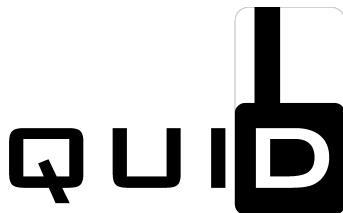


Project 4: Design

Group 6



QUID
Quality User Interface for Dining

In collaboration with
Owens Food Court at Virginia Tech



Team Members

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This project involves the start of the design production phase. Here we show our personas. Then, we show the initial sketches and explain the workspace and materials used to conduct that with some team pictures. After that, we explain our mental model and conceptual design and map it into the user mental model. We finally ended this report with the storyboard and wireframes

CS/ISE 5714 - Usability Engineering - Fall 2023

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1. System Concept Statement

The Quality User Interface for Dining (QUID) is a redesigned interface for the Point of Sale (POS) at Owens Food Court, meant to improve the cashier experience while processing transactions. The current interface has a cumbersome layout, which often yields incorrect orders and presents a lack of distinction between food items and commodities like drink cups or compostable boxes. To reduce processing time and voided transactions, our interface will ensure only available items are displayed and will provide consistent and commonly used names on button labels; restaurants will be sorted by frequency of their orders - making the most ordered food the most easily accessible. QUID will help streamline payment processing with less intervention with prominent payment method selection and payment confirmation displays to bolster transparency and customer trust. QUID, backed by its cashier-friendly interface, represents a comprehensive solution for Owens Food Court, promoting operational excellence and consumer satisfaction.

2. Tailoring of Scope and Process

We extensively tailored our scope for this milestone according to project requirements and the nature of our project. Our group had to distill the needs and traits of our interviewees and POS users into relevant personas to guide our mental models, conceptual designs, storyboard, and wireframes. Entering project 4, our group had preconceived notions of key attributes to include in the revised interface, however - after creating our personas and recognizing their needs, we elicited entirely different interface attributes to focus on. Along with this, our personas informed us on the tasks each work role is involved with, and the permissions each work role should have in completing those tasks. For example, our group initially planned to add refund authority to the cashier account, before quickly realizing after persona development that this change would usurp manager authority. As with previous milestones, we found that the cashier work role and manager work role interact most directly with the POS, so we tailored our deliverables to the needs of these roles, while considering the various user classes associated with these roles.

In designing our conceptual models, we recognized the broad scale of the dining hall, with 12 unique shops, 6 checkout lanes, and thousands of customers per day. As such, we conveyed the scale of the dining hall through various ecological models - incorporating the chaotic nature of thousands of students each with unique meals and the technology that backs the transaction process in the dining hall. Along with this, the POS systems at Owens see regular use from cashiers and managers every day, we wanted our interaction perspectives to convey this, and also illustrate the unique interfaces we developed for each work role that interacts with the POS. Lastly, the inspiration for QUID was the high number of voided transactions and errors that spawn from the current interface design used in the dining hall. Accordingly, we wanted our emotional perspective to illustrate user sentiment from the reduced voided transactions and simplified interface.

3. Design Personas

The Process

To create user personas for QUID, our team started with persona development. Each team member crafted two personas, one for a cashier and one for a manager, drawing insights from the data we had collected up to that point. Various team members focused on different user classes for cashiers, such as novice cashiers and fill-in cashiers. Similarly, for managers, we diversified our approach, with some concentrating on the different user classes of the Chief Cashier Officer (CCO) and other team members focusing on other subroles including administrative managers and assistant managers. Each team member created their personas using various formats, including text, PowerPoint charts, and more. To enhance the effectiveness of our personas, we consolidated them into a standardized format, which we designed using the Canva website. This format included essential components such as pictures, background and demographic information, goals and objectives, frustrations, attributes, and skills.

In total, our team developed 12 unique personas to choose from. As a team, we gathered to discuss and select the two most representative personas. However, we ended up choosing three personas, two for cashiers and one for manager as we felt that the cashier work role is best represented by two distinct personas. For cashiers, we decided on the novice cashier and a cashier with prior retail experience. These distinct personas represent the real world users we interviewed during the user discovery phase - from these interviews, we derived the user classes which appeared in the developed personas. In the case of managers, we had various managers representing different user classes, we decided to combine Chief Cashier Officer (CCO) personas to create a final persona that encompassed the characteristics we deemed essential. The three final personas are presented below.

A. Novice Cashier



Jack

Cashier

Age: 18 years old

Education: 1st Semester Undergraduate

Sex: Male

Occupation: Part time wage Cashier

BIOGRAPHY

Jack is freshman undergraduate student in his first semester at Virginia Tech and is a newly hired cashier at Owens Food Court.

Jack decided to get a job at Owens to make supplementary tuition money throughout school. Jack has never held a job before, and has no prior experience with POS systems, but is very tech savvy. However, his fresh perspective brings a new way of looking at how interactions with the POS could be improved

FRUSTRATIONS

- Insufficient training to fully understand nuances of job role
- Customers get frustrated when issues arise
- Frequently exceeds his void quota limit
- Not being able to answer customer questions effectively

GOALS AND OBJECTIVES

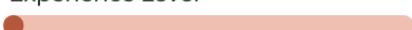
- Minimize number of voided transactions per shift
- Gain enough experience to become a Student Assistant Manager

SKILLS

People skills	★★★★★
Documentation	★★★★★
Tech savvy	★★★★★
Problem solving	★★★★★

ATTRIBUTES

Experience Level



Detail oriented



Social Acuity



B. Cashier with retail experience



Ella

Experienced Cashier

Age: 26 years old

Education: Graduate Student

Sex: Female

Occupation: Cashier

BIOGRAPHY

Ella is an experienced cashier with 2 years of experience in the Owens dining hall.

She excels at handling cash transactions, providing excellent customer service, and maintaining a high level of accuracy. Her knowledge of various point-of-sale systems, as well as her keen attention to detail, make her an invaluable asset.

GOALS AND OBJECTIVES

- Providing customers with a pleasant shopping experience
- Have a minimum number of voids and refunds.
- Reduce the waiting time in lines during busy hours
- Stay updated on the store's product offerings for quick checkout process

FRUSTRATIONS

- For refunds need to call the manager which puts a hold to the process
- Being overwhelmed with a high volume of customers and long lines during peak hours
- Difficult to direct the flow of consumers if the queue is long

SKILLS

People skills



Documentation



Tech savvy



Problem solving



ATTRIBUTES

Experience Level



Detail oriented



Social Acuity



C. Chief Cashier Officer (CCO)



Deryk
Chief Cashier Officer

Age: 42 years old

Education: Undergraduate Business Degree

Sex: Male

Occupation: Chief Cashier Officer

BIOGRAPHY

Deryk has an immense experience working with different kind of POS systems at places like CVS, Walmart and Target. He has been working as the Chief Cashier Officer (CCO) at Owen's Dining Hall, Virginia Tech for 8 years.

Deryk is not only an effective leader but also a warm and social personality who thrives on building strong connections with his team

GOALS AND OBJECTIVES

- Supervising the cashier work and operations at the dining hall
- Training the new group of cashiers about the POS through online and in person sessions
- Ensuring smooth and accurate transactions processes
- Handling customer complaints and refunds

FRUSTRATIONS

- The system's complexity can hinder quick refunds during busy hours.
- Reports may not provide all the necessary data to make informed decisions.
- Inventory management (like menu updates) can be time-consuming and needs to be more streamlined.
- Not being able to directly change and modify the training interface
- Dealing with cashiers with different level of experiences with POS system

SKILLS

People skills	★★★★★
Documentation	★★★★★
Tech savvy	★★★★★
Problem solving	★★★★★

ATTRIBUTES

Experience Level



Detail oriented



Social Acuity



4. Ideation and Sketching

Our ideation and sketching process involved multiple team meetings, in-person and online. During these collaborative sessions, our team collectively identified key attributes for personas, conceptual designs, and our mental models. These attributes were meticulously documented for implementation in our deliverables.

Each team member developed a minimum of 2 personas to provide a wealth of personas for our group to choose from. This allowed us to select our group's favorite personas, and combine ideal qualities from each member's personas to implement in our primary personas.

Subsequently, our team engaged in a selection process to prioritize and focus on the most frequently reported and critical user complaints, also ensuring our design efforts aligned with user's pressing needs while encompassing interactive, ecological, and emotional dimensions.

5. Workspace and Materials

To facilitate the ideation process, we utilized a combination of traditional and digital tools. We made use of whiteboard markers for collaborative brainstorming sessions, fostering creativity and discussion. Additionally, digital tablets and paper were employed for sketching and visualizing design concepts. Furthermore, we used digital design tools such as StoryboardThat, Figma wireframing, and Canva, respectively.

6. Photos of Teamwork

Our team held frequent meetings, often taking place in-person at Newman Library, where we were able to use large whiteboards for our sketching and brainstorming sessions. Other team meetings were held online over Zoom, where we could make use of digital design tools like Figma and Canva for collaborative design efforts.



Figures 1-4: Team brainstorming and sketching sessions

7. Scans of Sketches

Our group developed a wide breadth of sketches spanning across various mediums. Examples of group whiteboard sketches are shown in figures 5 & 6 below, these and our other sketches - combined with our personas and mental models, guided the development of our wireframes and other deliverables.

