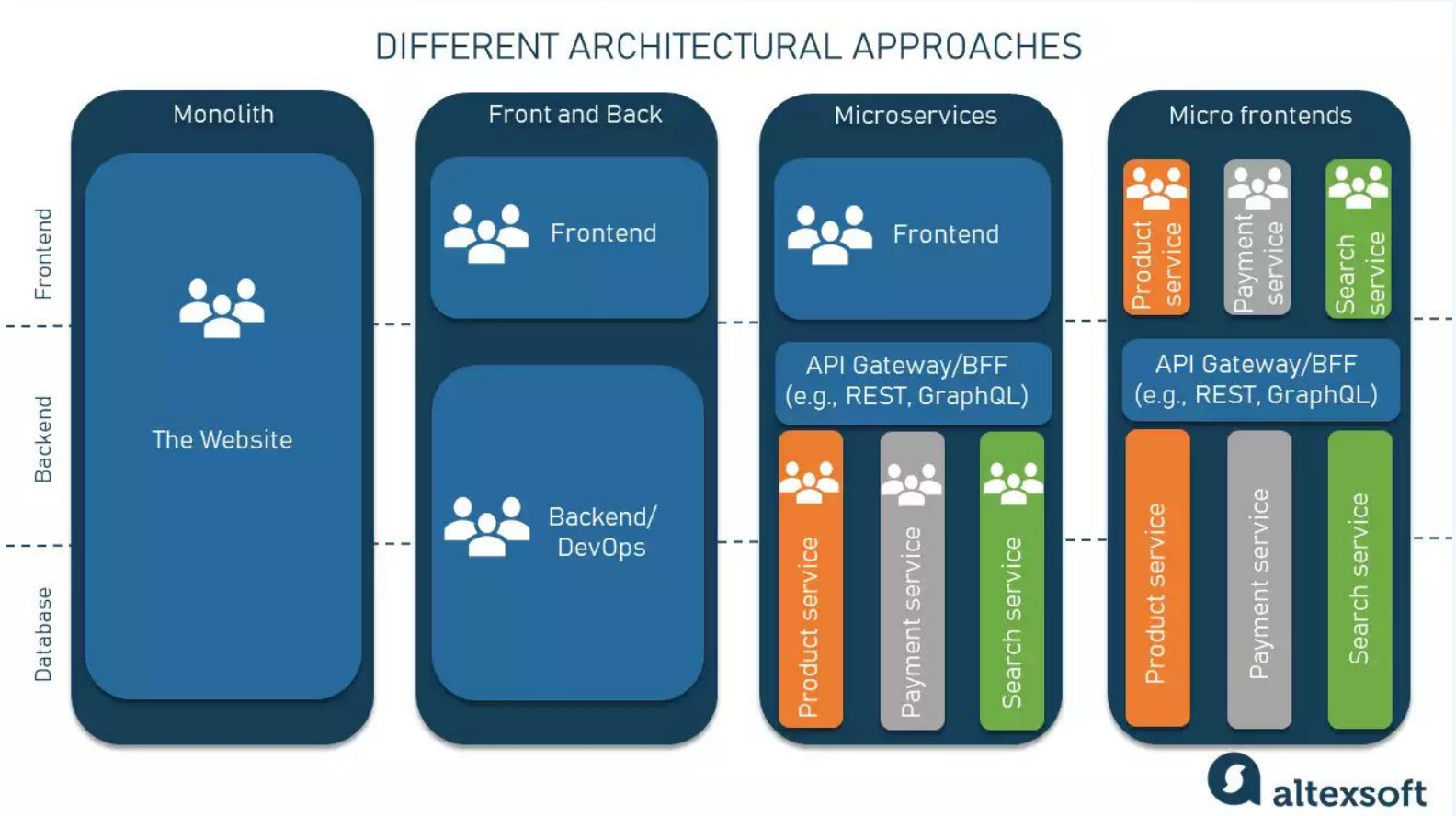

Struktur Direktori_

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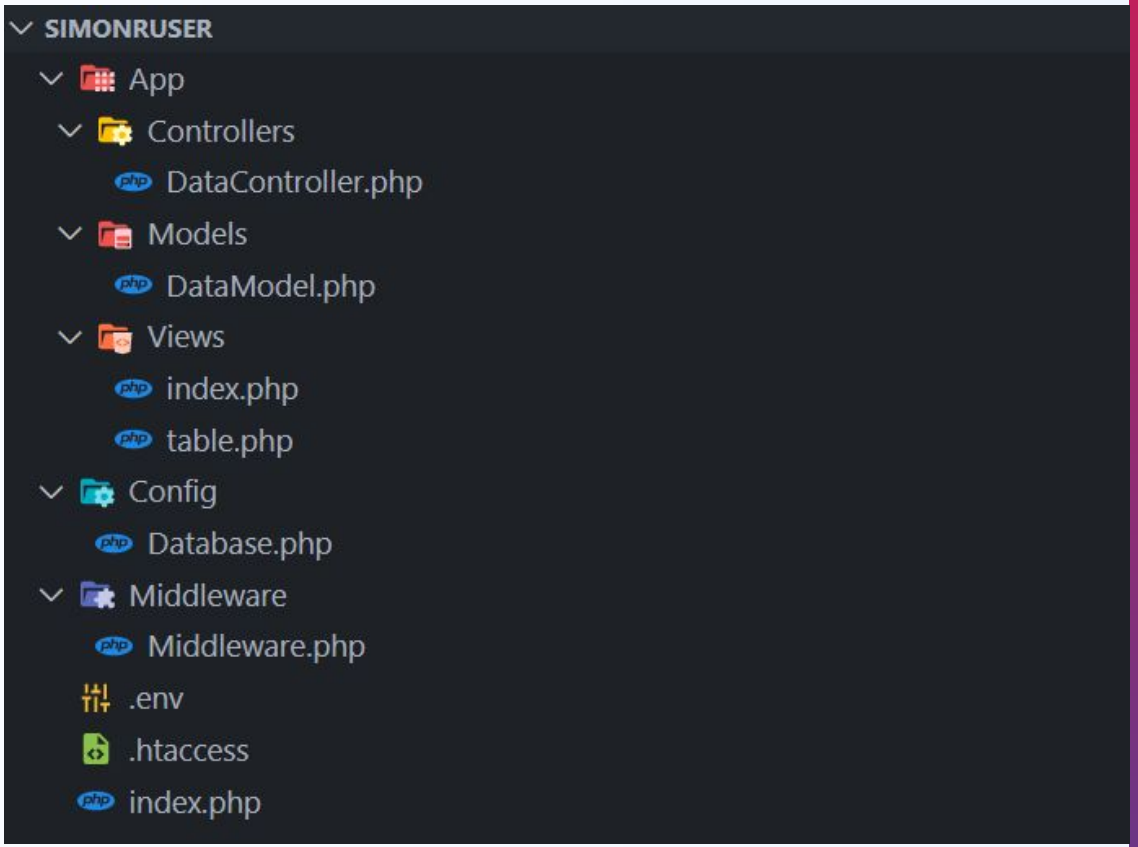
SIMONRUSER

Sistem
Monitoring
Ruang
Server



Pengertian *PDO*_

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PHP Data Object

Extension Universal yang tersedia di PHP untuk terhubung ke DBMS.

PHP PDO → Database Driver → Database Server

Selain MySQL PDO mendukung: PostgreSQL, Oracle, MS SQL Server, SQLite, dsb...

Config/Database.php_

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```php
<?php
$host = 'localhost';
$user = 'root';
$password = '';
$dbname = 'db_simonruser';

try {
    $conn = "mysql:host=$host;dbname=$dbname";
    $pdo = new PDO($dsn, $user, $password);
    $pdo->setAttribute(PDO::ATTR_ERRMODE, PDO::ERRMODE_EXCEPTION);
    // echo "Koneksi berhasil!";
} catch (PDOException $error) {
    echo "Koneksi gagal: " . $error->getMessage();
}
```

Config/Database.php UPDATE_

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```
class Database
{
    private $host = 'localhost';
    private $user = 'root';
    private $password = '';
    private $dbname = 'db_simonruser';
    private $pdo;
    public function getConnection()
    {
        if (!$this->pdo) {
            $dsn = "mysql:host={$this->host};dbname={$this->dbname}";
            $this->pdo = new PDO($dsn, $this->user, $this->password);
            $this->pdo->setAttribute(PDO::ATTR_ERRMODE,
PDO::ERRMODE_EXCEPTION);
        }
        return $this->pdo;
    }
}
```

