[W] Group 2: Codename: Developers Next Door

Milestone 4
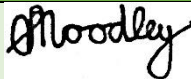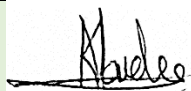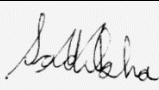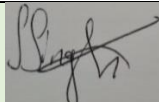
Sashen Moodley, Denita Pillay, Kalen Naidoo, Sadikha Maharaj, Shridhar Singh

Index

Group and System Details

Group Number	Group/System Name
Westville Group 2	Codename: Developers Next Door System: Self-service Snacks and Drinks Ordering System

No.	Student Number	Name and Surname	% Estimated Contribution	Signature
1	219006946	Sashen Moodley	20	
2	219002425	Denita Ruth Pillay	20	
3	219032871	Kalen Naidoo	20	
4	219001721	Sadikha Maharaj	20	
5	217008024	Shridhar Singh	20	
			Total: 100%	

System Name

We have developed a **Self-Service Snacks and Drinks Ordering System.**

For the front-end system: This is implemented in the style a Self-Service kiosk.

For the website: This is implemented as a facility for mobilising the appropriate front-end system capabilities.

Objectives of the System

In aiding the objectives of the system, it is best to provide some context with regard to some of the main issues our client, Dimension Data, was experiencing that prompted the development of the front-end and website systems.

Dimension Data's Westville branch was experiencing issues related to their canteen. Particularly, they faced lengthy waiting times, long queues, and general inefficiencies that arise from implementing manual procedures for capturing orders – such as lack of reporting and business intelligence capabilities. Another area for improvement was to provide a safer ordering environment during the Covid-19 pandemic that we currently find ourselves in.

Front-end System

The front-end system provides all the bells and whistles to meet these needs as well as additional quality of life improvements. In more detail the front-end system has the following objectives, which have all been met:

Objective	Description
Login – Access Control	All entities of interest can login to the system using their respective details. These people include the canteens staff and the Dimension Data employees (which can be further divided by a management role). Each user group gets access to their respective pages.
Full Ordering Capabilities	Employees will be able to select their snack and/or drink items from a well-designed interface, thereafter they can review their order and confirm for payment.
Order History	Employees can view their complete order history
Order Fulfilment	Canteen workers will be able to view their active order listings and prepare the orders based on their respective details. The system tracks the stages that the order goes through from being placed to being ready and finally being collected.
Item Management	Managers have control over creating, updating, reading, viewing, and removing/archiving items.
Credit System Management	Managers have the ability to set the monthly credit limits for the employees
Canteen Worker Management	Managers have full capabilities to add, remove (archive), update and view the Canteen workers' details (except sensitive information such as passwords)
Reporting	The system now generates informative reports on various aspects such as sales, stock, credits, and canteen worker reports. These are viewable through PowerBI. Also included is a receipt that generates within the front-end system upon placing an order.

The website allows features deemed appropriate of the front end-system to be portable allowing users to access these functionalities on the go. This provides the Dimension Data employees a more flexible and convenient way of placing their orders from the comfort of their work offices or current surroundings. The main objective was to mobilise the ordering procedure. In more detail the website has the following objectives, which have all been met:

Objective	Description
Login – Access Control	The Dimension data employees can login to the system using their employee credentials. The employees are further divided by a management role; giving managers access to specific pages.
Full Ordering Capabilities	Employees will be able to select their snack and/or drink items from a well-designed interface, thereafter they can review their order and confirm for payment.
Order History	Employees can view their order history on their profile
Item Management	Managers have control over creating, updating, reading, viewing, and removing/archiving items.
Reporting	The website generates data in tandem the front-end system. These are all externally accessed via PowerBI. Additionally, the website allows users to view their order history, as stated above.