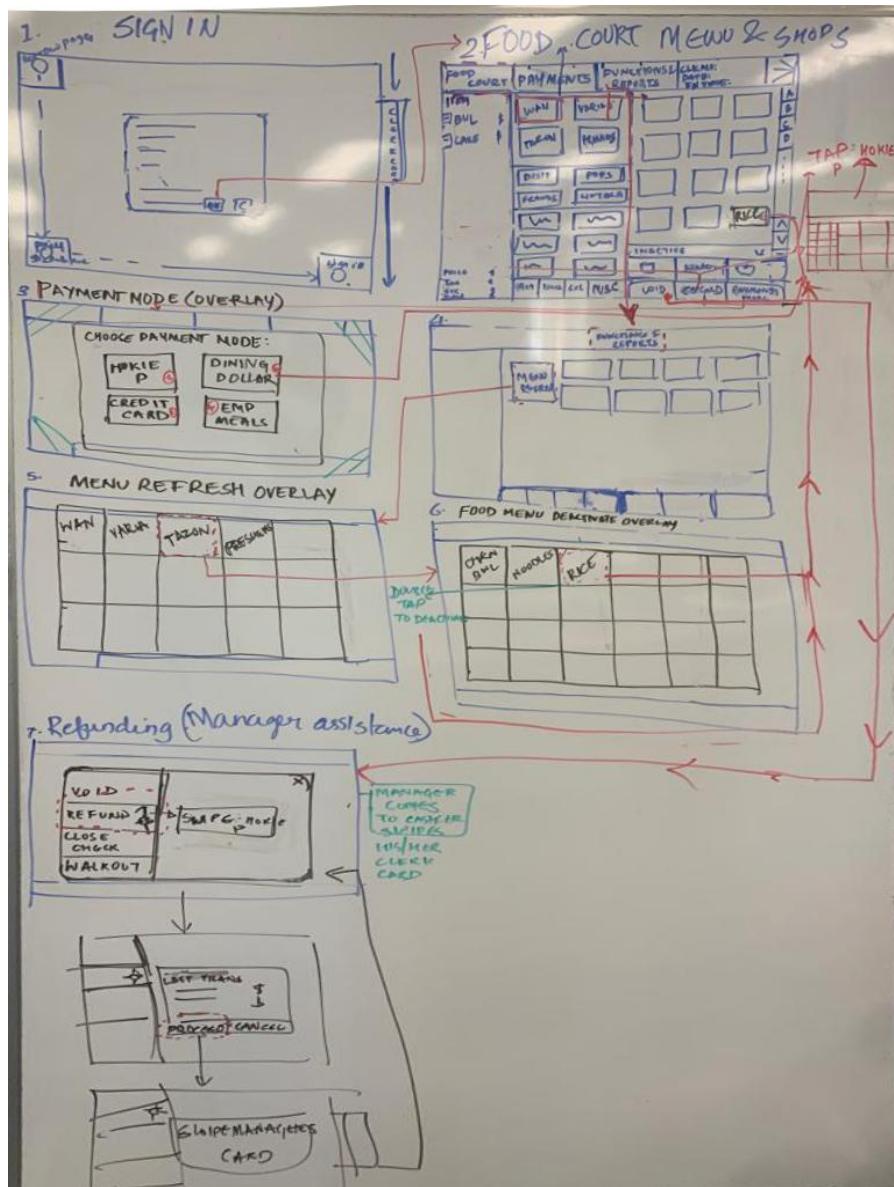


Figure 5: Whiteboard sketch of wireframe to portray refund process in case of an incorrect transaction and menu update option for cashier

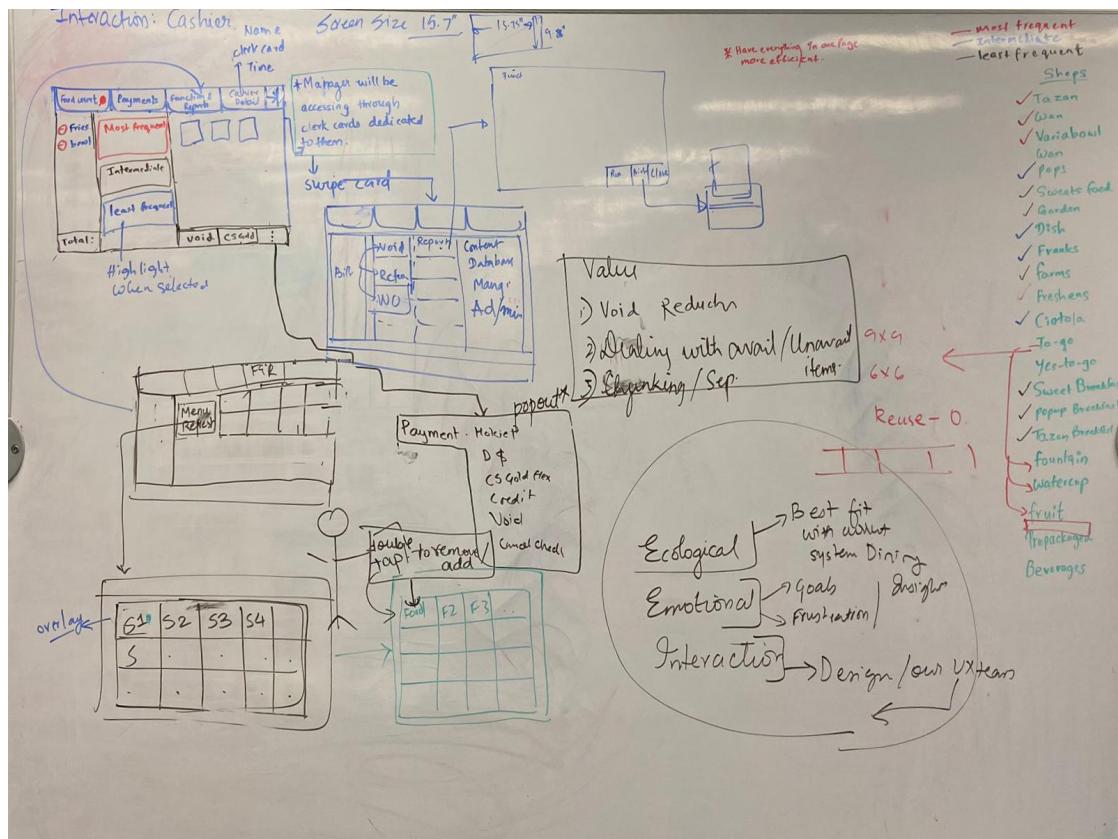


Figure 6: Whiteboard sketch depicting key attributes to include in revised interface

8. Mental Models and Conceptual Design

8.1 Designer's Mental Model

QUID is a redesigned POS interface developed specifically for Owens Food Court at Virginia Tech to improve the cashier experience at the register while processing transactions. We likened our design philosophy to that of a “well-tailored suit”, we aimed to provide a bespoke experience for each work role that interacts with the POS, keeping only what those roles need, and exactly what they need. The new interface will be implemented on the same current touch screen POS (Oracle Micros Workstation 6) which is used by the Owen’s Food Court staff.

The new interface will first address the layout by redesigning it to ensure an efficient user experience. The new design will ensure each part of the layout is distinctly clear. For instance, the proximity compatibility principle will be applied to

clearly separate a restaurant/shop from the food menu items, as in the current interface such a distinction is not clear. Another aspect of layout design is to reduce the cluttering in the shop's list on the POS. For instance, the current quick access bar has a plethora of features, most of which go unused - according to current users. Therefore, the new collapsible quick access bar reduces the amount of information on one screen, thereby reducing cognitive workload for cashiers. Finally, the current interface sometimes requires the user to take more time to find an item. We addressed this by adding sorting and filtering features in the main layout.

Another challenge addressed by the redesign is related to the menu and item availability updates. The current system does not provide live or daily updates regarding food availability. We solved this issue by ensuring that the new interface offers what is actively available in shops & restaurants, and by providing toggle switches to alter individual item availability on-the-fly. By doing so, we will achieve the goal of keeping the cashier informed, which makes our new interface consistent with one of Jakob Nielsen's 10 usability heuristics: Visibility of System Status.

Another issue our group highlighted is the current interface has a cluttered screen, which causes cashiers to make mistakes. The clutter often causes incorrect item selection, prompting the cashier to void incorrectly selected items. Incorrect selections can also lead to overcharging a customer if a cashier does not notice the error, which can cause an even more problematic refunding process. Regarding the voiding issue, the redesigned layout of the food menu section and features which mentioned earlier helps in reducing the error rate of choosing wrong items. Regarding overcharging a customer - which leads to refunding, the current refund process requires manager assistance. The refunding process is part of the voiding process; our group's proposed solution is a dedicated button and overlay for the refund process - we foresee reductions in navigation time as the refund process occurs quite frequently.

8.2 User's Mental Model and Conceptual Design

Our interviews with current users guided the development of our users' mental models. We were able to discover the specific needs and expectations of the cashiers who operate the POS for an entire shift, the managers who step in during a cashier's time-of-need, and the customers who get processed through the POS. Our group

incorporated our findings from our developed mental models into our wireframes and will continue to use these findings as we further develop our prototype in P5.

The enhanced cashier POS system is designed with a focus on improving the interaction, ecological, and emotional perspectives for both cashiers and customers. The following key perspectives have been incorporated into the system's design.

Interaction Perspective:

The system has been reconfigured to optimize the layout, changing the positions of food shops and menus, with enhancements designed to provide cashiers with a more user-friendly interface. These improvements aim to address the interaction perspective by better using colors and spacing, resolving the common issue of cashiers adding the wrong items to the cart, which prompt voiding a transaction. The improved system features a user-friendly design that optimizes the cashier's experience. The bill section's placement on the left ensures efficient order management, while the menu and functions on the right provide convenient access to menu and frequently used options. The revised design incorporates logical grouping according to the proximity compatibility principle, where more frequently used buttons are kept together and displayed prominently, while less-used items are stowed away, simplifies item selection and minimizes ambiguity with clear labels, collectively serving as affordances that streamline tasks and enhance the overall user experience. The redesigned interface promotes efficiency and accuracy in interactions with the system and prioritizes ease of use, reducing the cognitive load on cashiers by offering a clear, straightforward menu structure to streamline cashier tasks and make interactions smoother and more effective.