App/Models/DataModel.php _

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```php
<?php
require_once $_SERVER['DOCUMENT_ROOT'] . '/simonruser/Config/Database.php';
class DataModel
{
    private $pdo;
    public function setConnection($pdo)
    {
        $this->pdo = $pdo;
    }
}
```

DataModel Input Function_

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```php
public function inputData($temperature, $humidity)
    {
        try {
            $query = "INSERT INTO sensor_data (temperature, humidity) VALUES
(:temperature, :humidity)";
            $statement = $this->pdo->prepare($query);
            $statement->bindValue(':temperature', $temperature,
PDO::PARAM_STR);
            $statement->bindValue(':humidity', $humidity, PDO::PARAM_STR);
            $statement->execute();
            return true;
        } catch (PDOException $e) {
            return false;
        }
    }
```

App/Controllers/DataController.php_

```php
<?php

require_once $_SERVER['DOCUMENT_ROOT'] . '/simonruser/Config/Database.php';
require_once $_SERVER['DOCUMENT_ROOT'] .
'/simonruser/App/Models/DataModel.php';

class DataController
{

}
```

DataController Input Function_

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```php
public function input()
    {
        if (isset($_POST['temperature']) && isset($_POST['humidity'])) {
            authenticateApiKey();
            $temperature = $_POST['temperature'];
            $humidity = $_POST['humidity'];
            $database = new Database();
            $pdo = $database->getConnection();
            $dataModel = new DataModel();
            $dataModel->setConnection($pdo);
            $input = $dataModel->inputData($temperature, $humidity);
            if ($input) {
                echo "Data berhasil diinput";
            } else {
                echo "Data gagal diinput";
            }
        } else {
            echo "Data tidak lengkap";
        }
    }
```

index.php _

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```php
<?php
require_once('App/Controllers/DataController.php');
$controller = new DataController();
$controller->input();
```

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HTTPS, SSL, and HTTP Responses

Pengertian *HTTP, SSL*_

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Hypertext Transfer Protocol Secure

Protokol komunikasi yang aman yang digunakan untuk mentransfer data antara pengguna dan situs web. HTTPS **menggabungkan protokol HTTP yang biasa digunakan** untuk mengirim dan menerima permintaan data dengan **lapisan keamanan SSL/TLS** (**Secure Sockets Layer/Transport Layer Security**) yang menyandikan dan melindungi data yang ditransfer.

HTTP vs HTTPS_

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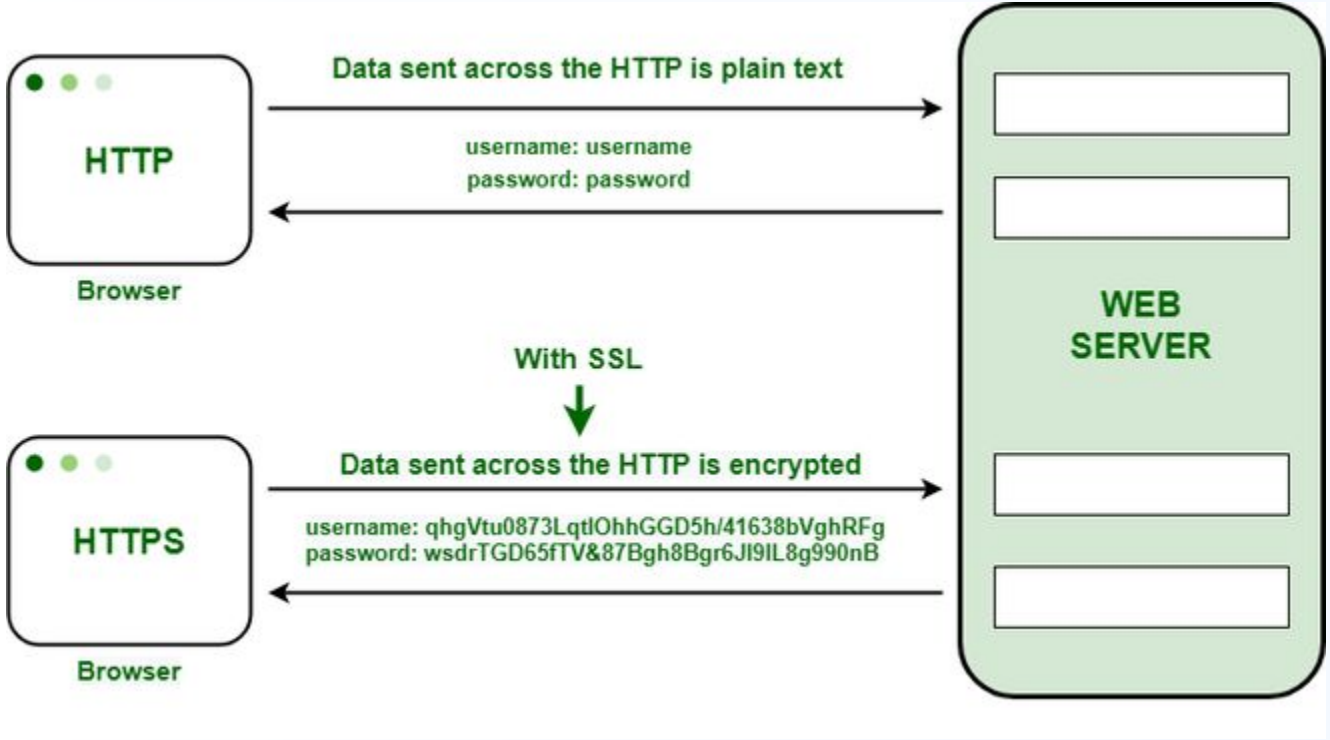

