



Proposal for the design of Foodify - an online Food Management System

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RunTime Terror

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Submitted to—

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Executive Summary

This proposal is to introduce a web application that allows its users to track their food items and encourages a reduction in food wastage by them. The web application is called Foodify. Anyone can use this web application by simply using their email address to register as a user. A registered user can insert food items under their account. The expiry date of the item will be required and will be tracked. When a food item has been consumed fully, the user can delete the item from their list of items. If left unconsumed, the user will receive email notifications close to the expiry date and suggestions on how to cook and consume the food items immediately. Alternatively, the user can opt to put up a post in the web application's Market page to seek people who would be interested in buying the food item for a negotiable price. Using the different features of the web application, users can better monitor and save food from being wasted unnecessarily.

Statement of Problem

Food wastage has been an incessant global issue for a long time now. It is estimated that one-third of all global foods are wasted annually [1]. With some parts of the world in extreme hunger and some wasting colossal amounts of food, food management is definitely a necessity in today's world. Especially in Singapore, each Singaporean household is found to contribute an average of 1.5kg of food waste everyday [2]. Furthermore, a study of food wastage behavior in Singapore discovered that about 40% of food wastage happens at the final consumer level and that production level or retail level food wastages were not major contributors to food wastage [3]. With knowledge on the extent of food wastage in Singapore and its main contributor, working towards addressing this issue would be very crucial. Singaporeans also share the same sentiment as the above-mentioned study on food wastage behaviour in Singapore also found through surveying that a wide number of participants, who expressed a desire to reduce their food wastage in the future, hoped to do so by minimizing the discarding of unconsumed food [3]. As such, to aid contributors of food wastage to work towards reducing food wastage in the easiest and most desired way by them, an accessible and efficient food management system would be the perfect solution.

Objectives

This document proposes a design and implementation plan for a web application meant to run an online, user-based food management system. This system's two main objectives are:

1. Reduce food wastage due to negligence towards expiry date of food items

In order to achieve the first objective, the user will receive notifications from the web application on the following occasions:

- I. 10 days before the expiry of food item
- II. 5 days before the expiry of food item
- III. Last 3 days till the expiry of food item

These notifications are intended to reduce user negligence to the expiry date of food items by constantly reminding them.

Along with notifications, users will also receive suggested recipes involving the food items that are about to expire to encourage consumption of the item before expiry. Upon expiry, the registered food item will automatically be removed from the user's account.

2. Reduce food wastage due to inability to consume food items by the expiry date.

In case of user inability to consume food before expiry, a 'Market' page also exists to allow users to put up their food items for sale in order to prevent them from going to waste. If interested, viewers of the Market page can click the chat icon to start a private chat with the seller, allowing price negotiation and meet-up

details to be discussed. If the buyer would no longer like to purchase the food item, they can simply select the 'End Chat' button and exit the chat, else they can proceed with payment (managed by an external vendor). If unbought upon expiry of the food item, any post regarding the food item will be automatically removed.

By consistently using this web application, users are able to cut down on their food wastage by either remembering to consume foods or giving them away before expiration, thereby, fulfilling the objectives of the web application.

Technical Approach

We are going to develop a web application that is easy to access to everyone. By developing a web application, we allow users to use our application just by logging into their account without the need of downloading a software application.

Customer Needs

Food waste problems may come from different causes. According to [4], on the customer's side, food waste comes from three sources: food scraps, expiring goods, and uneaten food. Our application is intended to solve the problem of expiring and uneaten food. According to [5], S\$257 worth of food is wasted per household annually and one-third of the respondents throw away more than 10% of food weekly. From the survey we conducted with 71 NTU students, we found that 66.2% of students say they are not mindful of the expiry dates, 88.7% students want to exchange or give their food away if they think they cannot finish by the expiry date and 83% students would like to have an application to maintain the expiry dates. To our acknowledgment, there has been no such application available for use in the market. Therefore, it would be beneficial if we could develop an application for the need of managing food expiry dates and provide a platform for exchanging food. Our application helps reduce not only the resources and money wasted by expired food but also the hassle of remembering food expiry dates.