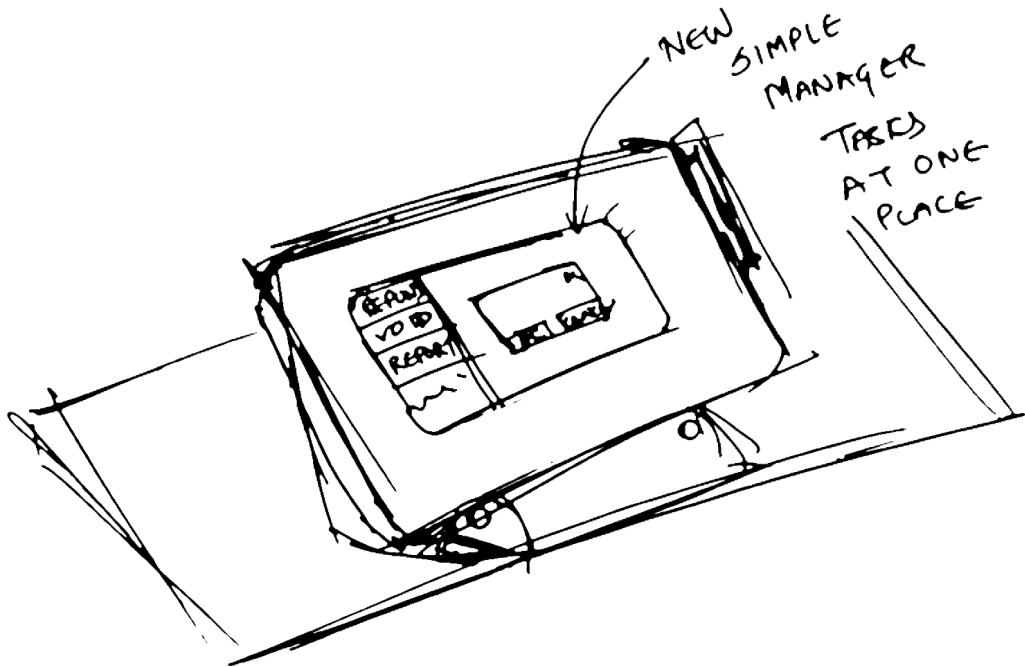


Figure 7: Interaction Perspective - Manager Overlay

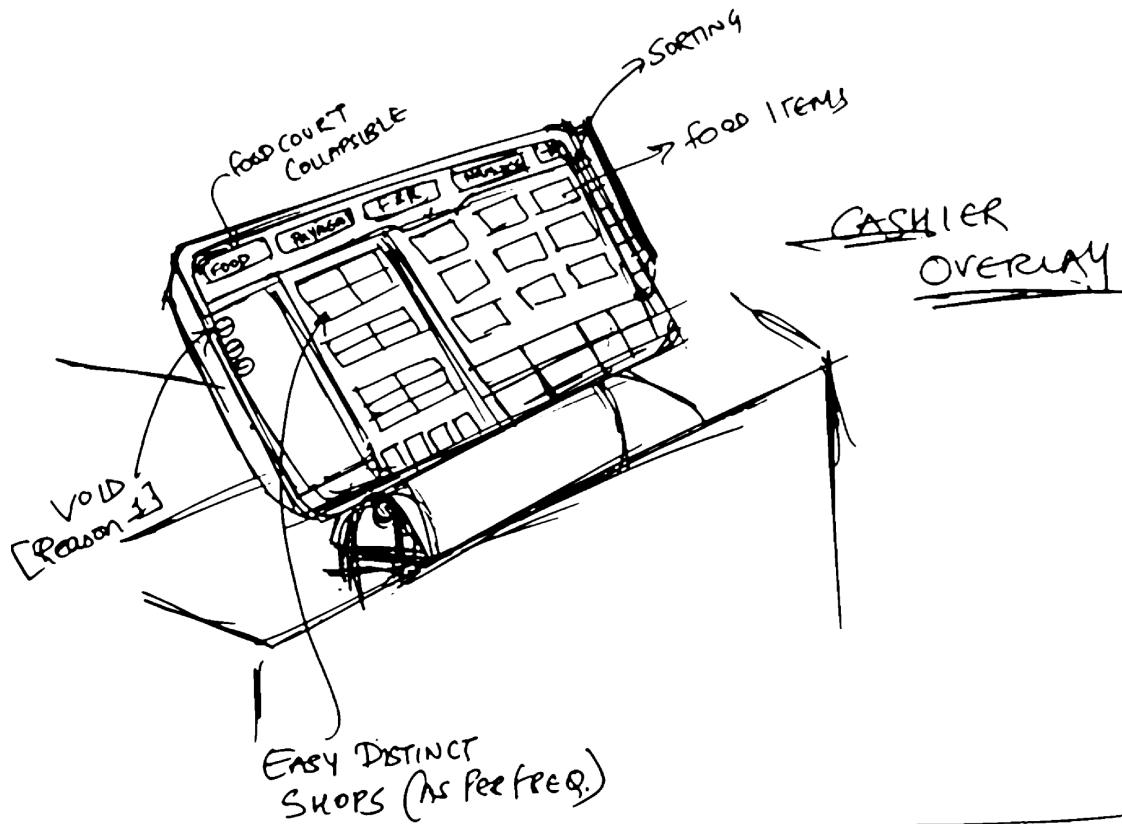


Figure 8: Interaction Perspective - Cashier Overlay

Ecological Perspective:

The POS and its users process immense data every day through its many thousands of transactions. As part of this, the POS interacts constantly with a cloud-based database to provide menu and pricing updates - yet the interactions don't end there. The POS is naturally in charge of processing all customer transactions, so it directly interfaces with credit card readers, hokie passport readers, and thermal printers to issue receipts. This has been represented in figure 9 below.

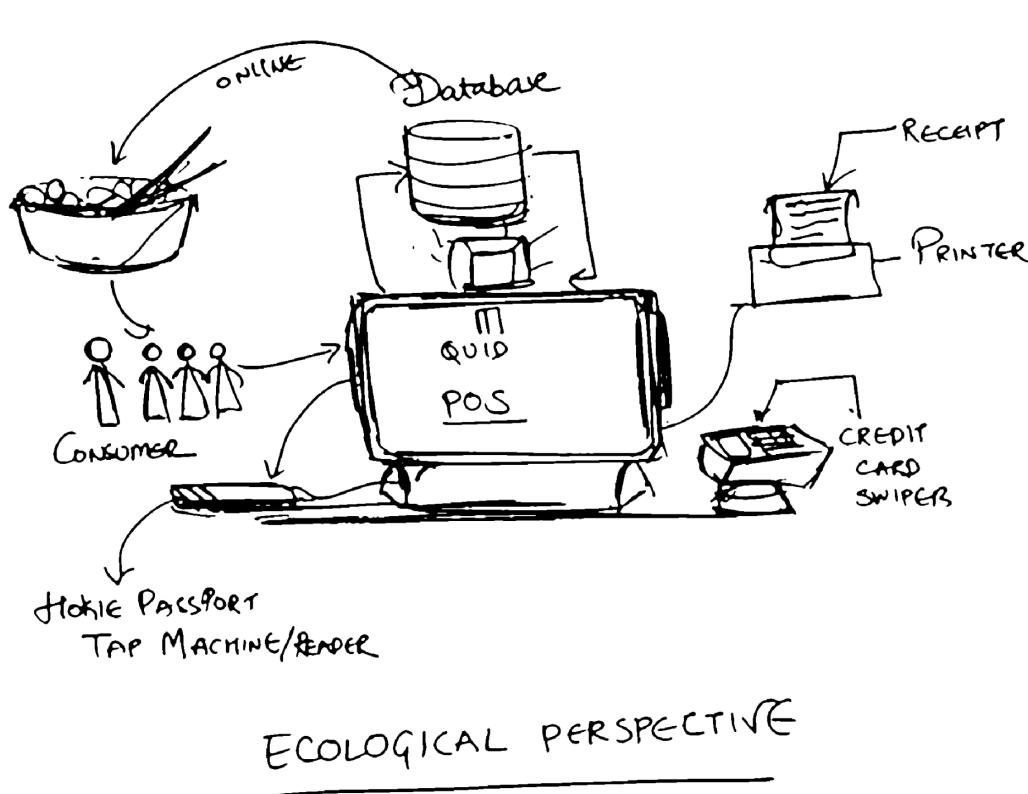


Figure 9: Ecological Perspective Diagram

To enhance the ecological perspective, the system now enables cashiers to update the POS regarding food availability. This feature acknowledges the dynamic nature of the food service industry, where the availability of items can change. Cashiers can disable unavailable items from being displayed, aligning the system with the broader work context and offering a practical solution to real-world operational needs.

Emotional Perspective:

The improved system is designed to alleviate common sources of stress for cashiers and managers. It fosters a positive emotional response by making interactions more straightforward, reducing the likelihood of errors, and ensuring that cashiers feel in control of their tasks, which can positively impact their job satisfaction. The projected results of these features are highlighted in Figures 10 & 11 below.