Sumber Gambar: https://www.geeksforgeeks.org/difference-between-http-and-https/

HTTP Response Code_

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HTTP STATUS CODES

2xx Success

200	Success / OK

3xx Redirection

301	Permanent Redirect
302	Temporary Redirect
304	Not Modified

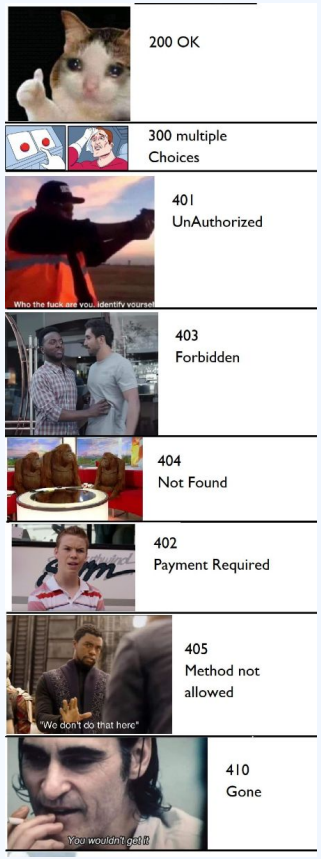
4xx Client Error

401	Unauthorized Error
403	Forbidden
404	Not Found
405	Method Not Allowed

5xx Server Error

501	Not Implemented
502	Bad Gateway
503	Service Unavailable
504	Gateway Timeout

Sumber gambar:
https://www.infidigit.com/blog/http-status-codes/



HTTP Response Code_

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```
http_response_code(403);
```

```
http_response_code(402);
```

```
http_response_code(404);
```

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Authentication API Key

Pengertian *API Key*_

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Autentikasi Api Key

Salah satu metode autentikasi yang digunakan pada **API (Application Programming Interface)**. API Key adalah sebuah kode akses yang disediakan oleh server kepada client API untuk mengidentifikasi dan memverifikasi pengguna tersebut saat **melakukan permintaan (request) ke API**.

Middleware/Middleware.php

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```php
<?php
function authenticateApiKey()
{
    $apiKey = isset($_SERVER['HTTP_X_API_KEY']) ? $_SERVER['HTTP_X_API_KEY'] : '';
    if (empty($apiKey)) {
        http_response_code(401);
        echo "Unauthorized";
        exit;
    }

    $expectedApiKey = 12341212;
    if (empty($apiKey) || $apiKey !== $expectedApiKey) {
        http_response_code(403);
        echo "Forbidden";
        exit;
    }
}
```

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Menampilkan Data Terbaru dan Tabel

DataModel getLatestData Function_

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```php
public function getLatestData()
    {
        try {
            $query = "SELECT * FROM sensor_data ORDER BY id DESC LIMIT 1";
            $statement = $this->pdo->prepare($query);
            $statement->execute();
            $result = $statement->fetch(PDO::FETCH_ASSOC);
            return $result;
        } catch (PDOException $e) {
            return false;
        }
    }
```

DataModel getAllData Function_

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```php
public function getAllData()
    {
        try {
            $query = "SELECT * FROM sensor_data ORDER BY id DESC";
            $statement = $this->pdo->prepare($query);
            $statement->execute();
            $result = $statement->fetchAll(PDO::FETCH_ASSOC);
            return $result;
        } catch (PDOException $e) {
            return false;
        }
    }
```