Target Specifications

Our application has three main features: food items expiry date reminder, recipes recommendation and food exchange Market page. Users can log in using their account and specify their basic information including username, password, email. With the food items expiry date function, users can add food items with respective expiry dates. The system would remind the user to consume the food 10 days before, 5 days before, and last 3 days till the expiry date. The system also has the function to suggest meal recipes to cook based on the existing expiring items for users to refer. Moreover, the application also has the function to exchange food by posting it to a Market page.

The application would be an all-in-one application that helps users to manage the food expiry date and find better ways to consume, by either consuming themselves or exchanging.

The application will not only help to reduce food resources being wasted but also help to reduce the money wasted on food and the effort to remember and manage them.

These specifications mentioned above will satisfy the identified customer needs.

Technology Consideration

A web application is our choice of technology to make the application usable without downloading any resource. Our choice of technology was made keeping our target user in vision. Seamless integration with the technology stack shall enable a near immaculate user experience.

We require certain technologies for the functionality of this application.

Technology	Purpose
Cloud Firestore (Firebase)	Cloud-hosted and scalable NoSQL database which is intuitive to use and is embedded into the backend service of Foodify.
Firebase	Suite of tools for building our web application on top of Google Cloud. It is a Backend-as-a-Service (BaaS) platform whose features include realtime database, user authentication, push messaging, file storage and more.
React JS	JavaScript library for building user interfaces for Foodify web application.
Chromium Browser	A browser supporting JavaScript to allow for testing of Foodify web application.

System Architecture/Platform

We prefer the Data-centered architecture where Clients (JavaScript Web-application) may communicate with the Firebase central data storage. This architecture allows scalability as multiple users can communicate with the cloud database.

Platform/Tool	Description
Git	Distributed Version Control System (VCS) and Source Code Management.
GitHub	Code collaboration platform integrated with Git.
GitHub Actions	Workflow automation tool integrated with CI/CD pipelines.
VSCode	Streamlined code editor with support for development operations like debugging, task running and version control. It has also embedded Git.
Figma	Tool used for UI prototyping.
Google Cloud Platform	Fully managed backend infrastructure on the cloud.

Project Management

We use an incremental development model for our SDLC where we gather customer requirements and come up with a prototype and design our project by revisiting and readjusting our design as the project progresses. By doing the design of use cases, then Front-End and Back end Development of the product iteratively, we are able to improve the quality of our products and give more customer satisfaction as well. Additionally, we can come up with planning for change management and product release,

and testing of the application by QA and perform testing on our product continuously before the final release too.

