**Abstract**

The **Food Wastage Management System** is a technology-driven solution designed to combat the growing problem of food waste by promoting responsible food donation and redistribution. In today’s world, millions of people face food insecurity while tons of edible food are wasted daily. This web-based application seeks to bridge this imbalance by providing a platform that connects food donors—such as restaurants, grocery stores, and households—with individuals and organizations in need, such as NGOs, shelters, and community kitchens. The goal is to ensure that surplus food, which would otherwise be discarded, reaches those who can benefit from it.

This system enables users to register as either donors or receivers, allowing them to interact based on their roles. Donors can list surplus food items with detailed information, including the quantity, type of food, preparation/expiry time, and location. Receivers can browse through available donations in real time, filtered by location and food type, to claim what suits their requirements. Additionally, features like pickup scheduling, real-time notifications, and geo-tagging ensure timely and efficient logistics for food redistribution.

The application also focuses on increasing awareness about the impact of food wastage. It provides educational tips and strategies to users on how to reduce waste at the source. To ensure long-term effectiveness, the system incorporates a waste tracking dashboard that logs and analyzes donation patterns. This feature helps users and administrators identify peak waste periods, popular food items, and potential bottlenecks in the donation flow.

Moreover, the platform maintains a complete history of donations, helping users review past activities and enabling transparent reporting. Administrators can generate detailed reports to evaluate the volume of food saved, the number of beneficiaries reached, and overall impact. This data-driven approach not only encourages responsible behavior but also empowers NGOs and community organizations to manage resources more effectively.

Built with a combination of HTML, CSS, JavaScript on the frontend and PHP or Python on the backend, the system uses a MySQL database to store critical data such as user information, donation records, and logistical details. It emphasizes security, user-friendliness, and scalability, making it suitable for deployment at local, city, or even national levels. Overall, the **Food Wastage Management System** is a practical and impactful project that demonstrates how digital solutions can address real-world problems through community engagement, data analytics, and efficient coordination.

**Introduction**

Food wastage has emerged as one of the most alarming global challenges in recent decades. While millions of people go to bed hungry every day, vast amounts of edible food are discarded by households, supermarkets, restaurants, and other establishments. The issue is not just ethical but also environmental and economic—wasting food means wasting the water, energy, labor, and money invested in producing it. The **Food Wastage Management System** is conceptualized to tackle this paradox by creating a digital platform that connects surplus food sources with people or organizations that need it.

In urban and semi-urban areas, food surplus often results from bulk cooking, unsold goods, or misjudged inventory needs. Unfortunately, due to lack of coordination, information, or infrastructure, this excess food ends up in landfills rather than being redirected to those in need. This project aims to eliminate that gap using a web-based application that is accessible, transparent, and efficient.

The system allows different types of users to register on the platform: **donors** (such as restaurants, grocery stores, and households) and **receivers** (such as NGOs, shelters, and food banks). Once registered, donors can post available surplus food along with important details like quantity, category (cooked, fresh produce, packaged), and expiration time. Receivers can view these listings in real time and claim donations that are logistically feasible. To further streamline the process, features such as pickup scheduling, SMS/email notifications, and location-based matching are integrated into the platform.

In addition to logistical facilitation, the application also plays an educational role. It promotes responsible food consumption and disposal habits by offering actionable tips and statistics that help users understand the broader consequences of food wastage. For example, the dashboard shows the cumulative amount of food saved and environmental benefits such as CO₂ emissions prevented.

Another critical aspect of this platform is the inclusion of data analytics and reporting tools. By analyzing historical data, administrators and stakeholders can observe trends in food donation and wastage. These insights can then be used to refine outreach strategies, improve logistics, and scale the system to cover more geographical areas.

Ultimately, the **Food Wastage Management System** is more than just a technical solution—it is a step towards building a more equitable and sustainable society. By fostering collaboration between community members, businesses, and charitable organizations, the platform aims to significantly reduce food wastage and ensure that surplus resources are directed to where they are most needed.

### ****Scope****

The scope of the **Food Wastage Management System** encompasses the development and deployment of a centralized, user-friendly web application that facilitates food donation, distribution, and waste reduction. The system is aimed at serving as a bridge between individuals or entities with surplus food and those who are in need of it. The target users include restaurants, grocery stores, households (as **donors**), and charitable organizations such as shelters, food banks, and NGOs (as **receivers**).

