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DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC ACCREDITED with "A" GRADE (CGPA : 3.18)

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE CODE: DJS22ITL604 **DATE:27-02-25**

COURSE NAME: Full Stack Web Development Laboratory **CLASS: TYBTech**

Name: Anish Sharma **Div:IT-1-1**

EXPERIMENT NO. 05

CO/LO: CO1-Develop a full stack web application.

AIM / OBJECTIVE: Authentication and Authorization with JWT: Implement user authentication using JWT tokens for a simple login/signup functionality.

THEORY:

Introduction to MongoDB

Authentication and Authorization are key components in web applications to ensure secure user access.

Authentication verifies user identity (e.g., login/signup).

Authorization grants or restricts access based on user roles.

JWT

JWT (JSON Web Token) is a secure token format used to transmit data between parties. It is widely used for authentication and authorization in web applications.

A JWT consists of three parts, separated by dots (.):

Header.Payload.Signature

Header: Contains metadata, including the token type (JWT) and the signing algorithm (e.g., HS256 for HMAC SHA-256).

Payload: Contains claims (user information and other data).

Signature: Ensures data integrity. It is generated using a secret key.

JWT (JSON Web Token) is a compact, self-contained token used for secure communication between the client and server.

JWT in Authentication

1. User logs in with credentials (email & password).
2. Server verifies credentials and generates a JWT.
3. JWT is sent to the client and stored (e.g., in local storage or HTTP-only cookies).

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4. Client includes the JWT in each request's Authorization header (Bearer <token>).
5. Server verifies the JWT, extracts user details, and grants access.

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JWT in Authorization

1. Each request includes the JWT.
2. The server decodes the JWT and checks:
3. Is the token valid? (Signature verification)
4. Has it expired? (Expiration check)
5. Does the user have permission? (Role-based access control)
6. Based on this, access is granted or denied.

Express.js is used for handling server-side logic, while React provides the front-end interface. bcrypt is used for password hashing, and jsonwebtoken for generating JWT tokens.

PROCEDURE

Step 1: Set Up the Project mkdir jwt-auth-app && cd jwt-auth-app npm init -y 1.2 Install dependencies:

npm install express bcryptjs jsonwebtoken cors dotenv mongoose body-parser 1.3 Install development dependencies:

npm install nodemon --save-dev

Step 2: Setting Up the Express.js Server

2.1 Create a file server.js and set up Express:

```
const express = require('express'); const cors
= require('cors'); const mongoose =
    require('mongoose');
const dotenv = require('dotenv');
const authRoutes = require('./routes/authRoutes');


dotenv.config();
```

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```
const app = express();
app.use(cors()); app.use(express.json());
app.use('/api/auth', authRoutes);

mongoose.connect(process.env.MONGO_URI, {
  useNewUrlParser: true, useUnifiedTopology:
  true,
}).then(() => console.log('MongoDB connected'))
.catch(err => console.log(err));

app.listen(5000, () => console.log('Server running on port 5000'));
```

Step 3: Creating the User Model Create a models/User.js file:

```
const mongoose = require('mongoose'); const
UserSchema = new mongoose.Schema({
  username: { type: String, required: true, unique: true },
  email: { type: String, required: true, unique: true },
  password: { type: String, required: true }
});
module.exports = mongoose.model('User', UserSchema);
```

Step 4: Implementing Authentication Routes Create routes/authRoutes.js:

```
const express = require('express');
```



```
const bcrypt = require('bcryptjs'); const jwt
= require('jsonwebtoken');
```

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```
const User = require('../models/User'); const router = express.Router();
const SECRET_KEY = process.env.JWT_SECRET;


// Signup Route  router.post('/signup', async (req, res) => { try { const { username, email, password } = req.body; const hashedPassword = await bcrypt.hash(password, 10);  const user = new User({ username, email, password: hashedPassword }); await user.save();
    res.status(201).json({ message: 'User registered successfully' });
  } catch (error) { res.status(500).json({ error: 'Error registering user' }); }
});


// Login Route  router.post('/login', async (req, res) => { try { const { email, password } = req.body; const user = await User.findOne({ email }); if (!user || !(await bcrypt.compare(password, user.password))) { return res.status(400).json({ error: 'Invalid credentials' });
```