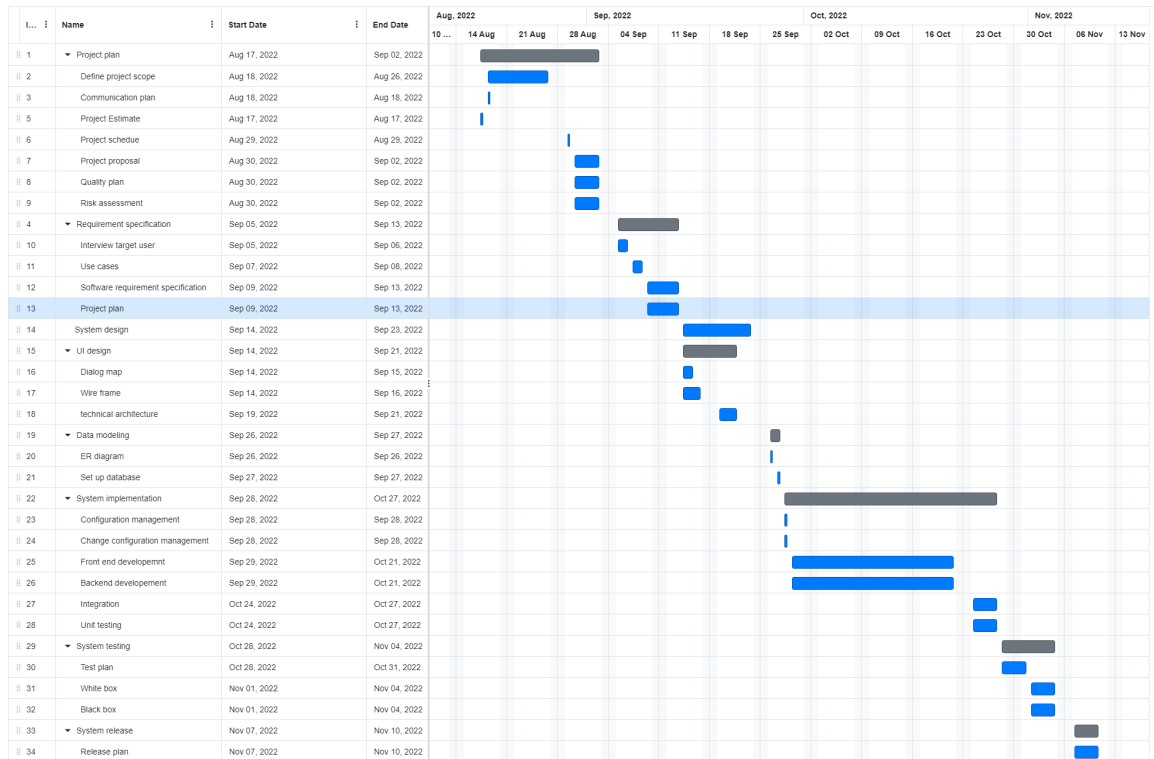


Figure 1: Proposed Gantt Chart for Project Development Timeline

Deliverables

Project deliverables will be a fully-functioning web application Foodify and complete documentation for building and maintaining the web application.

The web application will contain the functions mentioned above in the *Objectives* segment.

The documentations will include meeting minutes, use case models, requirements documentation, test documentation, version histories and so on.

Budget

The proposed budget for the project will include three parts:

Labor expenditure

Project manager will receive \$15,000 dollars as the overall leader of the project. The remaining team members will receive \$5,000 each for their contributions towards the project deliverables.

Capital Expenditure:

To efficiently work on the project, team members would need resources such as a Dell computer (estimated to be \$1000 each computer), a HP printer (estimated to be \$1200) for easy discussion of documentation during meetings. Furthermore, standard operational requirements such as Technology license (estimated to be obtained for \$2000 from Amazon), Oracle Development SDK (estimated to be \$5000) and Oracle Database (estimated to be \$15,000).

Operational Expenditure:

Renting an office would be necessary to provide the required space for team members to work together in the project. A suitable office rental at NTU will cost an estimated \$6000. Additionally, considering the visitations that might be required to consult and collaborate with sponsors, each member of the team is allocated a \$800 allowance for travel via taxi to save travel time.

Table 1: Requested items and funds for initial design.

Item	Supplier	Quantity	Unit Price	Total
Project manager		1	\$15,000.00	\$15,000.00
Project team members		4	\$5,000.00	\$20,000.00
Computers	Dell	5	\$1,000.00	\$5,000.00
Printer	HP	1	\$1,500.00	\$1,500.00
Technology license	Figma	1	\$2,000.00	\$2,000.00
Technology license	VSCode	1	\$2,000.00	\$2,000.00
Development SDK	Firebase	1	\$5,000.00	\$5,000.00
Database Subscription	Firebase	1	\$15,000.00	\$15,000.00
Office rental	NTU	1	\$6,000.00	\$6,000.00
Transportation	Taxi	5	\$800.00	\$4,000.00
			TOTAL	\$80,500.00

Communication and Coordination with Sponsor

We consider communication and coordination with our sponsors and partners a key aspect of the lifecycle of our project. All updates regarding the project will be sent to the sponsor contact person on the last working day of every week i.e., Friday by the Project Manager, unless specified otherwise. In the case of a public holiday, the communication will be sent on the following Monday.