DataController index table Function_

```php
public function index()
    {
        $database = new Database();
        $pdo = $database->getConnection();
        $dataModel = new DataModel();
        $dataModel->setConnection($pdo);
        $data = $dataModel->getLatestData();
        include_once 'App/Views/index.php';
    }
    public function table()
    {
        $database = new Database();
        $pdo = $database->getConnection();
        $dataModel = new DataModel();
        $dataModel->setConnection($pdo);
        $data = $dataModel->getAllData();
        include_once 'App/Views/table.php';
    }
```

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Route

.htaccess _

```
RewriteEngine On
RewriteBase /simonruser/
RewriteCond %{REQUEST_FILENAME} !-d
RewriteCond %{REQUEST_FILENAME} !-f
RewriteRule ^(.*)$ index.php [QSA,L]
```

index.php _

```php
<?php

require_once('App/Controllers/DataController.php');
$route = $_SERVER['REQUEST_URI'];
$controller = new DataController();

if ($route === '/simonruser/') {
    $controller->index();
} elseif ($route === '/simonruser/api') {
    $controller->input();
} elseif ($route === '/simonruser/table') {
    $controller->table();

} else {
    http_response_code(404);
    echo "Not Found";
}
```

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.env

.env _

```
DB_HOST=localhost
DB_NAME=db_simonruser
DB_USER=root
DB_PASSWORD=
API_KEY=1231212312
```

Config/Database.php _

```php
class Database
{
    private $host;
    private $user;
    private $password;
    private $dbname;
    private $pdo;
    public function __construct()
    {
        $env = parse_ini_file($_SERVER['DOCUMENT_ROOT'] . '/simonruser/.env');
        $this->host = $env['DB_HOST'];
        $this->user = $env['DB_USER'];
        $this->password = $env['DB_PASSWORD'];
        $this->dbname = $env['DB_NAME'];
    }
    public function getConnection()
    {
        if (!$this->pdo) {
            $dsn = "mysql:host={$this->host};dbname={$this->dbname}";
            $this->pdo = new PDO($dsn, $this->user, $this->password);
            $this->pdo->setAttribute(PDO::ATTR_ERRMODE, PDO::ERRMODE_EXCEPTION);
        }
        return $this->pdo;
    }
}
```

Middleware/Middleware.php _

```php
<?php
function authenticateApiKey()
{
    $apiKey = isset($_SERVER['HTTP_X_API_KEY']) ? $_SERVER['HTTP_X_API_KEY'] : '';
    if (empty($apiKey)) {
        http_response_code(401);
        echo "Unauthorized";
        exit;
    }
    $env = parse_ini_file($_SERVER['DOCUMENT_ROOT'] . '/simonruser/.env');
    $expectedApiKey = $env['API_KEY'];
    if (empty($apiKey) || $apiKey !== $expectedApiKey) {
        http_response_code(403);
        echo "Forbidden";
        exit;
    }
}
```

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MQTT Private Broker +Webhook

MQTT Private Broker_

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MQTT Broker

Sebuah server yang digunakan untuk menghubungkan antara **publisher (pengirim)** dan **subscriber (penerima)** pada protokol MQTT.

Webhook x MQTT Broker

Webhook pada **MQTT Private Broker** adalah sebuah fitur yang memungkinkan pengguna untuk mem-forward data dari **MQTT Broker** ke aplikasi atau layanan web lainnya.