This system is designed to function in urban, semi-urban, and potentially rural areas where internet access is available. The main focus lies in providing real-time listing, matching, and notification services that enable quick redistribution of food before it perishes. Additionally, the platform will support scheduling of pickups and deliveries either manually or automatically based on predefined preferences, minimizing delays and maximizing freshness.

Apart from facilitating food sharing, the platform is also educational. It will include a section dedicated to raising awareness about the impact of food waste and offer practical tips to both individuals and organizations on minimizing wastage. The system also includes a **Waste Tracking Dashboard** for users to view patterns in their contributions or needs over time.

The web application will be scalable, allowing for future additions such as mobile app integration, integration with third-party delivery services, multilingual support, or even blockchain-based transparency features. Security is an integral part of the scope, ensuring user authentication, secure data storage, and compliance with local food safety and data protection regulations.

In summary, the scope includes:

* User account management (Donors, Receivers, Admins)
* Real-time food listing and browsing
* Pickup scheduling and notifications
* Geo-tagging and location-based suggestions
* Reporting, analytics, and history logs
* Educational content and awareness tools
* Scalable architecture for future expansion

The ultimate goal is to create a solution that is technically sound, socially impactful, and practically scalable across regions and user types.

### ****Problem Statement****

Food wastage remains one of the most significant challenges across both developed and developing nations. On one hand, large quantities of edible food are discarded daily by households, grocery chains, and restaurants due to overproduction, mismanagement, or aesthetic standards. On the other hand, millions of people face hunger, food insecurity, and malnutrition due to lack of access to affordable and nutritious food.

This dichotomy is a consequence of several factors: lack of awareness, logistical challenges, absence of communication between donors and receivers, and the absence of a centralized system to manage food redistribution. Moreover, even when people are willing to donate, they may not know how or where to channel their excess food in a timely manner. On the receiving end, charitable organizations often struggle to locate donors or are unaware of available surplus resources within their locality.

Current food donation processes are largely informal and inefficient. There is no proper tracking of how much food is saved, how many people it helps, or how donations can be optimized. There is also minimal community involvement and accountability. As a result, food continues to go to waste while hunger remains rampant.

Therefore, there is a pressing need for a structured, accessible, and transparent system that addresses these gaps. The **Food Wastage Management System** is developed as a digital platform to solve this problem by:

* Providing a structured interface for donation and reception of food.
* Offering real-time matching based on location and food availability.
* Reducing logistical barriers through pickup scheduling and notifications.
* Raising awareness and promoting behavioral change to prevent wastage at the source.

This system aims to create a sustainable food ecosystem by ensuring that food reaches those who need it most before it becomes waste.

### ****Objective****

The **Food Wastage Management System** project is driven by the goal of reducing food waste and promoting efficient food redistribution through a digital, community-driven platform. The primary objectives of this system are outlined below:

1. **To facilitate the donation of surplus food**: The system allows restaurants, grocery stores, and households to log and list excess food items with detailed descriptions, ensuring that food that is still fit for consumption reaches those in need.
2. **To connect donors and receivers efficiently**: The system creates a direct and immediate connection between those who have food and those who need it. Through real-time location-based listings and notifications, it bridges the gap caused by lack of communication.
3. **To promote transparency and accountability**: Every food transaction (donation and reception) is logged and maintained in a secure database. This not only builds trust among users but also allows for impact tracking through analytics and reports.
4. **To encourage responsible behavior through awareness**: By integrating food waste prevention tips and educational content, the platform aims to change user behavior and reduce food waste at the source itself.
5. **To optimize logistics**: With pickup scheduling, time-based donation expiries, and geolocation matching, the system ensures that food is distributed in a timely and efficient manner, reducing spoilage and ensuring freshness.
6. **To provide useful analytics and insights**: Admins and organizations can track the amount of food saved, donation frequency, peak wastage periods, and other important data points. This helps in decision-making and strategy planning.
7. **To support scalability and adaptability**: The system is designed to handle growing user bases and can be extended to include mobile apps, API integrations, and more sophisticated features as needed.