As the COVID-19 situation is becoming milder, all weekly meetings, discussions and conferences will be conducted physically, unless specified otherwise.

All sponsors will be required to acknowledge the receipt of the information received are strongly encouraged to provide any feedback as well as raise any concerns, (e.g., change in deadlines, feature request, etc.) early

Team Qualifications

Project team consists for five very skilled members:

Project Manager - Anandarajan Sindini

Experienced project manager who has managed various software development projects in previous companies. Project manager is also equipped with the relevant technical skills to foresee software projects and has leadership skills that will ensure the team stays focused and motivated towards completing the project on time and within budget.

Lead developer and Front-end developer - Verma Nandini

Experienced developer with proficiency in front-end demonstrated in various software development projects in previous companies. Lead developer works closely with stakeholders to understand business requirements and translates them into technical requirements for the development team. Directing the development team in terms of design, coding, testing, debugging of application(s) and mentoring junior developers to adhere to determined software quality standards is also undertaken by the Lead developer. Furthermore, the Lead developer is adept in creating websites using web languages such as HTML, CSS, JavaScript utilizing open-source front-end libraries like React and back-end run-time environments like Node.js. The Lead developer's technical depth combined with strong interpersonal skills contribute towards a high team morale and ensure that the project deadlines are met timely.

Back-end developer - Chua Jim Sean

Experienced back-end developer with 5 years of experience. Designed and developed web applications across multiple APIs, third-party integrations and databases. With a curiosity for learning and desire to solve pressing real-world problems, Sean is a reliable individual with determination to deliver assignments on time with great results.

QA Manager and Release Engineer - Kolady Anamika Martin

The QA Manager has past experience in developing and ensuring implementation of project quality control plans to fulfill contractual obligations while maintaining customer satisfaction. The QA Manager has great communication and decision making skills to effectively coordinate project quality activities and maintain a good relationship with the customers and other members taking part in the project. In addition, the member has past experience in developing Software Release Management Strategies for various applications according to the Agile process. The Release Engineer has strong organization and scheduling skills to ensure multiple simultaneous software releases.

QA Engineer - Duong Ngoc Yen

The QA Engineer has past experience in conducting product testing, validation before launching. With 3 years of being a QA Engineer, the QA Engineer has practical experience and essential knowledge to ensure good software quality for the project. The QA Engineer also possess strong organizing and management skills that ensure everything is under control and meet the respective deadlines.

Individual resumes containing more information on team member's experiences and qualifications can be found in Appendix A.

Conclusion

With the incessant increase in food wastage all over the world, Foodify will be an essential addition to society to reduce wastage due to negligence and inability to consume food items by the expiry date by allowing users to monitor food consumption well.

References

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- [2] *Food Waste - Food Waste - Electronic Waste*. (n.d.). Towards Zero Waste. Retrieved September 7, 2022, from <https://www.towardszerowaste.gov.sg/foodwaste/>
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- [5] Yusof, N. (2019, August 6). *Every Singaporean household throws away an average S\$258 worth of food a year: Study*. TODAY. Retrieved September 7, 2022, from <https://www.todayonline.com/singapore/every-singaporean-household-throws-away-average-s258-worth-food-year-study>

Appendix A: Résumés of Team Members

The following pages present one-page résumés of the team members for this project.

ANANDARAJAN SINDINI

Blk 444, #12-23, Pioneer Ave 1, Singapore 450444 • +65 8322 3766

Email : sindini@gmail.com • LinkedIn : [SindiniAS](#)

Energetic IT Project Manager with 8+ years of experience in planning, controlling, executing, and closing various IT projects. Managed all phases of \$14M deployment of CMS for Lyndl Inc. and closed before deadline. Achieved 70% process time savings through implementing process automations and IT upgrades at ZynTec.

