

City Of Tshwane

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Interactive Development 200

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Project Proposal: City of Tshwane Electricity Token Automation Application

1. Problem Statement

The current process of manually entering electricity tokens into metre boxes is time-consuming and inconvenient, particularly for users who are away from their premises. This can cause delays in power supply, especially when users need an immediate electricity top-up but cannot physically access their metre box.

Significance:

This problem affects a wide range of electricity consumers, causing potential disruptions in both residential and business environments. By allowing users to purchase electricity tokens via an app and automating the token insertion into their metre boxes, this project will enhance user convenience and ensure a seamless power supply.

Solution:

The application will enable users to purchase electricity through the City of Tshwane app. After payment approval through integrated banking services, the tokens will either be automatically sent to the user's metre box or manually entered by the user. This will eliminate the need for the user to be physically present.

2. Target Audience

The primary users of the application will include:

- Residents of Tshwane: Homeowners and tenants who regularly purchase prepaid electricity.

- Business Owners: Commercial establishments that use prepaid electricity and require uninterrupted power supply.

- Remote Users: People travelling or away from their premises who still need to manage their electricity.

Benefit:

The app will provide a seamless experience, eliminating the need for manual token input. Users will benefit from the convenience of having electricity tokens automatically applied to their meter, ensuring continuous power supply, even in their absence.

3. Technology Stack

I will be using the LAMP stack (Linux, Apache, MySQL, PHP), combined with CSS, GSAP (GreenSock Animation Platform), and SCSS for styling and animation, due to the following reasons:

- Linux: For a stable and secure server environment.
- Apache: As a robust and widely-used web server for hosting the application.
- MySQL: A relational database to efficiently manage user data, transactions, and token information.
- PHP: For dynamic server-side scripting and managing CRUD operations.
- CSS/SCSS: To ensure a responsive and visually appealing user interface.
- GSAP: To enhance user experience through smooth animations and transitions.

4. Application Features

The main features of the app include:

1. User Registration and Login: Secure account creation and login system for users.
2. Electricity Purchase: Users can purchase prepaid electricity using their linked bank accounts.

3. Automatic Token Application: After successful payment, tokens are automatically sent to the user's meter box.

4. Manual Token Entry: Users can opt to input the token manually if preferred.

5. Transaction History: Users can access their past electricity purchases and token usage.

CRUD Operations:

- Create: Users can register new accounts, and new transactions will be recorded after each purchase.

- Read: Users can retrieve their transaction history and meter information.

- Update: Users can update their profiles or modify meter settings.

- Delete: Users can delete their account or old transaction records.

5. Database Design

The database will consist of the following key tables:

1. Users: Stores user information, including name, address, meter details, and bank account information.

2. Transactions: Logs all electricity purchases, including token codes, meter ID, and purchase time.

3. Meters: Links meter box IDs to user accounts.

The design will use **third normal form (3NF)** to reduce redundancy and optimize queries, ensuring efficient storage and retrieval of information.

6. User Interface and Experience

The user interface will focus on simplicity, clarity, and functionality:

- Responsive Design: CSS and SCSS will be used to make the application accessible across various devices, including smartphones and tablets.

- Smooth Animations: GSAP will provide fluid transitions and animations to improve the user experience.

- Minimal Steps: Users can purchase electricity and send tokens with just a few clicks.

7. Security Considerations

Security is critical in an application involving financial transactions and user data.

Potential risks and their mitigation strategies include:

1. Data Breaches: Secure sensitive user data through encryption, including bank account and meter information.

2. Fraudulent Transactions: Implement strong authentication and validation mechanisms to prevent unauthorised purchases.

Mitigation Strategies:

- Encryption: Use SSL to encrypt all sensitive data transmitted between the server and users.
- Input Validation: Prevent attacks such as SQL injection by validating all user inputs.
- Authentication: Implement two-factor authentication to add an additional layer of security.

8. Project Timeline

Stage	Duration	Milestones
Planning & Research	2 weeks	Analyse the problem and define solution
Backend & Database Setup	3 weeks	Set up PHP, MySQL database, and APIs
Frontend Development	3 weeks	Design UI with CSS/SCSS and integrate GSAP

Integration & Testing	2 weeks	Test payment system, automatic token submission
Deployment	2 weeks	Deploy the application on server

9. Challenges and Risks

- Bank Integration: Working with different banks may cause delays due to varying integration protocols.

- Mitigation: Start communication early with bank representatives and perform integration tests during development.

- Metre Compatibility: Not all metres may support automatic token application.

- Mitigation: Conduct tests with various types of metres to identify compatibility issues and work on solutions.

10. Conclusion

This application aims to streamline the electricity purchasing process for residents and businesses in Tshwane. By automating the token entry process and integrating secure payment solutions, users will experience greater convenience, saving time and ensuring constant access to electricity. This project will have a positive impact on the daily lives of users by providing a modern, efficient solution to a common problem.