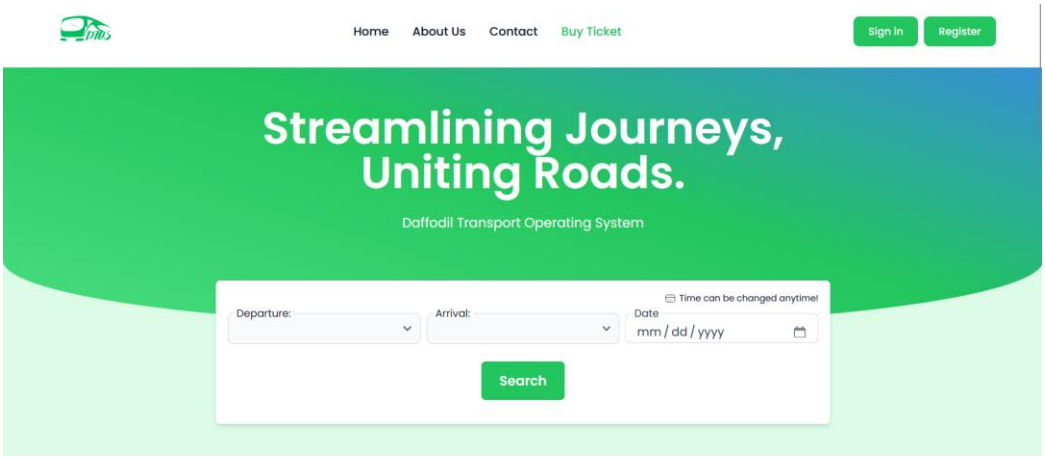
PROJECT REPORT



DTOS - DAFFODIL TRANSPORT OPERATING SYSTEM

Github Repository Link: https://github.com/sulymansifat1/dtos

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Introduction

DTOS (Daffodil Transport Operating System) is an innovative web application developed to streamline the transportation experience for students of Daffodil International University (DIU). The primary function of this system is to allow students to easily purchase bus tickets and search for available bus routes within Dhaka city. By providing a centralized platform, DTOS aims to simplify the process of managing transportation needs, ensuring students can travel efficiently and comfortably. The system is designed with both user and administrative functionalities in mind, featuring user registration, login capabilities, and a robust admin panel that oversees the operations of the website, including bus schedules and ticket management.

Overview of the Project

DTOS is crafted to offer an intuitive and user-friendly interface. The navigation bar at the top of the application includes essential options such as Home, About, Contact, and Buy Ticket, making it easy for users to navigate through the site. Additionally, there are options for user registration and login, which are implemented using modals for a seamless user experience.

The application leverages several modern web technologies to deliver a responsive and dynamic user experience. These technologies include:

- **HTML**: Utilized for the basic structure of web pages, ensuring a solid foundation for the application.
- **Tailwind CSS**: Employed for styling and layout, providing a consistent and visually appealing design across all pages.
- **JavaScript**: Used to add interactivity and dynamic content, enhancing the user experience by making the site more engaging and functional.
- **PHP**: Handles server-side scripting, enabling the processing of user requests and interactions with the database.
- **MySQL**: Manages the database, storing all necessary data such as user information, bus schedules, and ticket details.

Main Features

DTOS is designed with several key features to meet the needs of its users:

- **Home Page**: The home page features a search functionality that allows users to quickly find buses. This feature is essential for students who need to plan their trips from Daffodil Smart City (DSC) to various locations within Dhaka.
- **User Registration and Login**: Accessible via modals, these features allow users to create accounts and log into the system. This ensures that only authorized users can purchase tickets and access personal information.
- **Bus Search**: This feature enables users to search for buses based on their routes. Users can easily find buses traveling from DSC to different areas within Dhaka, making trip planning straightforward and efficient.
- **About Page**: Provides information about the project developers
- **Contact Page**: Allows users to send messages and view contact information. This feature ensures that users can easily reach out for support or inquiries. *not completed.