Message Broker_

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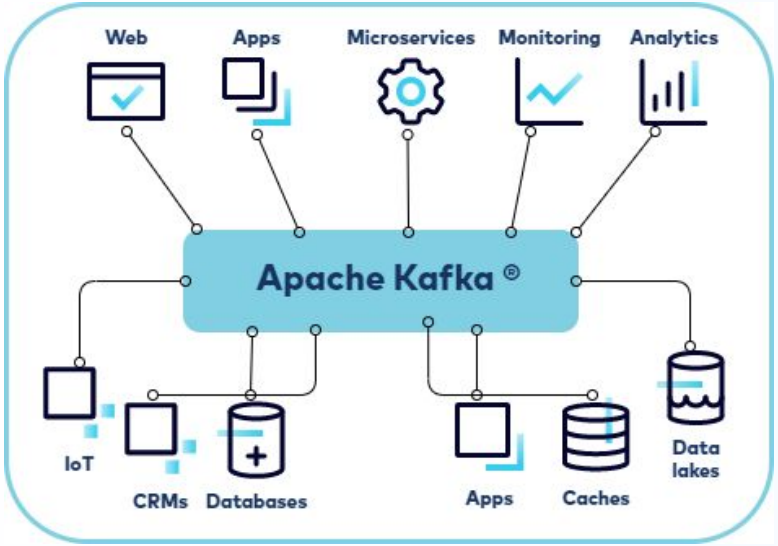
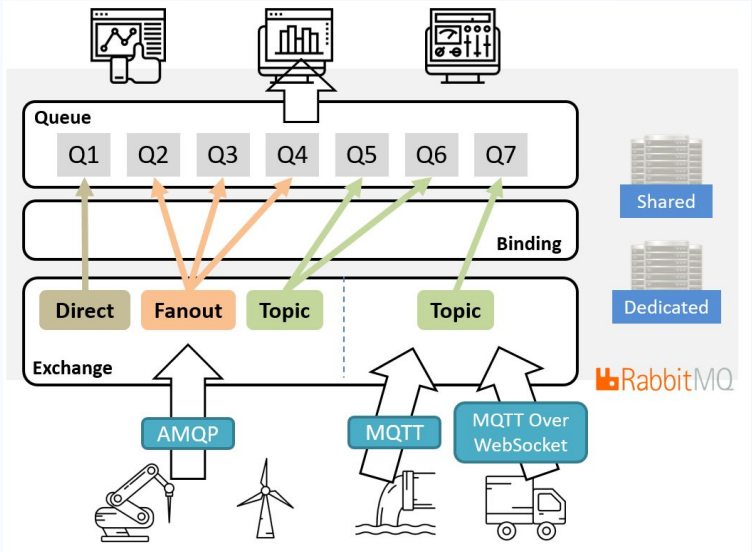


Sumber Gambar:
https://docs.confluent.io/kafka/introduction.html



Sumber Gambar:
https://docs.wise-paas.advantech.com.cn/en/Guides_and_API_References/Cloud_Services/IoT_Hub/1590542261557764902/v1.0.0

Shiftr.io _

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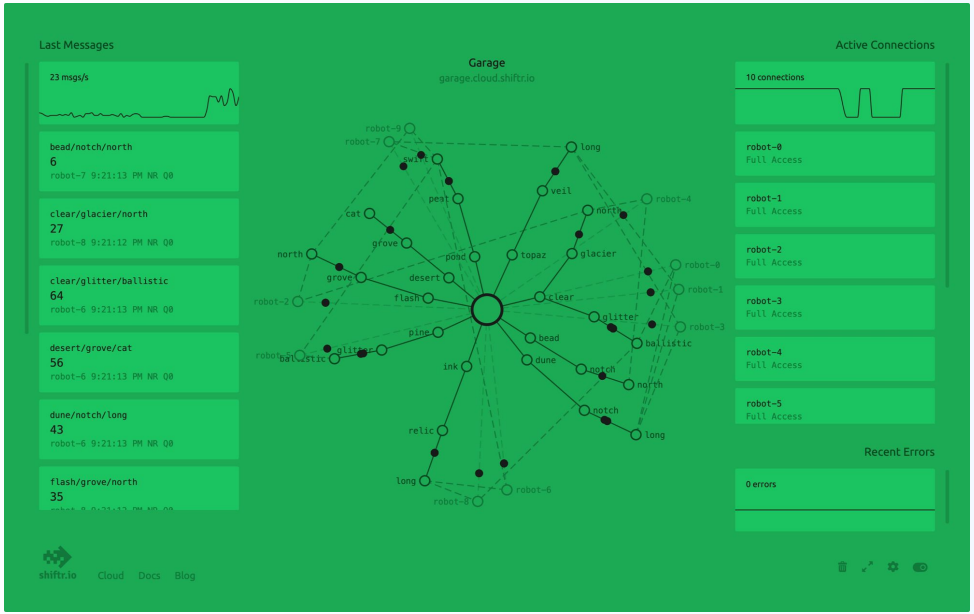

Sumber Gambar: https://www.shiftr.io/

Referensi_

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1. https://lp2mp.uma.ac.id/apa-itu-model-view-controller-mvc/
2. https://www.duniailkom.com/tutorial-php-mysql-pengertian-pdo-dan-cara-mengaktifkan-pdo-php-data-objects/

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