Requirements Traceability Matrix

They are not specific to any object or process and hence needs to be refined.

**User Requirements**

1. User should be able to navigate the system without any difficulty.
2. System supports native language of the country and other commonly spoken languages.
3. User should be able to place order according to his choices
4. User should be able to make payment using cash/credit/debit card.
5. User should get a receipt and a token number after making the payment.

**Sources:**Goals 1, 2 & 5, Scenario 1.1, 3.1, & 5.4, Use Case 1 & 2.

**Performance Requirements**

1. The system should be able to take any type of inputs, once the mouse is clicked on the respective button.
2. The system should be able to take any amount of order and display it when finished.
3. The system should be able to calculate the bill and prompt the user for the mode of payment and generate a receipt.
4. The system should be able to pass on the order in the kitchen for processing.
5. The system should be secured to restrict the number of people to enter the system to make changes in the menu and its items.
6. The system should be sturdy for rough usage.
7. System has a cash collector which gives refund up to 5 $ in coins.
8. System should be able to communicate to the central database to verify the authenticity of the credit/debit card.
9. System should allow Store manager to add/delete/alter system items.

**Sources:**Goals 5, 6 & 7, Scenario 4.1 & 4.2, Use Case 2, 3, 4 & 5

**User Interface Requirements**

1. The system must be a graphical user interface for easy use and understanding.
2. The system must be able to prompt the user for the next step to be performed during the process of using the system.
3. The system must display the bill and final order for confirmation.

**Sources:**Goal 1, Scenario 4.3 & 5.4, Use Case 1 & 4

**Ergonomics Requirements**

1. The system interface layout must be self-explanatory
2. Horizontal and vertical distances between two adjacent buttons should be at least 5 pixels for better visibility and accessibility.
3. The mouse should be placed not below 3 feet above the ground.

**Sources:**Goal 1, Scenario 1.2 & 1.3, Use Case 1 & 4.

**Requirements Traceability**

The detailed flow down of requirements from use cases and scenarios is as follows

|  |  |  |  |
| --- | --- | --- | --- |
| **SOURCE** | | **DESTINATION** | |
| **Use Case** | **Scenario** | **Requirement No** | **Description** |
| **Place Order** | 1.2 | User 1 | Easy navigability |
| 2.1, 2.2 | User 2 | Support of native language and others |
| 1.3, 3.1, 3.2 | User 3 | User places order as per his choice |
| 3.1, 3.2 | Performance 1,2 | Take any input and amount of order |
| 4.1 | Performance 3 | Able to calculate bill, prompt for mode of payment and give receipt. |
| 1.3, 1.1 | User Interface 1 | Supports GUI for easy use. |
| 1.2 | User Interface 2 | Prompts user for next step |
| 4.1 | User Interface 3 | Display bill and confirm order |
| 1.1, 1.3 | Ergonomics 1 | Self-explanatory system interface |
| 1.3 | Ergonomics 2 | 5 pixel distance b/w buttons |
| **Make Payment** | 1.2 | User 1 | Easy navigability |
| 5.1, 5.3 | User 4 | Make payment using cash/credit/debit cards. |
| 5.5 | User 5 | Generation of receipt/token no. |
| 4.1 | Performance 3 | Able to calculate bill, prompt for mode of payment and give receipt. |
| 5.2 | Performance 7 | Equipped with cash refund device. |
| 5.4 | Performance 8 | Ability to connect with bank central database. |
| 1.2 | User Interface 2 | Prompts user for next step. |
| 4.1 | User Interface 3 | Display bill and confirm order. |
| 1.1 & 1.3 | Ergonomics 1 | Self-explanatory system interface. |
| 1.3 | Ergonomics 2 | 5 pixel distance b/w buttons Update Menu. |
| 7.1 | Performance 5 | Restricted access to change system. |
| 6.1, 6.2 & 6.3 | Performance 9 | Ability to add /delete / alter menu items. |
| 1.1 & 1.3 | Ergonomics 1 | Self-explanatory system interface. |
| 1.3 | Ergonomics 2 | 5 pixel distance b/w buttons Monitor inventory. |
| 6.1, 6.2 and 6.3 | Performance 9 | Ability to add /delete / alter menu items Read Order. |
| 5.6 | Performance 4 | Communicate order to kitchen. |