- **Buy Ticket Page**: Users can purchase tickets directly through the application once logged in. This streamlines the ticket-buying process and eliminates the need for physical tickets. *not completed because it requires laravel packages.
- **Admin Panel**: This feature is crucial for managing the website. The admin panel includes a dashboard for an overview of the system, management of bus information, ticket details, and various website settings.

Objectives of the Project

1. **Ease of Ticket Purchase**: The primary objective of DTOS is to provide DIU students with a simple and efficient method to purchase bus tickets online. By digitizing the ticket-buying process, the application aims to reduce the hassle associated with traditional methods and save time for students.
2. **Efficient Bus Search**: Another key objective is to enable students to quickly search for available buses and view detailed schedules. This feature is designed to help students plan their travel effectively and avoid missing buses due to a lack of information.
3. **Admin Interface**: DTOS includes a comprehensive admin interface for managing bus schedules and ticket information. This ensures that the system can be maintained and updated efficiently, providing up-to-date information to users.
4. **Security and Usability**: Ensuring the system is secure, user-friendly, and scalable is a critical objective. DTOS incorporates various security measures to protect user data and prevent unauthorized access, while the user interface is designed to be intuitive and easy to navigate.
5. **Future Enhancements**: The project also aims to plan for future enhancements. This includes real-time bus tracking using IoT devices and additional admin features to further streamline operations and improve the user experience.

Target Audience

1. **DIU Students**: The primary users of DTOS are the students of Daffodil International University (DIU). These users will utilize the system to purchase bus tickets and search for bus schedules, making their transportation within Dhaka city more convenient and efficient.
2. **DIU Administration**: The administration at DIU will use the system to manage bus schedules and ticket information. They will have access to the admin panel, allowing them to oversee the website's operations and ensure everything runs smoothly.
3. **Future Potential Users**: If the system is expanded, students from other institutions could also benefit from DTOS. This broader user base would allow the system to grow and provide its services to a larger audience, enhancing its utility and impact.

Technical Specifications

Front-end:

1. **HTML5**: Used for structuring the content on the web pages. HTML5 ensures that the content is organized and accessible.
2. **Tailwind CSS**: This utility-first CSS framework is used for styling and layout management. It allows for rapid customization and ensures a consistent design throughout the application.
3. **JavaScript**: Employed for adding dynamic content and interactivity to the web pages. JavaScript enhances user experience by enabling real-time updates and responsive features.
4. **Modals**: Utilized for user registration and login. Modals provide a seamless way for users to interact with the application without navigating away from the current page.

Back-end:

1. **PHP**: The server-side scripting language used to handle requests and interact with the database. PHP processes user inputs, manages sessions, and performs server-side operations.
2. **MySQL**: The database management system used to store user information, bus schedules, and ticket details. MySQL ensures that the data is organized and easily retrievable.

Pages and Functionality

1. **index.html**: The home page, which includes a bus search feature. This is the primary interface where users can initiate their bus search.
2. **search.php**: Handles the search functionality. It processes user queries and interacts with the database to retrieve relevant bus schedules.
3. **searchDetails.php**: Displays the search results, including routes, times, and stops. This page provides detailed information to help users plan their trips.
4. **about.php**: Contains information about the web applications developers.
5. **contact.php**: Features a contact form and displays contact information. Users can send messages and inquiries through this page.
6. **buyticket.php**: The interface for buying tickets, accessible only to logged-in users. This page facilitates the ticket purchasing process.
7. **Admin Panel**: Includes a dashboard for managing bus information, ticket info, and website settings. The admin panel is essential for maintaining the system's operations.

User Roles and Permissions

1. **Users**: Regular users can search for buses, view schedules, and purchase tickets. They have access to the main features of the system.
2. **Admin**: Administrators have additional permissions to manage bus schedules, view and manage ticket information, update website content, and control site availability. This role ensures the smooth operation and maintenance of the system.