Critical Success Factors for the Front-end System

Transaction Processing Requirements

All transaction processing requirements for the front-end system were met. This included:

- The full processing and capturing of the order details
- Order fulfilment
- Various management features (items, credits, workers)
- Reporting (Sales, stock, credits, workers)

System usability

All usability features brought up in discussion with our mentor were fully implemented. These include, but are not limited to:

- Search and filtering in as many contexts as possible
- Labels indicating mandatory fields
- System colour schemes and shading
- Different page landing for each user group
- Interface principle to reduce number of clicks
- Heading and text formatting for improved readability
- Images in appropriate locations
- Menu incorporates balances before and after an order is placed
- Various control decisions to ensure the user does not make an error
- Tab divisions to not overwhelm the user with information
- Using confirmation dialogues before finalising a process

<u>Error minimisation</u>

Through extensive error testing, we developed many tests and checks to prevent user errors as well as making the feedback in response to an invalid input as meaningful as possible. Examples of these extents include, but are not limited to:

- Drop-down lists were used to limit the possible values where appropriate
- There is very little "direct input" for the user placing the order
- Many event handlers checking every input from the user and validating
- Tooltips are displayed indicating the desired values so that the user does not need to get the end of a transaction to recognise an error
- Various error labels that will be displayed near the control elements from where the error took place, indicating the reason for the invalid input
- Should an error be detected, the system informs the user of the error via red labels and gives them the appropriate information to correct it.
- Should and error be detected, the system disables the relevant buttons, preventing the user from committing to an invalid process
- The creation of custom functions designed to detect invalid input
- Out use of a minimal and well-thought-out interface design also helps eliminate potential errors

<u>System Learnability</u>

The system incorporates various elements to help new users in familiarising themselves with the system. A few of these elements have been touched on in the previous CSF aspects, however they shall be further elaborated upon with the context of usability, as well as other elements not previously noted. Example of these learning aids include, but are not limited to:

- A help and FAQs page have been made available to employees once they have successfully logged into the system
- Various tooltips have been added to the UI elements, to help guide the user
- Headings and tabs are appropriately named ensuring there be no confusion in navigating through the system
- Should the user, after the all the help, input a wrong value or miss click, the system gives back meaningful information as to rectify this issue

<u>Business Intelligence – Reporting</u>

Through internal group discussions and various talks with our mentor we were able to identify reports that would be meaningful to Dimension Data, and we have successfully implemented all of them in PowerBI in a dynamic and interactive manner. The reports can be grouped into 4 main categories:

- Sales reports
- Stock reports
- Credit reports
- Canteen staff reports

Front-end errors

After the various iterations and feedback from our mentor we were able to patch the front-end system to completion and believe all identified errors have been corrected, and verified with our mentor.

Critical Success Factors for the Website

Business processing capacity and Front-end system interoperability

The website incorporates the objectives laid out at the beginning of this report:

Objective	Description
Login – Access Control	The Dimension data employees can login to the using their employee credentials. The employees are further divided by a management role; giving managers access to specific pages. Employees are also able to change their passwords.
Full Ordering Capabilities	Employees will be able to select their snack and/or drink items from a well-designed interface, thereafter they can review their order and confirm for payment.
Order History	Employees can view their order history on their profile to see how they have been spending their precious credits.
Item Management	Managers have control over creating, updating, reading, viewing, and removing/archiving items.
Reporting	The website generates data in tandem with the front-end system. These are all externally accessed via PowerBI.

The selected functions that we decided to mobilise via the website work exactly the same way as the Front-end system with regard to the data that it generates. Apart from the main processing activity of placing an order we also had to make a decision on what other activities would prove to be useful on a web-based platform. Through internal group discussions, as well as with our mentor, we decided that the item management feature would prove to be useful for the manager. The manager could access the website and view the stock levels of the items to determine if he should stop by the shops to get more items before heading to work. The ability for an employee to place an order online greatly achieves our goal of minimising waiting times and lengthy queues in the canteen, as employees can now place an order in the comfort of their office, or whilst they are in a meeting.

The website complements the front-end system perfectly by allowing the desirable front-end features to be mobilised, whilst not incorporating features that would bloat the website and makes no practical sense to include. The front-end system and the website reflect the same data and work together in perfect harmony.

Usability

We tabulated a website usability strategy that was a guiding hand throughout making the overall user experience a pleasant one. This table is given below:

1. SEARCH	The website will contain a search feature as well as HELP & FAQ
2. LARGE FONTS	Easier to read
3. COLOR SCHEMES	Appropriate colour schemes
4. IMAGES & TEXT	Images of menu items as well as text
5. SELECTED OPTIONS	Only selected options highlighted
6. DESIGN PROCESS AND EVALUATION	Only absolutely necessary information is included in website
7. AVAILABILITY	Website should be accessible at all times
8. USER FRIENDLY	The user interface is pleasant and easy to navigate. Not many button clicks required to place order/request reports.
9. SCROLLING	Website mainly incorporates vertical scrolling. with minimal horizontal scrolling making the website more easily readable by users and fully visible.
10. CLARITY	Website is attractive, yet simple and easy to read and understand
11. PRIVACY	Personal details of users are not visible or accessible to others
12. RELEVANCE	The website is quite engaging and includes all relevant information needed as well as images of menu items.
13. RECOGNITION	The Home Page includes all necessary steps required to place an order/request reports
14. USER EXPERIENCE	Website is easy to use, does not include pop ups or bright lighting/colours that can be harmful to the eyes. Plenty of images to grab the user's attention. Fonts are easily legible.