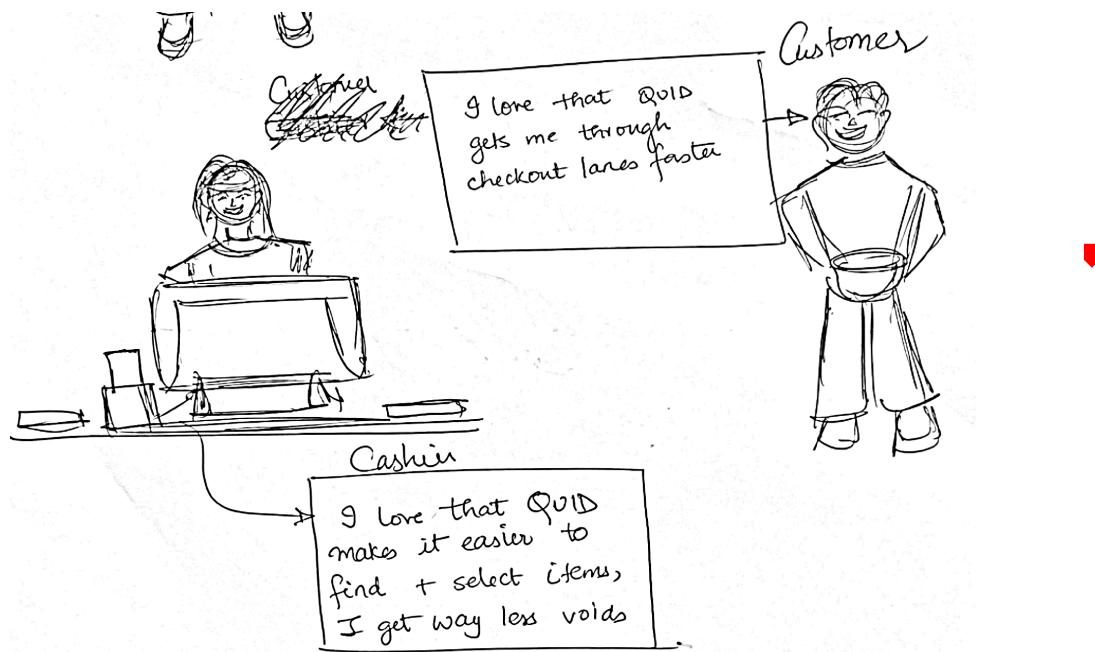


Figure 10: Emotional Perspective - Customer & Cashier Testimony

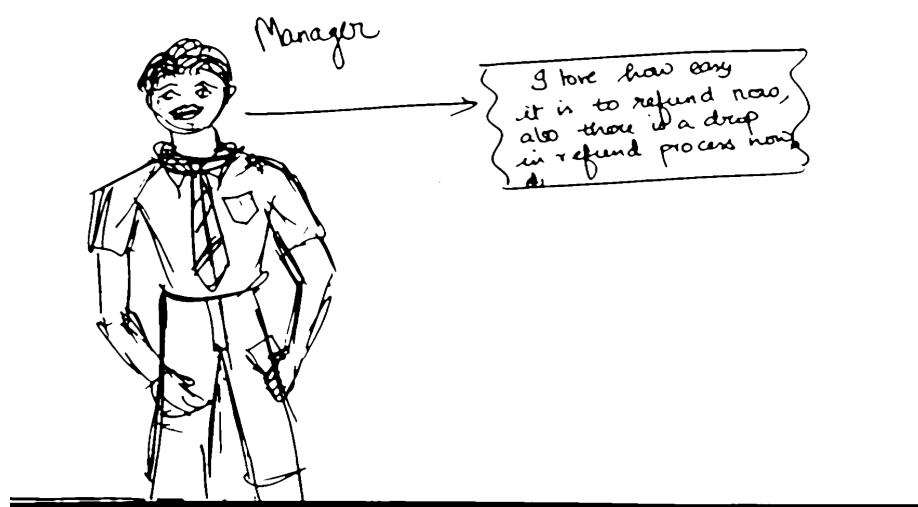


Figure 11: Emotional Perspective - Manager Testimony

9. Storyboarding

Our storyboard was designed to depict the many facets of day-to-day transactions at Owens. As such, our storyboard captures a typical customer interaction, and the common, yet troublesome refund process which we previously highlighted in the task sequence model and usage scenario in P3. The refunding process, one of the critical pain points in our existing POS system, often results in significant payment delays and can lead to frustration for both cashiers and consumers, especially during peak hours.

The storyboard begins with a cashier, Ella, stationed at her post - attending to customers in the queue. A customer in line presents their purchase, which consists of a Grubhub order and a bowl from Wan. Ella inquires about the source of the purchase, and the customer points to the "Wan Shop." Ella quickly identifies the order and adds the items for payment. She then offers the customer a choice of payment methods. Upon the customer's selection of the "Hokie P" payment method, Ella instructs the customer to tap their Hokie Passport card. Unfortunately, after the completion of the transaction, Ella realized that the food items were entered twice, which led to the customer being overcharged. To resolve this issue, Ella calls the manager for assistance.

When the CCO arrives, he uses his clerk card to access the system, and a new dialogue box appears with four options: "void," "refund," "close check," and "walkout." The manager selects the "refund" option and instructs the customer to tap their card to complete the refund process. The manager completes the refund and closes the dialogue box, which concurrently logs him out of the cashier system. With the refund process now complete, Ella can proceed with the transaction as originally intended.



Figure 12: Storyboard Panels 1-6



Figure 13: Storyboard Panels 7-14

10. Low Fidelity Wireframes

Below are the initial low fidelity wireframes our group developed to convey a refund process from cashier sign-in, to item selection, payment success, and subsequent refunding success. This process is again highlighted in our higher fidelity wireframes.

As reflected in figure 14 below, our group envisioned a dedicated login page for a user's initial interaction with a POS at the start of a shift. On this page, users are expected to swipe their Hokie Passport or clerk card to transfer their credentials and subsequently confirm their credentials to login.

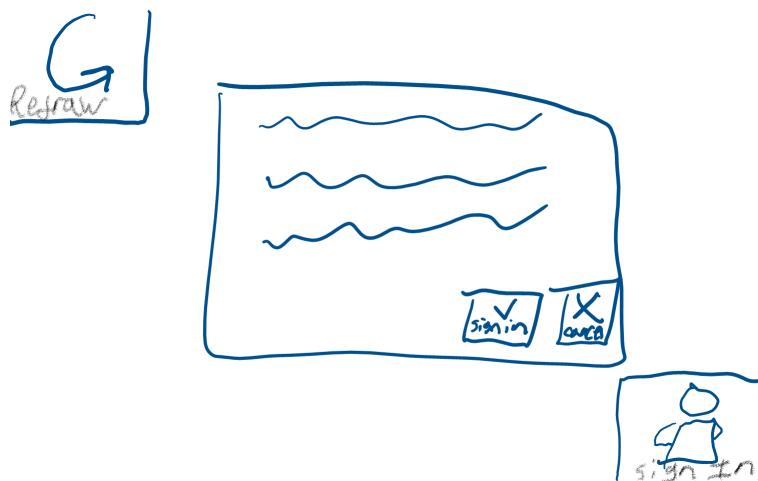


Figure 14: Low Fidelity Login Page

As shown in figure 15 below, upon logging in, our group designed QUID to have a constant, static area to display a current ticket with actively selected food items, the item totals, and the overall ticket cost - as these are crucial in every transaction. Restaurant selection panes and food item selection panes are dynamic and change according to user input.

Food Court	Payments	Functions	Reports	ID#:	Date	Time	*
Item							
Bowl	Wan	Tazon	General Tso's	Beef	Noodles		A
Cake	Variations	Freshens	Tofu	Broccoli	Rice		B
	Pops	Dish					C
	Franks	Ciatala					D
Subtotal:							
Tax:							
Fees:							
Total:	9x9	Reuse	6x6	Plastic	Void	CSGold	Payment Mode

Figure 15: Food Court Menu and Item Selection Page

Moving on to figure 16, to complete a transaction, a cashier can either select a meal plan payment method using the “CS Gold” button, which is the most commonly used payment method, and as such, warrants a dedicated button. In this wireframe case, the cashier uses the “Payment Mode” button to select an alternative payment method.

Food Court	Payments	Functions & Reports	Date/Time	*
Item				
3 Bowl	\$7.85			A
2 Cake	\$4.50			B
Subtotal:				C
Tax:				D
Fees:				
Total:				
Choose Payment Mode				
<input type="checkbox"/> 1 Hokie Passport <input type="checkbox"/> 2 Dining Dollar (Red Arrow) <input type="checkbox"/> 3 Credit Card <input type="checkbox"/> 4 Employee Meals				
9x9	Reuse	6x6	Plastic	Void
				CSGold
				Payment Mode

Figure 16: Payment Method Selection

Our group wanted to convey the refund process in case of an incorrect transaction, as such we represented the refund process in figures 17 through 19, beginning with the initial manager overlay as shown below.

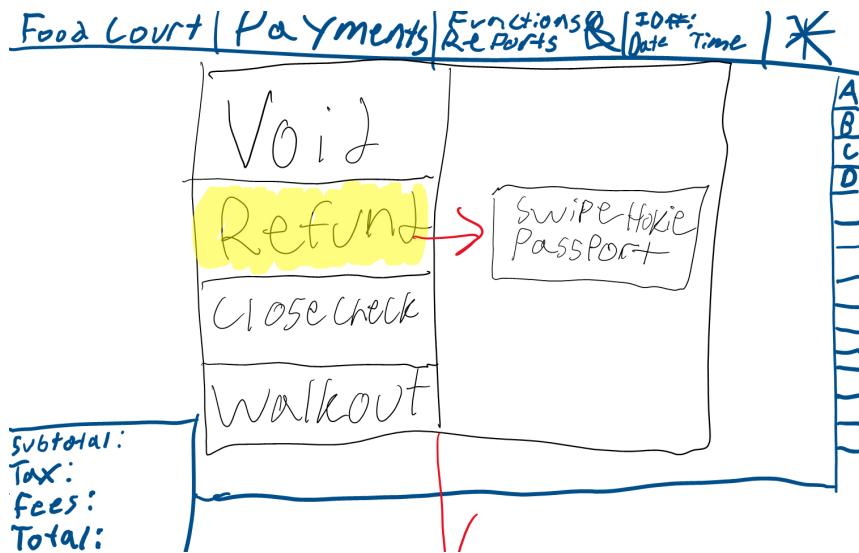


Figure 17: Manager Overlay, Step 1 of Refund Process

Once a manager has prompted a customer to retap their Hokie Passport, or other payment method, a manager reviews the last ticket attached to this customer's payment method, and can proceed with refunding that ticket or canceling the refund.