Security Measures

1. **Password Hashing**: Ensures secure storage of user passwords. This prevents unauthorized access to user accounts.
2. **Input Validation**: Prevents SQL injection and other vulnerabilities by validating user inputs. This step is crucial for maintaining the security and integrity of the system.
3. **Session Management**: Secure handling of user sessions to prevent session hijacking and other security threats.
4. **Future Measures**: Plans to implement IoT devices for real-time bus tracking. This will enhance the system's functionality and security by providing up-to-date information on bus locations.

Database Design

Table Structures:

1. **Users Table**: Stores user information, including usernames, passwords, and contact details.
2. **Buses Table**: Contains bus schedules and details such as routes, timings, and stop points.
3. **Tickets Table**: Stores ticket information, including purchase details and user associations.

Code Structure

The project directory is organized to separate the admin section from common includes and user section files.

Admin Section:

- **admin/ajax/settings_cred.php**: Handles AJAX requests for settings.
- **admin/img/**: Directory for admin images.

Common Includes (inc):

- **contact.php**: Handles contact form submissions.
- **db_config.php**: Database configuration and connection setup.
- **essentials.php**: Essential functions and utilities.
- **head.php**: HTML head section for including meta tags and title.
- **link.php**: CSS and JS link includes.
- **loader.php**: Loading spinner or animation.
- **busDetails.php**: Displays bus scheduling info from the MySQL server.
- **dashboard.php**: Admin dashboard overview.
- **delete.php**: Handles deletion of buses.
- **index.php**: Admin home page.
- **logout.php**: Handles admin logout.
- **settings.php**: Admin settings page.
- **tickets.php**: Displays ticket information. *not completed

User Section:

- **img/**: Directory for user-related images.
- **inc/footer.php**: Footer section of the website.
- **inc/header.php**: Header section including navigation bar.
- **inc/link.php**: CSS and JS link includes.
- **inc/loader.php**: Loading spinner or animation.
- **inc/login.php**: Login modal and processing.
- **inc/logout.php**: Logout processing.
- **inc/profile.php**: User profile page.
- **inc/register.php**: Registration modal and processing.
- **inc/search.php**: Search bus functionality.

Database Connection and Queries

```
<?php
$hname = 'localhost';
$uname = 'root';
$pass = '';
$db = 'dtos';

$con = mysqli_connect($hname, $uname, $pass, $db);

if (!$con) {
    die("Cannot connect to database: " . mysqli_connect_error());
}
function filteration($data)
{
    foreach ($data as $key => $value) {
        $data[$key] = trim($value);
        $data[$key] = stripslashes($value);
        $data[$key] = htmlspecialchars($value);
        $data[$key] = strip_tags($value);
    }
    return $data;
}

function select($sql, $values, $datatypes)
{
    global $con;
    if ($stmt = mysqli_prepare($con, $sql)) {
        mysqli_stmt_bind_param($stmt, $datatypes, ...$values);
        if (mysqli_stmt_execute($stmt)) {
            $res = mysqli_stmt_get_result($stmt);
            mysqli_stmt_close($stmt);
            return $res;
        } else {
```

```
            mysqli_stmt_close($stmt);
            die("Query cannot be executed -select");
        }
    } else {
        die("Query cannot be prepared - select");
    }
}

function update($sql, $values, $datatypes)
{
    global $con;
    if ($stmt = mysqli_prepare($con, $sql)) {
        mysqli_stmt_bind_param($stmt, $datatypes, ...$values);
        if (mysqli_stmt_execute($stmt)) {
            $res = mysqli_stmt_affected_rows($stmt);
            mysqli_stmt_close($stmt);
            return $res;
        } else {
            mysqli_stmt_close($stmt);
            die("Query cannot be executed -update");
        }
    } else {
        die("Query cannot be prepared - update");
    }
}

function delete($sql, $values, $datatypes)
{
    global $con;
    if ($stmt = mysqli_prepare($con, $sql)) {
        mysqli_stmt_bind_param($stmt, $datatypes, ...$values);
        if (mysqli_stmt_execute($stmt)) {
            $res = mysqli_stmt_affected_rows($stmt);
```

```
            mysqli_stmt_close($stmt);
            return $res;
        } else {
            mysqli_stmt_close($stmt);
            die("Query cannot be executed - delete");
        }
    } else {
        die("Query cannot be prepared - delete");
    }
}
function insert($sql, $values, $datatypes)
{
    global $con;
    if ($stmt = mysqli_prepare($con, $sql)) {
        mysqli_stmt_bind_param($stmt, $datatypes, ...$values);
        if (mysqli_stmt_execute($stmt)) {
            $res = mysqli_stmt_affected_rows($stmt);
            mysqli_stmt_close($stmt);
            return $res;
        } else {
            mysqli_stmt_close($stmt);
            die("Query cannot be executed - insert");
        }
    } else {
        die("Query cannot be prepared - insert");
    }
}
?>
```