**Functional Requirements**

Functional requirements describe what the system should do. They define the core functionalities that the **Food Wastage Management System** must implement to fulfill its purpose.

1. **User Registration and Login**
   * The system must allow new users to register either as **Donors** (households, restaurants, grocery stores) or **Receivers** (NGOs, shelters, food banks).
   * Each user should provide basic information like name, email, contact number, and location.
   * The system must support secure login using email/username and password.
   * Passwords should be stored securely using hashing algorithms.
2. **User Roles and Access Control**
   * Donors can create, edit, and delete food donation entries.
   * Receivers can browse available donations, request food, and schedule pickups.
   * Admins can monitor platform activity, approve/reject users if needed, and manage reports and analytics.
3. **Food Donation Logging**
   * Donors must be able to log donations by entering the food type, quantity, expiry time, and a short description.
   * The donation should be tagged with the donor’s location and availability window.
   * An option to upload images of the food can be provided for quality assurance.
4. **Food Search and Filtering**
   * Receivers must be able to search for food items based on categories (e.g., cooked, raw, packaged), expiry time, and donor location.
   * Filtering by date, distance, or availability must be supported.
5. **Pickup and Delivery Scheduling**
   * The system should enable donors and receivers to schedule pickup times.
   * Notifications via email or SMS should be sent to both parties upon confirmation.
   * Optionally, a delivery partner can be integrated into the future.
6. **Real-Time Notifications**
   * Whenever a new donation is posted, nearby receivers should get an alert.
   * Notification settings can be customized based on user preferences.
7. **Geo-Tagging and Maps Integration**
   * The system must use location services to match donors and receivers in close proximity.
   * Google Maps API (or similar) should be integrated to display donor and receiver locations.
8. **Donation History and Logs**
   * Both donors and receivers should be able to view their transaction history.
   * Logs should include timestamps, food details, and recipient information.
9. **Waste Tracking Dashboard**
   * The dashboard must display total donations, food saved (in kg), and estimated number of people helped.
   * Patterns of wastage and impact metrics should be visualized using charts and graphs.
10. **Tips and Awareness Section**

* The system must have a section dedicated to food waste reduction tips, storage best practices, and educational content.
* Articles, images, and videos can be included.

**Non-Functional Requirements**

These requirements define the quality attributes of the system. They are not about specific behavior but about how the system performs under different conditions.

1. **Performance**
   * The system should handle multiple concurrent users without noticeable lag.
   * Donation listings and search results should load within 2 seconds.
2. **Scalability**
   * The system should be designed to accommodate a growing number of users, donations, and locations without major reengineering.
   * Modular code and REST APIs should be used for scalability.
3. **Usability**
   * The interface should be clean, intuitive, and mobile-friendly.
   * Users with no technical background should find the system easy to navigate.
4. **Security**
   * Passwords must be stored using hashing (bcrypt or Argon2).
   * Sessions must be managed securely using HTTPS and token-based authentication.
   * Input validation and anti-SQL injection techniques must be implemented.
5. **Maintainability**
   * The codebase should be well-documented.
   * The architecture must allow easy updates or new feature integration.
6. **Availability and Reliability**
   * The system should aim for high availability (at least 99.5% uptime).
   * Failover mechanisms and backups should be planned.
7. **Localization Support**
   * While the default language is English, the system should support future translation into local languages for wider reach.
8. **Data Integrity and Accuracy**
   * The system must ensure that donation records are not lost or corrupted.
   * Time-sensitive data (e.g., expiry dates) must be handled with precision.
9. **Responsiveness**
   * The web application must work across all modern browsers and devices (desktop, tablet, and mobile).
10. **Legal and Ethical Compliance**

* The application must adhere to local laws concerning food safety, data protection (like GDPR), and ethical sharing.