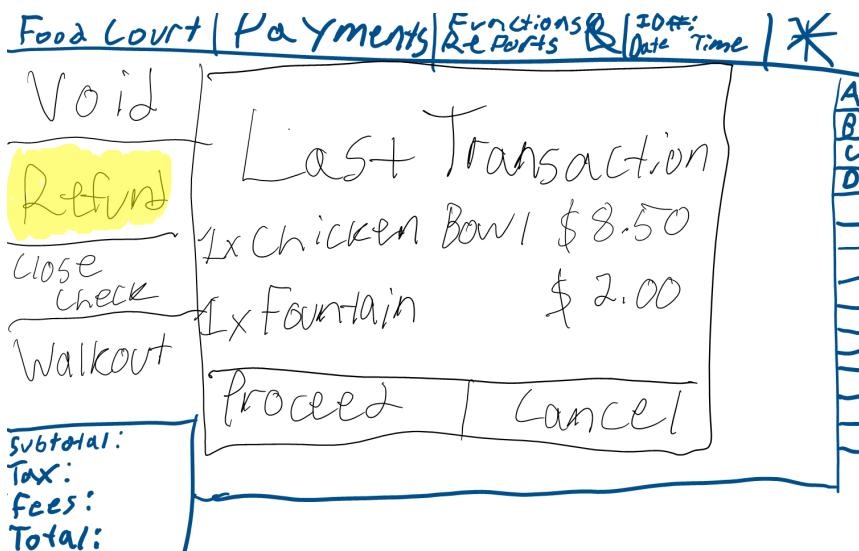


Figure 18: Step 2 of Refund Process, Manager confirmation of ticket

Upon choosing to proceed with the refund, we envisioned the manager swiping their clerk card to provide a final authorization for the refund, as depicted in figure 19 below.

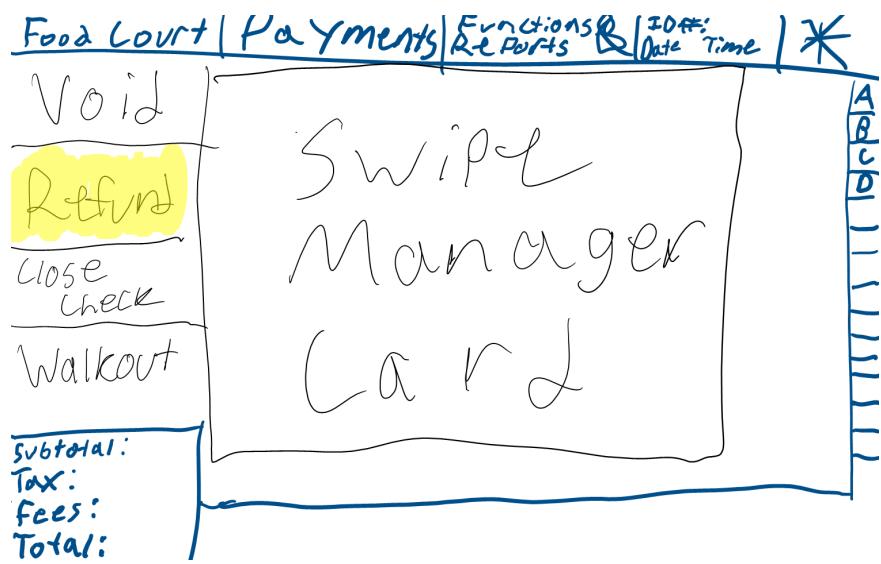


Figure 19: Final Step of Refund Process, Manager card-sweep

11. Wireframes

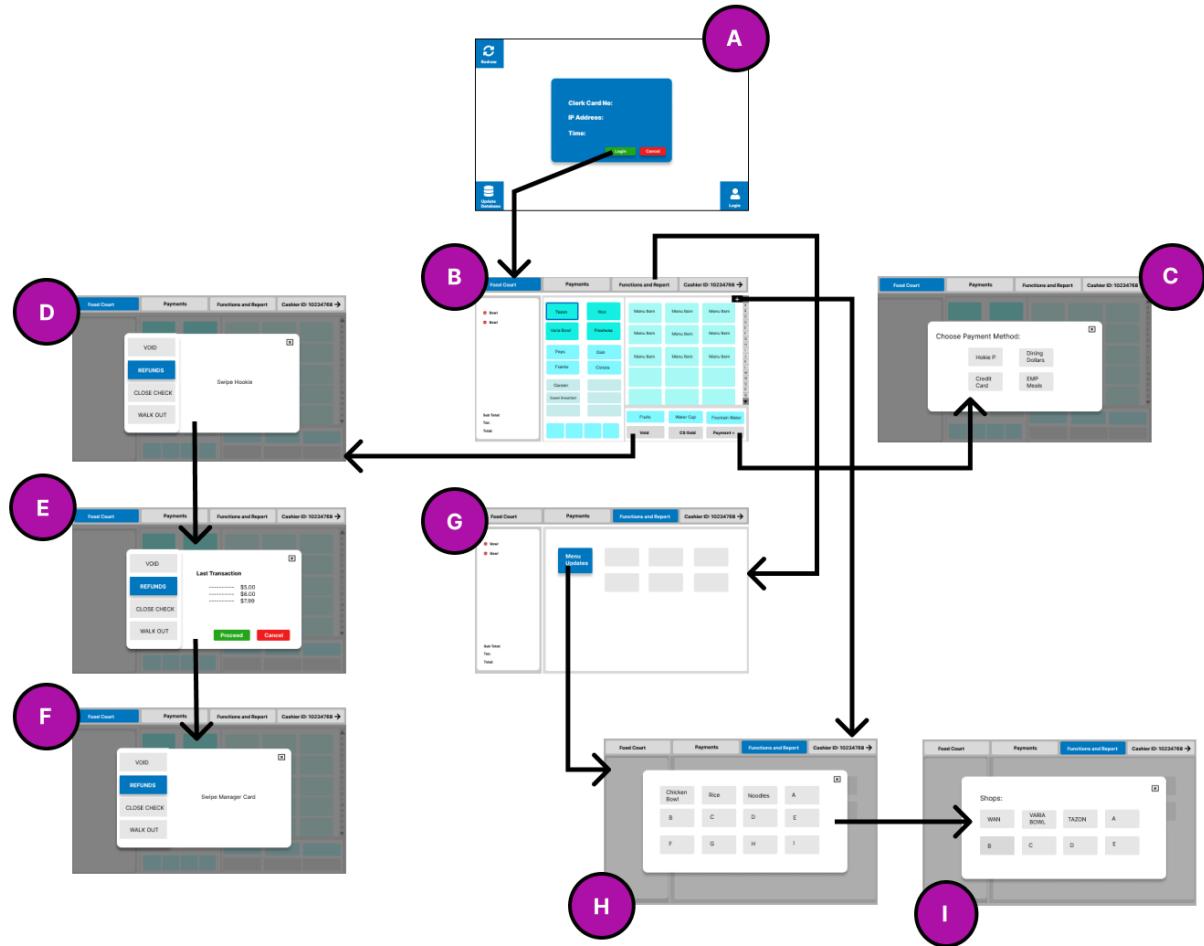


Figure 20: Wireframe Overview

Moving on to our group's higher fidelity wireframes, we again start with a sign-in page. With our interface design, cashiers and managers can sign in by swiping their user card from the sign in page. Users will have access to different features in the POS depending on their user role.

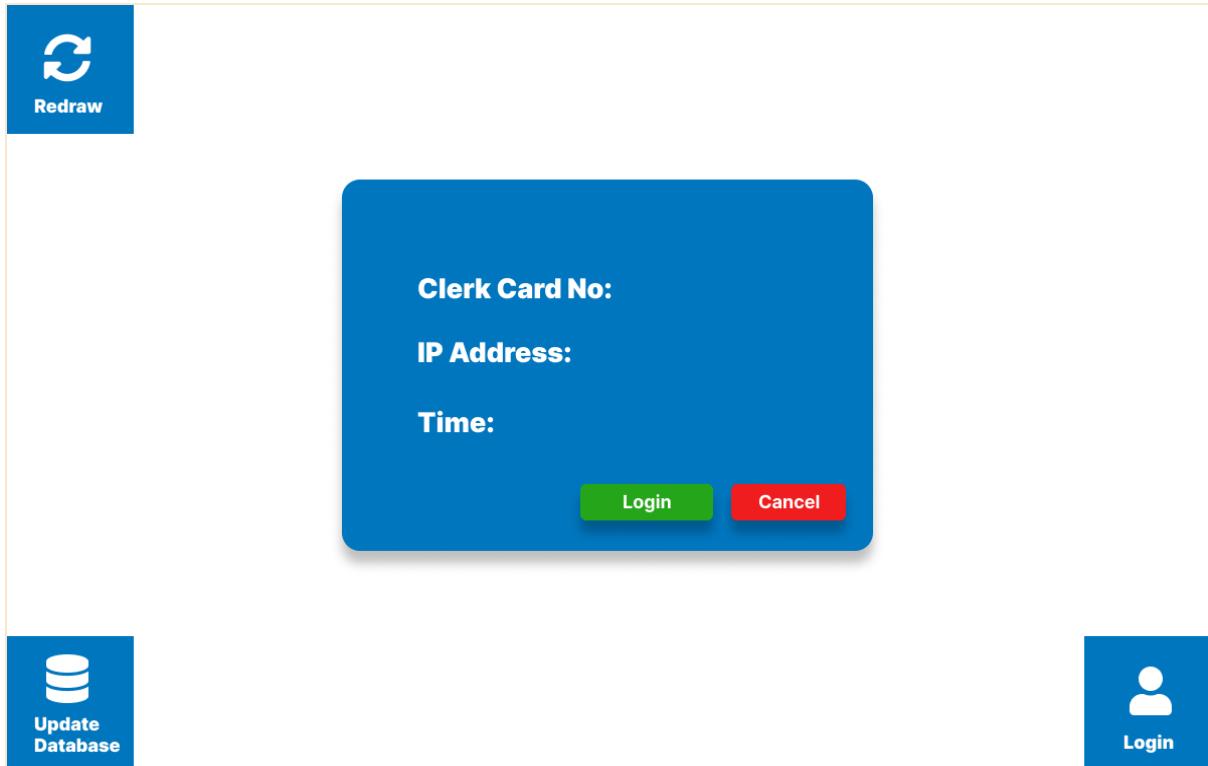


Figure 21: Login Page

Once a cashier has signed in, they are directed to the home page which consists of a list of shops, shop food items, and all the essential functionalities cashiers need in typical day-to-day interactions.



