# Cloud Computing Workshop with AWS

## Project Proposal Document

### Project Information Project Name: Supermarket Path Planner Student Names: Guy Sofer, Ben Hanover, Alicia Belhassen Project Track: Applicative

### 1. Background

### In modern retail, grocery shopping remains a time-consuming task, especially in large stores with unclear layouts. Customers rely on general aisle signs to locate items, but these signs are often too broad and lack the detail needed to find specific products. As a result, shoppers spend unnecessary time searching for items, revisiting aisles, and navigating inefficiently.

### While outdoor navigation systems like GPS have become standard, they are not effective in indoor environments such as grocery stores. Still, the lack of GPS shouldn’t mean shoppers have to waste time wandering through aisles. Cloud-based applications provide a powerful alternative, offering personalized maps and optimized routes to guide customers efficiently through the store.

### The Supermarket Path Planner addresses these challenges by providing:

### A mobile app for customers to input grocery lists and receive the fastest route through their chosen store.

### A web platform for store owners to manage and update store layouts in real time.

### This project leverages AWS Cloud Computing services to deliver a responsive and scalable web-based application that helps customers efficiently navigate supermarkets to collect groceries.

### 2. Problem Statement

### In supermarkets, customers often face difficulty navigating store layouts efficiently. Aisle signage typically offers only broad categories, making it challenging to locate specific items quickly. As a result, shoppers waste time wandering through aisles, searching for products, and revisiting sections of the store, leading to frustration—especially for those with lengthy grocery lists or limited time.

### Additionally, grocery store layouts are frequently updated to accommodate product rearrangements, seasonal displays, or promotions. These changes are rarely communicated to customers, further complicating navigation. Without a solution that reflects real-time store layouts, both efficiency and customer satisfaction suffer.

### 3. Proposed Solution

### The Supermarket Path Planner addresses these challenges by providing an integrated, cloud-based solution for both customers and store owners:

### Mobile App for Customers:

### Customers will use a mobile app to input their grocery lists, either creating new ones or selecting from previous lists. Once the list is entered, the app generates the fastest and most efficient route through the supermarket, helping customers save time and effort. The app will display a clear, step-by-step path tailored to the store’s current layout.

### Web Platform for Store Owners:

### Store owners will use a web-based platform to manage and update their store layouts dynamically. For example, if products are moved to a different aisle or shelf, owners can easily make these changes via the platform. This ensures that the navigation routes provided to customers are always accurate and up to date.

### By leveraging AWS Cloud Computing services, the project will deliver a scalable and responsive solution. AWS will support the storage of store layouts, grocery lists, and user preferences while ensuring seamless communication between the mobile app and web platform.

### This high-level approach will create a streamlined shopping experience for customers and empower store owners with tools to maintain efficient, up-to-date layouts.

### 4. Alternative Approaches & Market Research

### While there are existing grocery apps and supermarket management tools, most of them focus on:

### Online Ordering: Platforms like Instacart or Amazon Fresh deliver groceries to users' homes but do not assist in physical navigation within stores.

### Store Maps: Some supermarkets provide static store maps, which are not dynamic or personalized to a user's shopping list.

### Market Research: Existing solutions include apps that focus on inventory lookup or indoor navigation using Bluetooth beacons and Wi-Fi triangulation. However, these often lack integration with personalized shopping lists or real-time inventory updates. What sets this project apart is the use of intelligent pathfinding algorithms tailored to each customer's shopping list, combined with a supermarket-facing platform for layout and inventory management.

### 5. Innovation

### The Supermarket Path Planner introduces several key innovations that set it apart from existing solutions:

### Real-Time Layout Updates: Store owners can update layouts through a web interface, ensuring customers always receive accurate, up-to-date navigation routes, even as product placements change.

### Cloud-Based Scalability: Using AWS services, our solution scales across multiple locations, supporting real-time updates and future enhancements like personalized recommendations, without heavy infrastructure investment.

### Cross-Store Usability: Unlike store-specific apps, our platform works across multiple grocery chains, offering a consistent experience for customers.

### Optimized Shopping Routes: The app generates personalized, efficient shopping routes based on customers' grocery lists, minimizing time spent in-store.

### 6. Target Audience

### The Supermarket Path Planner is designed for two primary user groups:

### Customers:

### The main beneficiaries of the app are grocery shoppers who wish to save time and navigate supermarkets efficiently. This includes individuals with busy schedules, elderly shoppers, people with disabilities, or anyone looking to optimize their shopping experience. The app will help them quickly find products, minimize walking distances, and avoid backtracking, making their shopping experience more convenient and less frustrating.

### Grocery Store Owners and Managers:

### The secondary users are grocery store owners and managers who want to improve customer satisfaction and optimize in-store navigation. By using the web platform, store owners can update their store layouts in real time, ensuring that customers always receive accurate routes. This tool helps store owners enhance the shopping experience while streamlining the management of product placements and seasonal changes.

### 7. Features and User Flow

### The Supermarket Path Planner offers key features tailored to the needs of both customers and store owners, ensuring a smooth user experience for both groups.

### Store Selection: Customers can choose their preferred supermarket from a list of participating stores in the app.

### Grocery List Management: Users can create new grocery lists or select from previous ones.

### Optimized Shopping Route: After entering their grocery list, the app calculates the most efficient route based on the store layout, minimizing walking time and avoiding backtracking. The route is displayed on an easy-to-follow map with step-by-step instructions.

### Real-Time Updates: Supermarket owners can make changes inside the store and update the information via the web platform. This way, Customers receive up-to-date navigation routes and instructions.

### Route Guidance: The app provides visual and textual guidance, showing customers which aisle or section to visit next and the distance to the next item on their list.

### Store Layout Management: Store owners can log in to the web platform to manage their store’s layout. They can add, remove, or reposition products and update aisle names. These changes are instantly reflected in the customer app.

### User Flow (Customer):

### Launch the App → Select Store → Input or Choose Grocery List → Receive Optimized Shopping Route → Follow the Route (Visual and Text Guidance) → Complete Shopping and Checkout

### User Flow (Store Owner):

### Log into the Web Platform → Update Store Layout and Product Catalog → Save Changes and Publish → Changes Reflected in the Customer App in Real-Time

### 8. External Dependencies

### Algorithms: BFS/DFS implementations and possible extensions with Dijkstra or A\* for weighted paths.

### AWS Services: vpc, ec2, s3, dynamodb, rds, cognito, amplify, lambda, api gateway…

### Supermarket Data Product location coordinates provided by supermarket partners.

### Front-End Framework: Next.js for building the web interface.

### 9. Deliverables

### Supermarket Platform: A web-based application for layout management.

### Customer Application: A mobile app available for Android and iOS.

### AWS Integration: A fully scalable and responsive backend using AWS cloud services.

### Documentation: Comprehensive technical and user documentation.

### Algorithms: Optimized BFS/DFS implementations for pathfinding.

### Prototype Store Setup: A sample implementation in a selected supermarket for testing and refinement.

### GitHub Repository: Source code uploaded to a public or private repository.

### Presentation: Demonstration of the application's functionality.

### Submission Details

GitHub Link:  
https://github.com/benhanover/Supermarket-Path-Planner  
  
Workshop Website Registration Link:  
[Provide the link to the project registration on the workshop website]

### Additional Notes

[Use this space for any additional notes or information relevant to your project proposal]