EXPERIENCE

2017 -

PROJECT MANAGER, LYNDL INC.

- Managed a team of 15+ IT experts from all over the world.
- 90% of IT projects were completed ahead of schedule and within budget.
- Patched/upgraded 800+ servers, applications and databases.
- Managed \$14M deployment of CMS at 15% less cost than budgeted and 2 weeks ahead of schedule.

2013-2017

PROJECT MANAGER, ZYNTEC

- Managed a team of 8+ IT experts including developers and UX.
- Created SAP system for new affiliate which supported 150 key users.
- Delivered budget management program to manage \$250M marketing budget.

EDUCATION

MAY 2012

M.A. BUSINESS ADMINISTRATION, OXFORD

JUN 2009

B.E. COMPUTER SCIENCE, NTU

SKILLS

- Project Management
- Time Management
- Leadership
- UI/UX & Digital products
- Excellent knowledge of all major operating systems
- Strategic Planning



CONTACT

✉ NANDINI123@e.ntu.edu.sg

☎ +65 86788701

🌐 www.linkedin.com/in/nandini-verma-cc4942210/

SKILLS

- Spoken languages: English, Hindi
- HTML
- Java
- JavaScript
- CSS
- Tools: Node.js, React, Jupyter, Visual Studio, Android Studio

EXTERNAL CERTIFICATIONS:

- Front-end development course (General Assembly)
- AWS Certified Developer
- Meta Front-end Developer Professional Certificate (Coursera)
- Front-end development libraries certification (FreeCodeCamp)

NANDINI VERMA

WORK EXPERIENCE

LEAD DEVELOPER 2017 - Present

abc123 Pte Ltd, Singapore

- Managed a team of 10+ developers from around the world.
- Communicated with 50+ clients to elicit their needs and expectations.
- All projects were completed on time with fulfilled stakeholder expectations.
- 85% of the projects were completed ahead of schedule.

FRONT-END DEVELOPER 2013 - 2017

xyz789 Pte Ltd, Singapore

- Proactively participated in the development process of multiple software applications and websites.
- Created functional web applications and performed professional UI tests to optimize performance.
- Maintained relevant correspondence with back-end personnel.
- Recognized by the company as a top-achieving employee for successfully finishing all assigned tasks and projects within assigned budget and time.

EDUCATION

Nanyang Technological University Aug 2013 – July 2017

Bachelor of Engineering (Computer Science) with a minor in Business

- First class Honors with Distinction (top 1% of the cohort)

DUONG NGOC YEN

QA ENGINEER

CONTACT

939123112
ngocyen001@e.ntu.edu.sg
www.duongngocyen.com
21 Nanyang Circle, Singapore

SKILLS

Java, HTML, CSS, React, Python, C, C++
Git, Visual Studio Code
Software testing, product management
Time management, communication

EDUCATION

BE in Computer Science

Nanyang Technological University
2011-2015

Modules: Software engineering, advanced software engineering, system design and analysis

Competitions: 2nd prize Google design challenge 2012

Chu Van An high School

2008-2011

Specialized in Mathematics and Computer Science

LANGUAGES

English
Vietnamese
Mandarin

PROFILE

I am Duong Ngoc Yen. I have a passion in software engineering. For me, technology have transformed people's lives a lot. For me, quality of a software is critical in delivering the given purposes. As I have 8 years in Software Engineering industry, I believe I could use my skillsets developed through real experience to detect and evaluate software.