Figure 22: Food Court Menu Introduction

When a customer arrives with an item, cashiers can select the shop from the shop list (1). To make it easy to find the shops we decided to display the shops based on their frequency of use. We divided the shops as the most used, intermediate, and least used and grouped them accordingly. The most ordered shops are featured at the top as large buttons, followed by intermediate shops with slightly smaller buttons, and finally, the least ordered shops with the smallest buttons. When a given shop is chosen, available food items are displayed in an adjacent container (2). Food items for a given shop are sorted alphabetically, with an alphabetical sorting bar available on the right-hand side of the screen for the cashier in cases of an extensive shop menu.

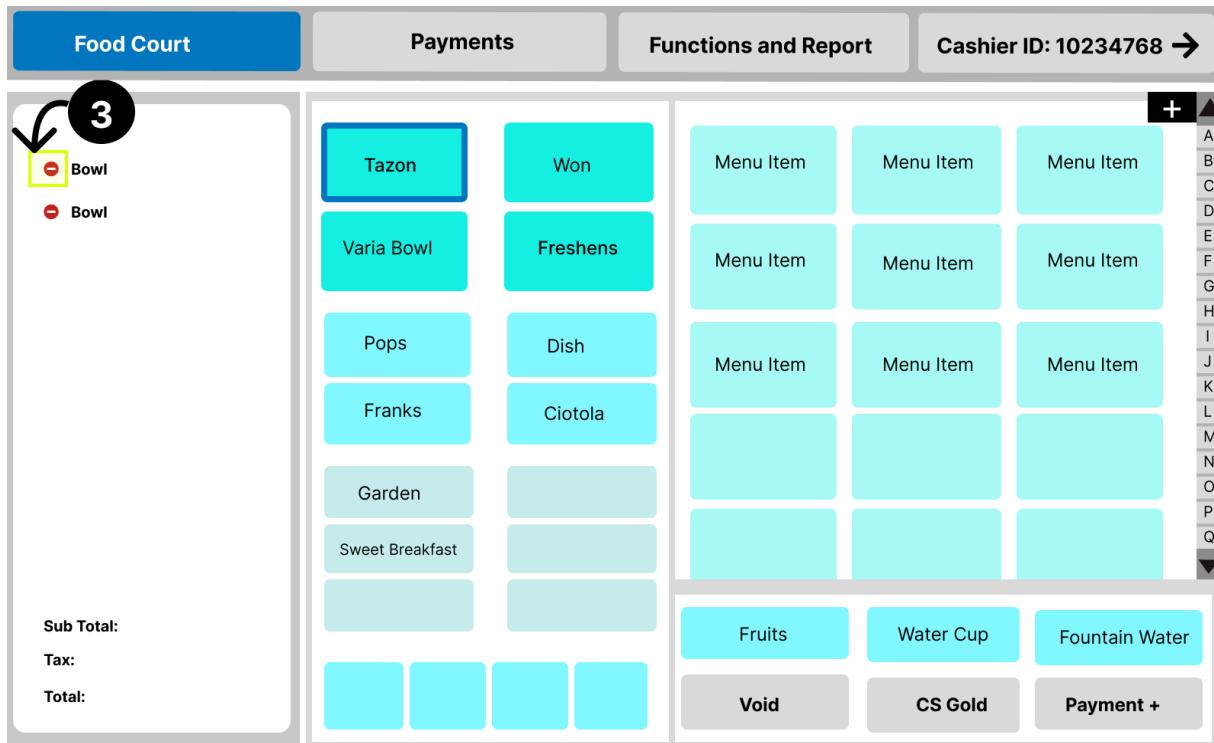


Figure 23: Shop Selection

One of the main pain points that was mentioned during the interviews was that there was no easy way to remove an wrongly selected item. We've introduced a 'Remove' button (3) next to items for easy deletion of wrongly selected items. The number of times this button is clicked will be tracked as part of the 'Voids – Wrongly Selected Items' category, so it can still be taken as a method to measure cashier performance. If an item needs removal for a different voiding reason, cashiers can still access the void option.

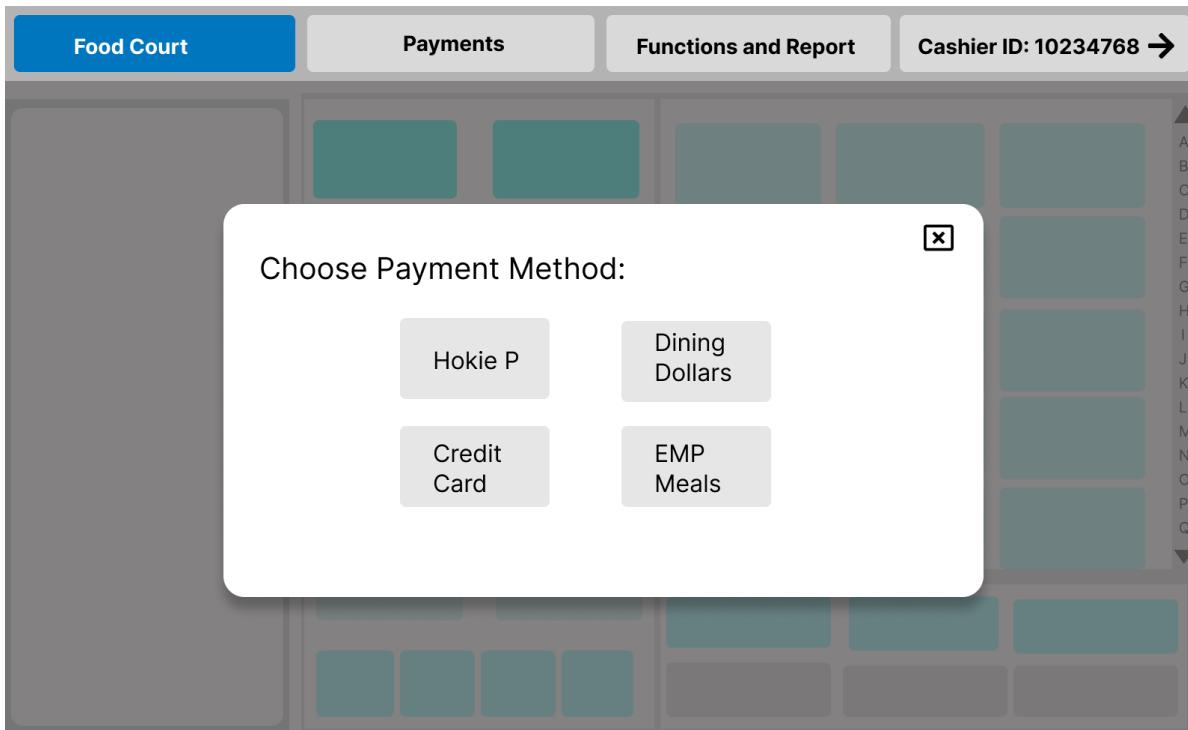


Figure 24: Alternate Payment Method Overlay

The most common payment option is CS gold so we decided to display it below the food items for easy access. If it's another payment method the cashier could select "Payment+" button which would lead to an overlay containing the other payment options. Once selected automatically the overlay would close and the cashier would be navigated to the homepage. We decided to not add a confirmation button to make the navigation more easier and faster.

If a refund is needed the cashier can select the void button at the bottom next to cs gold and select refunds option from the overlay. Once the Hokie Passport of the customer is swiped it shows the last transaction that needs a refund. Following this, a manager can swipe their card to complete the refund process as illustrated in figures 25-27.