Browser Compatibility Testing

Testing Browsers:

1. **Chrome**
2. **Firefox**
3. **Safari**
4. **Edge**

Issues to Look For:

- **Rendering Issues**: Ensuring that the web pages display correctly across different browsers.
- **Layout Problems**: Verifying that the layout is consistent and responsive.
- **Functional Bugs**: Identifying any functional discrepancies or errors.

Challenges Faced and Lessons Learned

Challenges:

1. **Integrating Different Technologies**: Seamlessly integrating HTML, Tailwind CSS, JavaScript, PHP, and MySQL was a significant challenge.
2. **Ensuring Security and Data Integrity**: Implementing robust security measures to protect user data and ensure system integrity.
3. **Handling Dynamic Content and User Interactions**: Efficiently managing dynamic content and user interactions to provide a smooth user experience.

Lessons Learned:

1. **Importance of Thorough Planning and Testing**: Proper planning and rigorous testing are crucial for the successful implementation of a web application.
2. **Effective Use of Frameworks and Libraries**: Utilizing frameworks and libraries can significantly enhance development efficiency and application performance.
3. **Continuous Improvement and Scalability Considerations**: Planning for scalability and continuous improvement ensures that the application can grow and adapt to future needs.

Future Scope and Enhancements

Additional Features:

1. **Real-time Bus Tracking**: Implementing IoT devices to track bus locations in real-time.
2. **QR Code Ticketing**: Automatically generating QR codes for ticket validation.

Scalability and Optimizations:

1. **Implement Caching and Load Balancing**: To improve performance and handle a larger user base.
2. **Optimize Code and Database Queries**: Ensuring efficient code and database operations to support scalability.

Conclusion

DTOS is designed to offer a comprehensive solution for DIU students to manage their transportation needs efficiently. By incorporating features such as bus search, ticket purchasing, and administrative management, DTOS significantly enhances the user experience for both students and administrators. The system's intuitive interface and robust functionality simplify the process of finding and booking bus routes within Dhaka city, ensuring that students can focus more on their studies and less on logistical concerns.

The current features of DTOS already provide a solid foundation for managing transport requirements. However, future enhancements are set to further elevate its functionality and user-friendliness. Planned updates include real-time bus tracking using IoT devices, which will allow users to see the exact location of buses in real-time, reducing wait times and increasing convenience. Additionally, the introduction of QR code ticketing will streamline the ticket validation process, making it faster and more secure.

DTOS addresses the present transportation challenges faced by DIU students by offering a reliable and user-friendly platform for bus scheduling and ticketing. By focusing on scalability and continuous improvement, the system is well-prepared to adapt to the growing needs of its users. This forward-thinking approach ensures that DTOS will remain a relevant and invaluable tool for DIU students, capable of evolving with technological advancements and user expectations. Overall, DTOS stands out as a robust, scalable, and innovative solution, perfectly tailored to meet the unique transport needs of DIU students.