15. NAVIGATION	All pages in the website have visible links to all public pages including the home page and login page making it easier for users to navigate the website. Navigation options are concealed in a burger menu when the website is viewed on mobile devices or when resized on larger displays.
16. LOGIN	The website will have 1 login page. When a user logs in, the website will analyse the type of user and redirect the user to the respective page accordingly; namely employee page or manager page. This is an access control mechanism which provides "context-dependent" access to pages that are access controlled, thus increasing website security.
17. CONVENIENCE	Important fields will be displayed on top left-hand side/ no need to scroll down page for important info
18.HEADINGS	All pages have a heading
19. LINKS	Links to social media pages included in the 'contact us' page of the website
20. ERRORS	Website does not allow users to order a quantity of menu items that does not exist. Try catch blocks are implemented for all database connectivity, this ensures that error handling is taking place and displays the error message on screen, should an error occur.
21. CRUD	The website will allow managers to add new menu items and delete menu items, as well as request reports. The website will also allow employees to update their details on the website.

Our team has developed a website that offers a simple yet visually appealing look that enables users to navigate through the various public web pages with ease and satisfaction. The initial dual logins on the website have been refined such that the website now reflects a single login page that can be used by both the canteen manager and Dimension Data's employees, to access their respective user accounts. The menu page now reflects the official menu items and their images offered from Dimension Data's canteen. A variety of choices, from confectionary items, divine cakes and pastry to frozen items, savoury items, and drinks. To ensure employees have easy access in finding specific items to purchase; all menu items have been categorized and each category of items are reflected on the various buttons that may be used to isolate each category of items from the other. To be more specific about the menu item, the employee is interested in purchasing; the menu page includes a search bar where employees can type in the menu item's name and that item will be isolated on the menu page for purchase.

Security

The website makes use of public and private pages. A person could receive an HTML form from the web server and see what snacks and drinks are on offer, however in order to continue this person would have to login to the system. This limits the ordering privilege to Dimension Data's employees. Similarly, to the front-end system only a registered employee would be given access to the system, and once logged in their respective pages become accessible. For example, the manager would have access to his/her management pages, which cannot be accessed by any other employee role. Our web-based system is also end-to-end encrypted with the use of HTTPS.

Business Intelligence – Reports

The website generates data in tandem with the front-end system. These are all externally accessed via PowerBI through dynamic and interactive reports. These reports help the manager make informed decision regarding various aspects of the canteen. A form of integrated report within the website is the facility for the employee to view their order history on their profile.

Website Errors

Error Type	Description	Follow-up Action
Level 4	We were unable to distinguish between the front-end system order and the website orders. As such the order/sale reports indicate all front-end system and website data	The underlying issue to this was our lack of foresight earlier in the year. When designing the order database table, we did not factor in an "order type" attribute to differentiate a website order and a front-end system order. The obvious change would be to simply add this new column to the database schema, however due to fear of this change having rippling effects and potentially breaking systems, we decided to "play it safe" and not change the schema. We did various tests, and research into how this could be done safely but did not find our results that comforting, so decided against this action. For example, we created an abstract isolated application for the Front-end system to see how the change in the schema would affect the insertion of data into the order table, and found that the dataset structure remained unchanged unless a new connection was re-established which would require reworking the adapter functions; overall this was providing inconsistent results and we believed was not worth the risk.

Mentor Statement of Endorsement (Ms Sue Price)

Mentor's report, Group 2 ("Codename: Developers Next Door"), 2021

Group members:

Student no.	Surname	First name	Degree
219006946	Sashen	Moodley	BSCSIT
219002425	Denita	Pillay	BCom ISTN and Finance
219032871	Kalen	Naidoo	BCom ISTN and Marketing
219001721	Sadikha	Maharaj	BCom ISTN Double Major
217008024	Shridhar	Singh	BSCSIT

Group 2 has developed a point of sale system for a canteen which sells snacks at Dimension Data Offices. The front-end system works as a kiosk, where the employees can place their orders. The system does not allow customers to purchase more items than are in stock. Using the system, it is also easy to make certain snacks unavailable – for example, for frozen items if load shedding were persistent. On placing the order, a Barista or server makes up the order. The system records when the order was picked up. Employees are given a certain number of credits per month, which they can use to pay for these snack items. If an employee wants to spend more than the credit allocation, money will be deducted from their salaries.