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```
    }  const token = jwt.sign({ id: user._id }, SECRET_KEY, { expiresIn: '1h' });
    res.json({
    token });
  } catch (error) { res.status(500).json({ error: 'Error logging in' }); }
});


module.exports = router;
```

Step 5: Implementing Authorization Middleware

Create middleware/authMiddleware.js: const jwt = require('jsonwebtoken');

const SECRET_KEY = process.env.JWT_SECRET;

module.exports = (req, res, next) => { const token = req.header('Authorization'); if (!token) return res.status(401).json({ error: 'Access Denied' }); try { const verified = jwt.verify(token, SECRET_KEY); req.user = verified; next(); } catch (error) { res.status(400).json({ error: 'Invalid Token' }); }
};

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Step 6: Creating a Protected Route Update routes/authRoutes.js: const authMiddleware = require('../middleware/authMiddleware'); router.get('/profile', authMiddleware, (req, res) => { res.json({ message: 'Protected data', user: req.user });
});

Step 7: Setting Up the React Front-End

7.1 Initialize React App:

npx create-react-app jwt-auth-client cd jwt-auth-client npm install axios react-router-dom **DEPARTMENT**

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7.2 Create Login.js Component:

```
import { useState } from 'react';
import axios from 'axios';

const Login = () => { const [email, setEmail] =
  useState(''); const [password, setPassword] =
  useState(''); const handleSubmit = async (e)
  => {
    e.preventDefault(); const res = await axios.post('http://localhost:5000/api/auth/login', {
      email, password }); localStorage.setItem('token', res.data.token);
  }; return
  (
```



```
    <form onSubmit={handleSubmit}>
      <input type='email' placeholder='Email' onChange={(e) => setEmail(e.target.value)} />
      <input type='password' placeholder='Password' onChange={(e) => setPassword(e.target.value)} />
      <button type='submit'>Login</button>
    </form>
  );
};
export default Login;
```

7.3 Implement Protected Route in App.js:

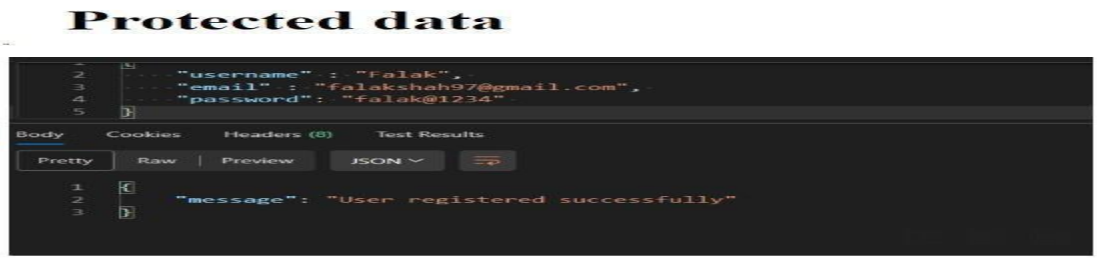
```
import { useEffect, useState } from 'react';
import axios from 'axios';
```

```
const Profile = () => { const [data, setData] = useState('');
  useEffect(()                    =>                    {
```



```
  axios.get('http://localhost:5000/api/auth/profile', { headers: {
  Authorization: localStorage.getItem('token') }
    }).then(res => setData(res.data.message));
  }, []);
  return <h1>{data}</h1>;
};
export default Profile;
```

Observation:



BOOKS AND WEB RESOURCES

[1] **"OAuth 2.0 and OpenID Connect: The Definitive Guide"** – by Aaron Parecki
[2] **JWT Official Website** – https://jwt.io/'
[3] **Auth0 Blog - JWT Authentication Best Practices** – https://auth0.com/blog

CONCLUSION: We implemented user authentication using JWT tokens for a simple login/signup functionality.