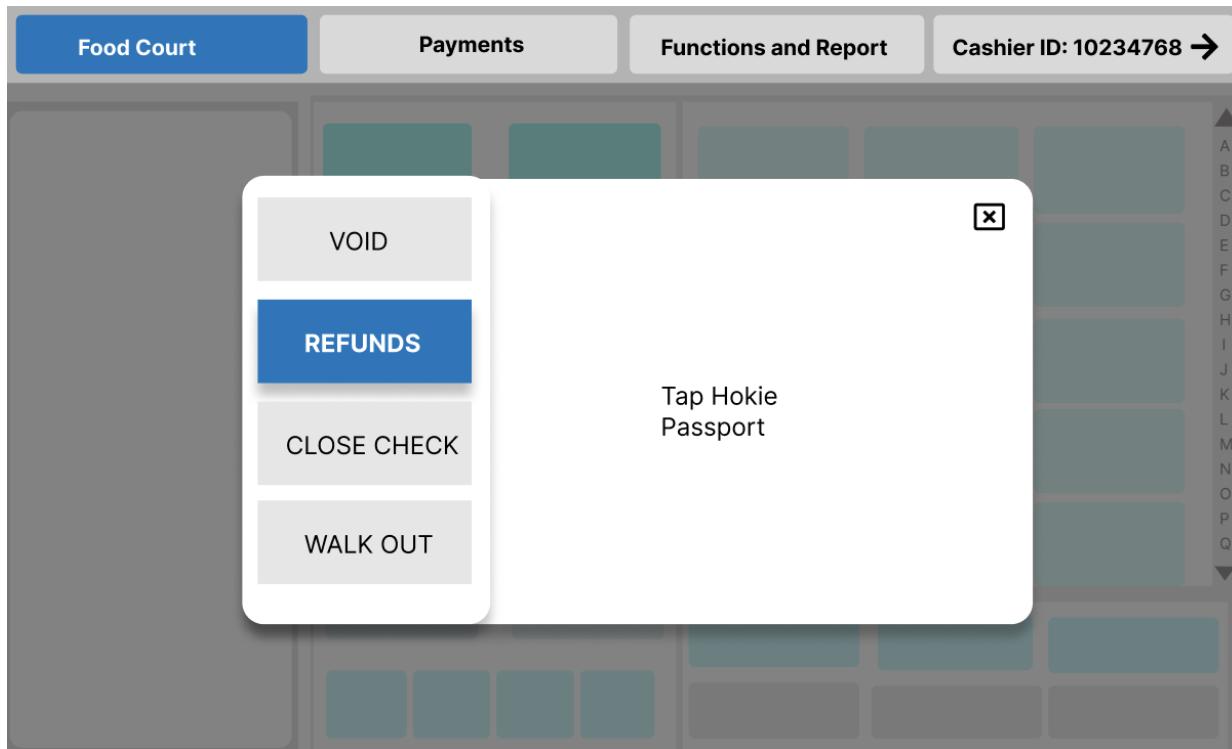


Figure 25: Step 1 of Refund Process

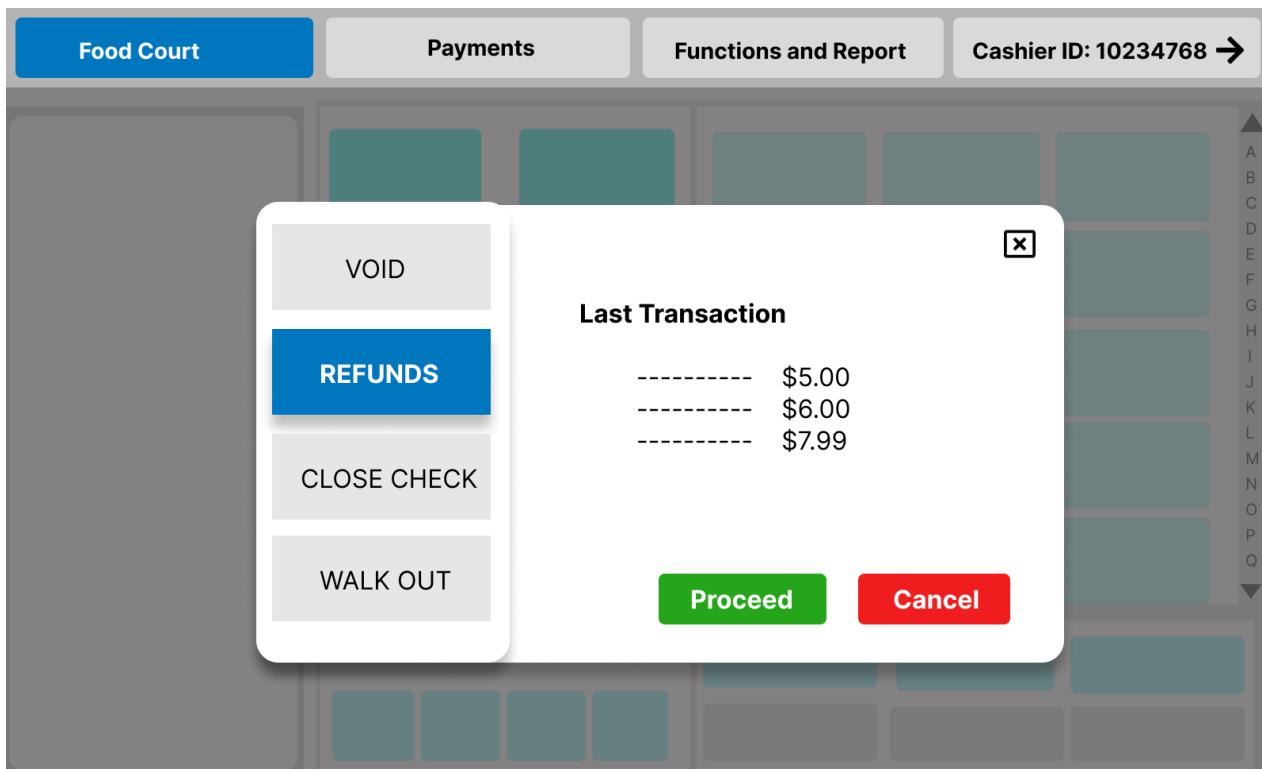


Figure 26: Step 2 of Refund Process

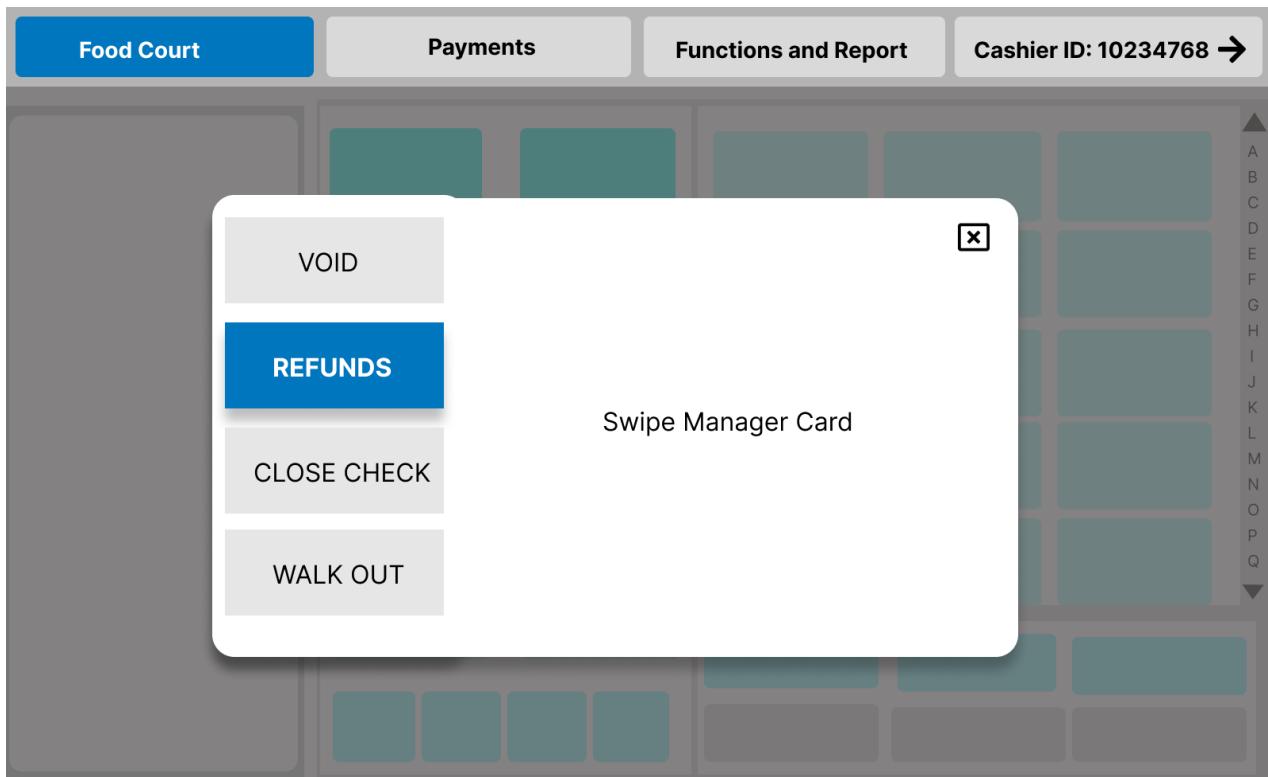


Figure 27: Final step of Refund Process

Our group added a 'Menu Updates' button to the Functions and Reports menu to address the issue of unavailable items cluttering the screen. Cashiers can now easily remove unavailable menu items and refresh item availability, thereby optimizing and saving time in the item search process; this process is represented in figures 28-30.