WORK EXPERIENCE

QA Engineer

Google

2020 - Present

- Test current products and identifying deficiencies
- Suggest solutions to identified product problems
- Investigate product quality in order to make improvements to achieve better customer satisfaction
- Plan, create and manage the overall Quality Planning strategy
- Collaborate with the Product Development team to ensure consistent project execution
- Identify quality assurance process bottleneck and suggest actions for improvement
- Oversee continuous improvement projects
- Collect quality data
- Identify key KPIs for product quality
- Prepare and present reports and metrics to Senior Management

Software Engineer - Back-end

Amazon

2017 - 2020

- Containerizing applications like Docker, Kubernetes
- Contribute to component level features' design and development
- Hands-on development experience in storage and networking
- Strong enterprise Java programming skills
- Study or Experience in Functional Programming is helpful
- Experience in SOA, Restful service design and development
- Strong knowledge of Linux systems and comfortable developing and debugging in Linux environments
- Comfortable with agile/scrum methodology

Software Engineer - Back-end

Thales

2015 - 2017

- Build monitoring & alerting platforms, automation tools and continuous integration environments
- Follow the product from inception to launch, and own large parts of the product's execution
- Naturally think of APIs, or RESTful APIs to enable automation
- Experience in implementing algorithms for large-scale system configuration, system upgrades, monitoring & provisioning in a distributed environment
- Working level understanding to advanced level experience in virtualization technologies like VMWare, Hyper-V, KVM including knowledge of OVF tools and VM templates
- Experience with, or a keen desire to learn and use,
- DevOps configuration management tools like Ansible, SaltStack, Puppet and Chef



ANAMIKA KOLADY

CONTACT

- +65 87322253
- ANAMIKAM001@e.ntu.edu.sg
- Singapore
- <https://www.linkedin.com/in/anamika-kolady-720ba2216/>

SKILLS

- Java, Python, C, C++
- Libraries: React.js, Numpy, Matplotlib
- Tools: Visual Studio Code, Android Studio
- Leadership, Teamwork,
- Verbal & Written communication

LANGUAGE

- | | |
|---------|-----------------|
| English | ● ● ● ● ● ● ● ● |
| Hindi | ● ● ● ● ● ● ● ● |
| Arabic | ● ● ● ● ● ● ● ● |

WORK EXPERIENCE

ABC Pte. Ltd.

Quality Manager 2020-Present

- Supervised quality control team of +15 members across several departments.
- Organized Quality Assurance plans and conducted Quality control testing for approx. 40+ cases and projects annually.
- Submitted reports consisting of analyzing, summarizing, and interpreting collected data to increase team efficiency by 14%.

XYZ Pte. Ltd.

Release Engineer 2017-2020

- Maintained source code repositories and build scripts and installation processes.
- Coordinated with developers to outline deployment procedures and resolve software configuration administration issues.
- Aided code integration between teams and partners as well as coordinated with Software Development Team and QA.

EDUCATION

Bachelors of Engineering in Computer Science

Nanyang Technological University 2011-2015

Masters in Business Administration

Really Great University 2015-2017

Name: CHUA JIM SEAN

Address: SINGAPOE, 10 NANYANG 129

Phone: 210-1000-10

E-Mail: JCHUA892@NTUL.com

PROFESSIONAL SUMMARY

Experienced back-end developer with 5 years of experience. Designed and developed web applications across multiple APIs, third-party integrations and databases. With a curiosity for learning and desire to solve pressing real-world problems, Sean is a reliable individual with determination to deliver assignments on time with great results.

SKILLS

- Java & PHP
- Web development cycle
- API integration
- UX improvement
- Technical analysis
- Project management
- Time management
- Communication

WORK HISTORY

Backend Developer

BARBASI. ASIA PACIFIC PTE LTD, Singapore

07/2017 – Current

- Oversee back-end development using PHP to maintain website integrity, security, and efficiency.
- Utilize such technologies as ASP.NET , MVC, HTML5, JavaScript and SQL Server 2012 to develop new applications.
- Build databases and table structures following architecture methodology for web applications. Create powerful Content Management Systems to serve as interface for client.

EDUCATION

Bachelor of Science: Computer Science

Nanyang University of Technology, Singapore