**Software Requirements**

* **Operating System:** Windows 8 or later / Windows Server 2008 or later
* **User Interface:** Web-based using HTML, CSS, and Bootstrap for responsive design
* **Scripting Language:** PHP (Server-side scripting)
* **Database:** MySQL for data storage and management

**Hardware Requirements**

* **Processor:** Intel Pentium IV or higher
* **Hard Disk:** Minimum 40 GB of available storage
* **RAM:** 512 MB or more (1 GB or higher recommended for smoother performance)

**Architecture Diagram**

The above mentioned Architecture Diagram consists of 3 Layers

* Front End Layer
* Middle Layer
* Database Layer

**1. Front End Layer**

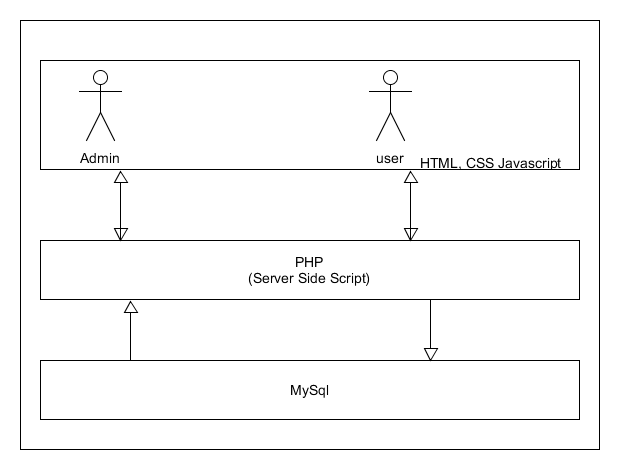
The front end of the application is developed using the HTML, JAVA Script, CSS and the Bootstrap technology. This application helps in making the application more effective and perfect. so that the every end user of the application understand the working of the application.

**2. Middle layer**

In our project to interact between the actors and the database is done by the middle layer is used. The PHP is used to interact between the user and the database. So that the data is stored effectively in the database and helps them to easy to fetch and display from the database.

**3. Database Layer**

The MYSQL database is used to store the data into database. The effective analysis is done to create the database design and to store the data. The every actions related from the front end are accessed from the database by the PHP.

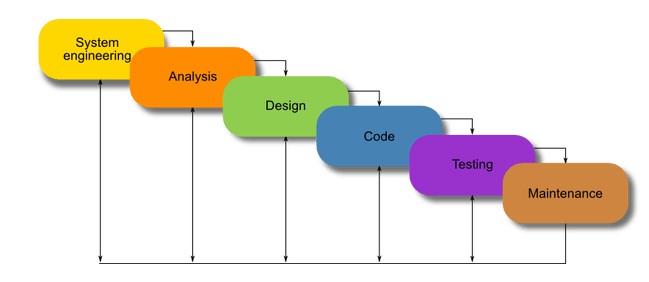
**Architecture Diagram**

**Software Engineering Model Used**

**Waterfall Model**

Waterfall model is the earliest SDLC approach that was used for software development. It is also referred to as a linear-sequential life cycle model. It is very simple to understood and use. In a waterfall model, each phase must be completed before the next phase can begin and there is no overlapping in phases.

Following is a diagrammatic representation of distinct phases of waterfall model.



**Waterfall Model**

In “The Waterfall” approach, the full process of software development is divided into separate phases. In Waterfall model, typically, the outcomes of one phase act as the input for the next phase sequentially. The sequential phases in Waterfall model are:

• **Requirement Gathering and analysis**

All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document.

• **System design**

The requirement specifications from first phase are studied in this phase and system design is prepared. Design helps in specifying hardware and system requirements and also helps in defining overall system architecture.

• **Implementation**

With inputs from system design, the system is first developed in small programs called units, 0020which are integrated in the next phase. Each unit is developed and tested for its functionality which is referred to as Unit Testing.

• **Integration and Testing**

All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.

**Conclusion and Future Enhancements**

**Conclusion**  
The **Food Wastage Management System** presents a thoughtful and effective digital solution to one of society’s pressing challenges: the wastage of edible food. By bridging the gap between food donors (restaurants, grocery stores, households) and receivers (NGOs, shelters, and individuals in need), the system not only minimizes food wastage but also promotes a culture of sharing and sustainability.

The system offers a structured and user-friendly platform that ensures surplus food is utilized before it goes to waste. It empowers users to take control of their contributions and consumption habits while providing data-driven insights that help track and reduce wastage over time. Features like geo-tagging, pickup coordination, donation history, and real-time alerts make the platform practical and impactful. Furthermore, the inclusion of educational resources fosters long-term behavioral change among users.