**Traceability of Requirements to Use Cases / Scenarios**

Traceability from requirements back to originating use cases/scenarios is as follow

|  |  |  |  |
| --- | --- | --- | --- |
| **SOURCE** | | **DESTINATION** | |
| **Requirement No** | **Description** | **Scenario** | **Use Case** |
| User 1 | Easy navigability | 1.2 | 1,2 |
| User 2 | Support of native language & others. | 2.1, 2.2 | 1 |
| User 3 | User places order as per his choice. | 1.3, 3.1 & 3.2 | 1 |
| User 4 | Make payment using cash/credit/debit cards | 5.1 & 5.3 | 2 |
| User 5 | Generation of receipt/token no. | 5.5 | 2 |
| Performance 1 | Take any input. | 3.1 & 3.2 | 1 |
| Performance 2 | Take any amount of order. | 3.1 & 3.2 | 1 |
| Performance 3 | Able to calculate bill, prompt for mode of payment and give receipt. | 4.1 | 1,2 |
| Performance 4 | Communicate order to kitchen. | 5.6 | 5 |
| Performance 5 | Restricted access to change system. | 7.1 | 3 |
| Performance 6 | Sturdy system for rough usage. | 7.2 | None |
| Performance 7 | Equipped with cash refund device. | 5.2 | 2 |
| Performance 8 | Ability to connect with bank central database. | 5.4 | 2 |
| Performance 9 | Ability to add /delete / alter menu items. | 6.1, 6.2 & 6.3 | 3,4 |
| User Interface 1 | Supports GUI for easy use. | 1.1 & 1.3 | 1 |
| User Interface 2 | Prompts user for next step. | 1.2 | 1,2 |
| User Interface 3 | Display bill and confirm order. | 4.1 | 1,2 |
| Ergonomics 1 | Self-explanatory system interface | 1.1 & 1.3 | 1,2,3 |
| Ergonomics 2 | 5 pixel distance b/w buttons. | 1.3 | 1,2,3 |
| Ergonomics 3 | Vertical placing of mouse. | 1.2 | None |