The system has a user-friendly website, where users can place orders on the website. They can also view their previous orders, and see which orders still need to be picked up. They can also change their login password on the website. The manager can also access the website: he can view how many items are in stock, which are low in stock, and he can also update stock details.

The system has useful and interactive reports, presented in PowerBI. Managers can use these reports to see things like which items are the most popular; when is the most common time for employees to place orders (and which staff member made up the orders); how much employees are spending at the canteen, among many others. These reports will help the manager to make decisions about which items to stock, how to schedule staff working hours etc.

The group has developed a very useful system which will help the Dimension Data canteen manager to keep track of their snack sales business.

CS Price
16-11-2021

Reflections and Lessons Learnt

Sashen: I can say confidently that this year long endeavour has been one of the most challenging yet exciting experiences; one that has taught me a lot. With every passing milestone I felt our group developing and evolving to the team that we are today. What started off as a group of people I had no prior contact with turned into a group that I am proud to be apart of. The unique situation that we find ourselves in, with the Covid-19 pandemic, certainly does not make things easier, however I feel we've rose to the occasion and managed to deliver. This has been one of the most enlightening experiences in my life, and has taught me many crucial principles of team work and the trials and tribulations that come along with developing an IT system through the application of theoretical knowledge. In closing, I am honoured and privileged to have worked with a group that is driven to improve and passionate about what we do.

Denita: The major project, in its own way had presented multiple challenges for each member of our group, however, our group managed to overcome these obstacles through working together as a team and building off each other's strengths and weaknesses. I have learnt that proper communication, action plans, group meetings, groups deadlines as well as a strong group leader as vital in any group development project. I am fortunate to have been in a group that adopted these factors, which made "delivering a well-working system" a lot easier to develop.

Sadikha: I learnt that teamwork, communication, a proper plan, and time management is of utmost importance in any group development project. I was able to learn and develop skills throughout the development of this major project that I previously had not had before. Given that we had to work remotely, we were still able to finish the M4 deliverables by the due date. As a team, I feel our collaboration and teamwork was excellent. The project was a great opportunity for me to learn communication skills and overcome my fears. I was able to learn skills that I previously did not know. We were able to split roles and activities to everyone in the group based on their respective strengths and weaknesses. Overall, it was more than a pleasure to be part of a team of such talented and kind-hearted individuals.

Kalen: I was very fortunate to have such a well-organized team in producing our major project. Although we might have had a few time management issues during our early stages of our major project but we as group improved on this. With regards to the project as whole, I am happy with the outcome of our system especially under the tough circumstances of COVID-19, we had consistent meeting with our mentor and kept on improving our system. We learnt as a group how important communication skills are and individually developed new useful skills to carry with us in the real world.

Shridhar: Honestly, this project has given me more confidence as a developer and a software engineer. I truly believe that a project of this magnitude prepares students to face challenges in the real-world that they did not even know existed. This project has changed my perspective and I am thankful that I got to work with my peers – who are all equally as motivated, passionate and dedicated as I, this truly made the experience fun and working together built great communication and social skills; and for my mentor who has guided and inspired our group to reach new heights, personally encouraging me to believe more in myself and to dream bigger with my goals. In my first year of study, I was unsure of my career path and how I would cope in the working world. Back then, doing web programming in my ISTN module ignited my passion for coding and I am glad to have had this opportunity to truly flex my creativity and knowledge, and expand my skillset to have the 'dream' I started in first-year come to fruition!

References/Acknowledgements

Popular website such as Takealot.com and amazon.com were referenced to gain an understanding of public and private page properties. A general study of most online ordering websites was conducted to find common trends and best practices. Particularly, their use of a consistent colour scheme and general layout and formatting schemes proved to be useful.

Special thank you and gratitude goes out to our mentor, Ms Sue Price, for her guidance and assistance in mentoring us in the major project development effort, and for always availing herself at our request. It is most appreciated.