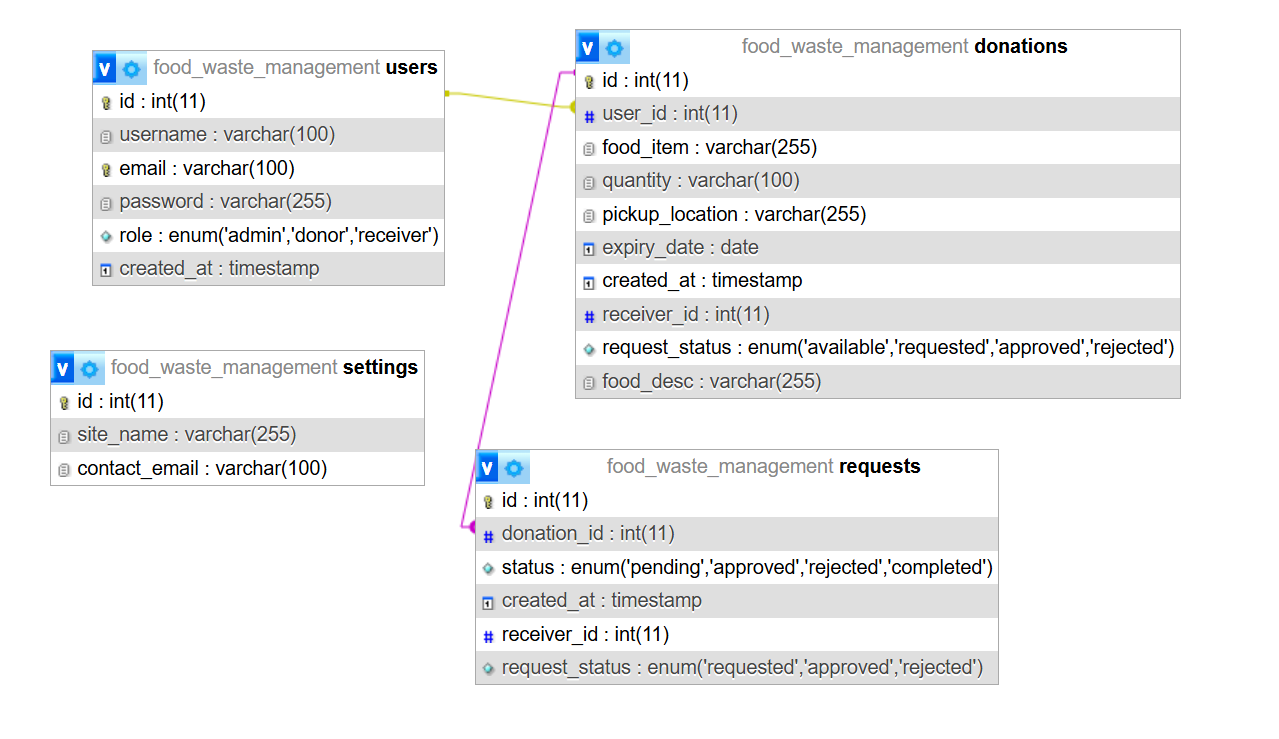
From a development standpoint, the project allows students and developers to gain real-world experience in web technologies, user experience design, database management, and problem-solving with a social purpose. It also opens doors for integration with larger food networks, governmental organizations, and smart logistics systems in the future.

In essence, the system serves as a digital bridge for communities to work together in the fight against food wastage, combining technology with social good.

**Future Enhancements**  
To expand the reach and impact of the system, several improvements and additional features can be considered in future iterations:

1. **Mobile Application Integration**
   * Develop native Android and iOS apps to improve user accessibility and enable on-the-go interactions.
2. **AI-Based Demand Prediction**
   * Use machine learning algorithms to predict areas and times of high food demand based on historical data and weather patterns.
3. **Integration with Government and NGOs**
   * Collaborate with local authorities or national programs that support food redistribution for policy-level backing and wider adoption.
4. **Barcode Scanner for Packaged Foods**
   * Allow donors to scan barcodes to auto-fill donation forms with food type, expiry date, and other details.

**DB Design**

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