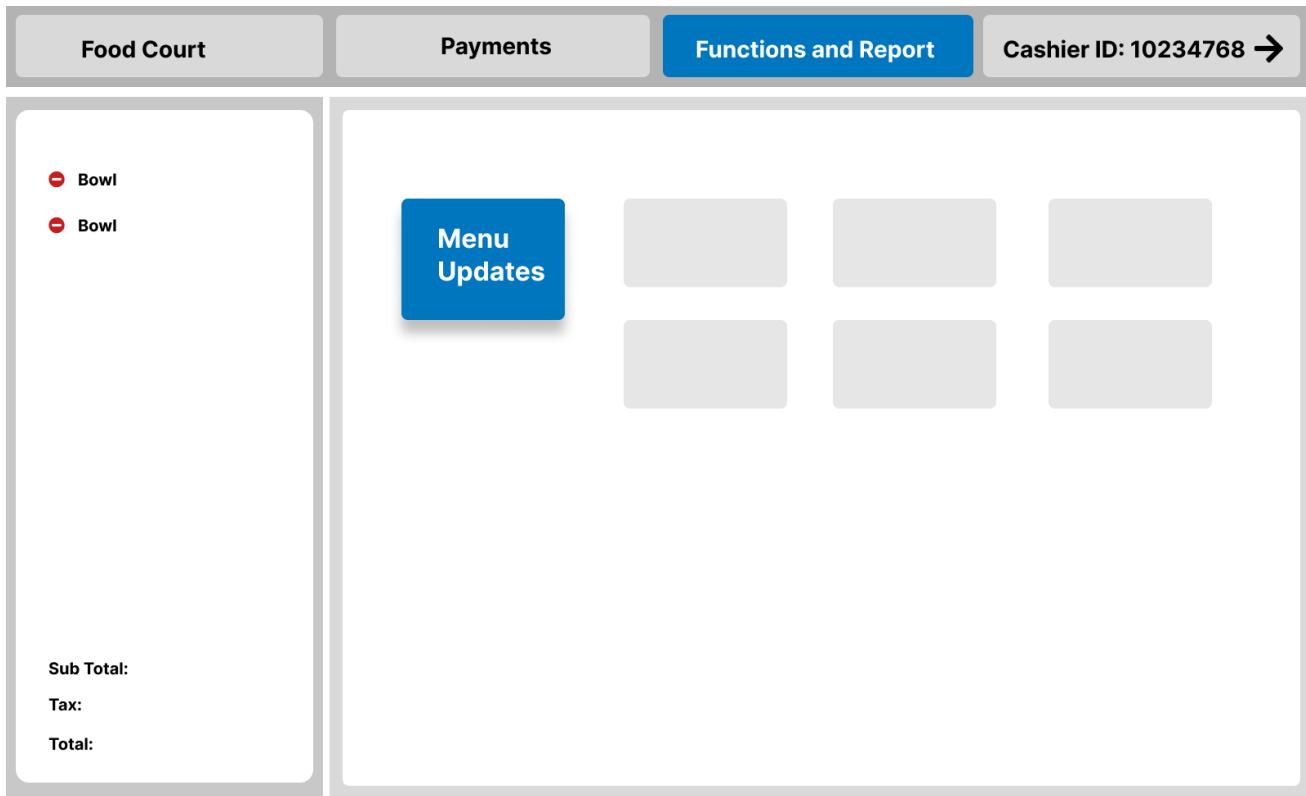


Figure 28: Revised Functions and Reports Overlay

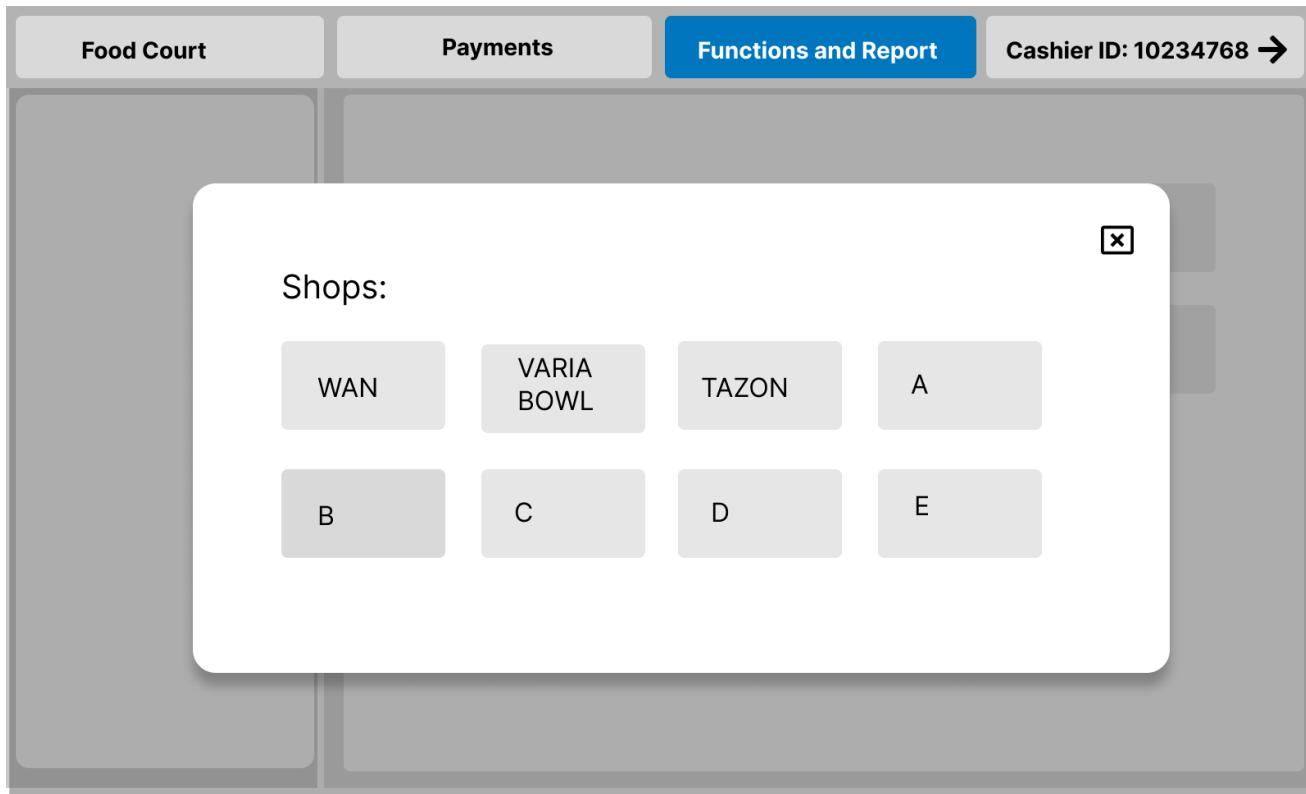


Figure 29: Individual Item Status Reports per Shop

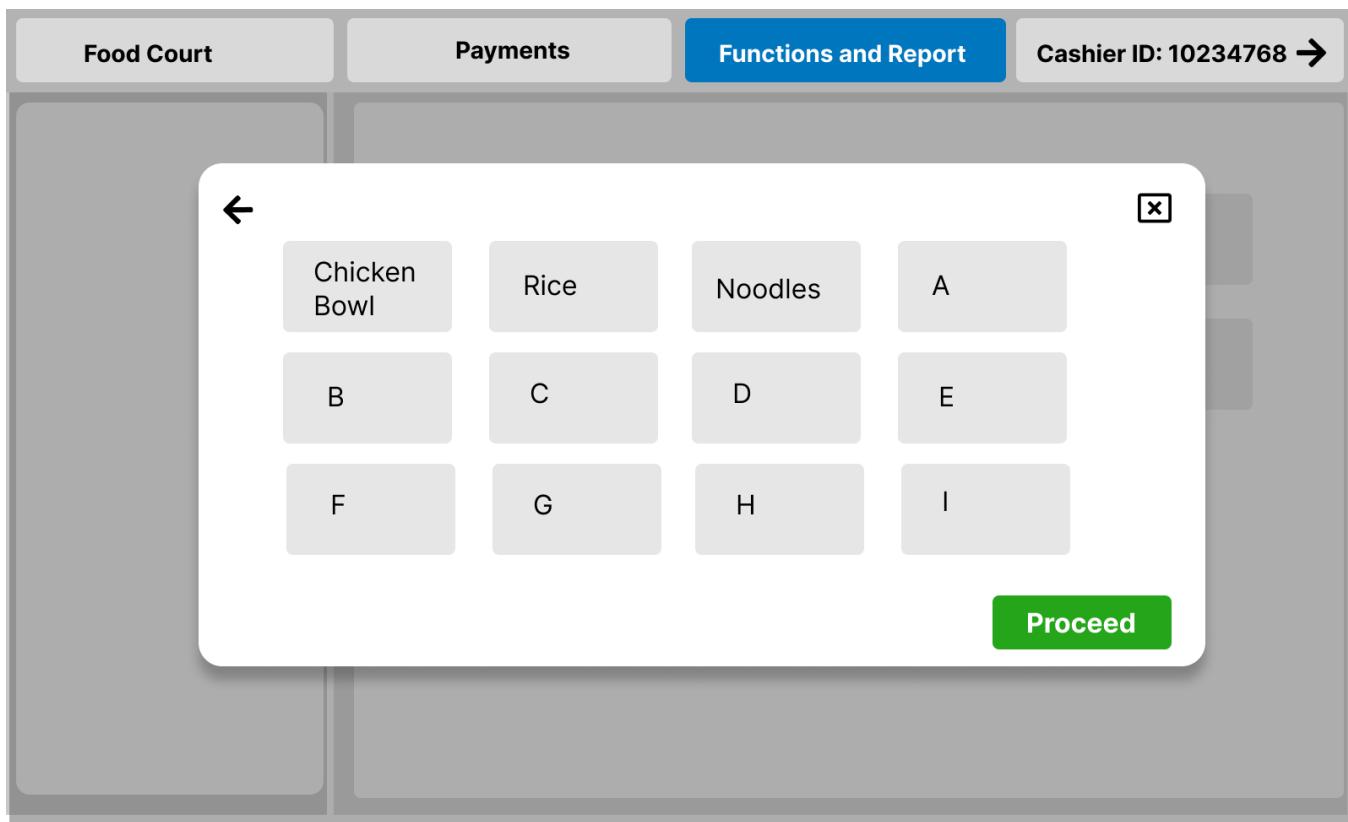


Figure 30: Individual Status of each Food Item

Appendix



Figure 31 - Attempted AI Image Generation for Storyboard

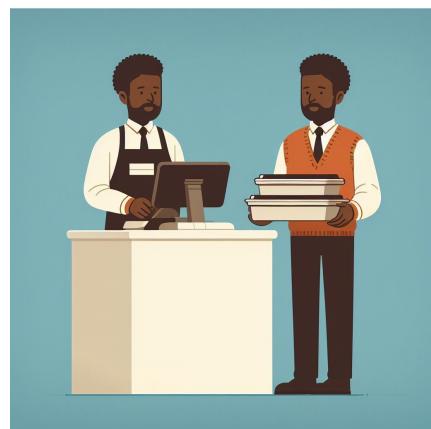


Figure 32 - Attempted AI Image Generation for Storyboard