**Traceability of Requirements to Attributes and Functions**

|  |  |  |  |
| --- | --- | --- | --- |
| **System Level Requirements** | **Object** | **Attribute** | **Function** |
| **1.1.** Restaurant will be open for 16 hours and will operate in four shifts as Morning (730 AM -1130 AM), Afternoon (1130 AM -330 PM), Evening (330 PM - 730 PM) and Night (730 PM -1130 PM). | Fast Food System | Time |  |
| **1.2.** System should be able to serve a throughput of 50, 125, 50, 75 customers per hour during these four shifts respectively. | Fast Food System | Throughput |  |
| **1.3.** Cooks, cleaners and assemblers will be the type of employees working the restaurant. | Employee | type |  |
| **1.4.** Cook will be paid at the rate of $5 per hour for the duration of their work. | Cook | Salary |  |
| **1.5.** Assemblers will be paid at the rate of $4.75 per hour for the duration of their work. | Assemblers | Salary |  |
| **1.6.** Cleaner will be paid at the rate of $4.5 per hour for the duration of their work. | Cleaner | Salary |  |
| **1.7.** Customer will leave without ordering if he sees 6 or more people in the line waiting to be served thereby causing a loss in revenue. | Fast Food System | Waiting time |  |
| **Sub-System Level Requirements** | **Object** | **Attribute** | **Function** |
| **2.1.1.** The system will provide queue management by passing orders sequentially to kitchen (FIFO) by assigning order numbers to them. | Internal Ordering System | Order No | TransmitOrder ToKitchen |
| **2.1.2.** Customer should be able to order item either by name or by number (for combo deals). | Item | Type/Name | Order |
| **2.1.3.** System will support native and other commonly spoken language in the country. | Display | Language |  |
| **2.1.4.** An average order takes about 1 minute to complete with a variance of 10 seconds. | Kitchen |  | Make Order |
| **2.1.5.** Customer takes 2 minutes on an average to complete and ordering process. |  |  | place order |
| **2.1.6.** System will be equipped with a standard QWERTY keyboard for taking inputs. | Keypad | layout |  |
| **2.2.1.** This Order number will be printed on the bill that customer receives. | Receipt Printer | Order No | PrintOrderNo |
| **2.2.2.** System shall be able to accept cash and coins. | Cash Acceptor | Type | AcceptCash- AndCoin |
| **2.2.3.** System should be able to accept debit / credit cards. | Card Reader | Type | ReadCard |
| **2.2.4.** System will accept only $1, 5, 10, 20 bills and nickel, dime, quarter denomination of coins. | Cash Acceptor | TypeTo AceeptCash- AndCoin | AcceptCash- AndCoin |
| **2.2.5.** System will reject pennies & $50, $100 bills. | Cash Acceptor |  | RejectCash AndCoin |
| **2.2.6.** System won't allow putting in $1 coin. | Cash Acceptor |  | RejectCash AndCoin |
| **2.2.7.** Cash return will return change only in coins. | Cash Return | type | returnChange |
| **Component Level Requirements** | **Object** | **Attribute** | **Function** |
| **3.1.1.** Touch screen should be able to take inputs from users when they apply a light pressure (x lb) from their fingers corresponding to an item. | Touch Screen |  | TakeInput |
| **3.1.2.** Touch screen should be able to withstand rough use i.e. it will be scratch proof (i.e., will be resistant to nail scratching) and will not malfunction if a pressure of (x+5) lb is applied to the screen. | Touch Screen |  |  |
| **3.1.3.** Touch screen will colored for visual appeal and will support at least 256 colors. | Touch Screen | type |  |
| **3.1.4.** Resolution of the screen will be at least 640X480 pixels. | Touch Screen | pixels |  |
| **3.1.5.** Touch screen will be at least 10" in size. | Touch Screen | dimension |  |
| **3.1.6.** Touch screen should be able to display at least 15 rows and 60 columns of text when the font size of the text is 10. | Touch Screen | dimension |  |
| **3.2.1.** System will be equipped with a card reader with built it keypad (containing all digits and special function keys corresponding to CANCEL, OK, # etc). | Card Reader | type |  |
| **3.2.2.** This card reader should be able to read the card information if swiped at a speed > 1 m/s. | Card Reader |  | ReadCard |
| **3.2.3.** Card reader will have a vertical slot on the right hand side of the keypad. | Card Reader | LocationOf Slot |  |
| **3.2.4.** System will read the swiped card, will retrieve the total bill amount and initiate the modem to dial the bank to complete the transaction. | Modem / Card Processor |  | Dial Bank |
| **3.3.1.** System will display all the menu items in icons/graphics format for selecting. | Display |  | selectItem |
| **3.3.2.** System will prompt the user for mode of payment. | Display | Payment Mode | SelectPayment Mode |
| **3.3.3.** Order will be transferred to the kitchen touch screen instantaneously once the user does the payment. | Internal Ordering System | ProtocolTo- Communicate | TransmitOrder ToKitchen |
| **3.3.4.** System will display the order sequentially on the kitchen screen with a forward and back button at the bottom. | KitchenScreen |  | ForwardOrder ReverseOrder |
| **3.3.5.** Touching an order on the kitchen screen will prompt the system that the order has been delivered and the screen will be rolled forward. | KitchenScreen |  | SignalComplete- Order |
| **3.3.6.** Any error message during such a process will be reported to the user on the touch screen informing him to take any further action. | Display |  | ReportError Message |
| **3.3.7.** There will be a high contrast between the foreground and the background of the display for easy reading capabilities. | Display |  |  |
| **3.3.8.** Throughout the ordering process all the text displayed on the screen will be either greater than 10 or less than 18 font size so that all users (young, adult, old) can read it. | Display | Text/Size |  |
| **3.4.1.** Modem should be able to complete a transaction (dialing, sending information, and receiving information) in 15 seconds or less at all times. | Modem | Speed | Dial Bank/ Transmit Information |
| **3.4.2.** Once connected to the bank system will supply the card information to the bank database, will query the card validity and will supply the amount to be charged to the card. | Modem |  | Transmit Information |
| **3.5.1.** System will be secured to grant access rights only to the system administrator. For this a login ID and a password will be assigned which could be changed. Password won't be visible to onlookers while typing for increased security. | Software | Login/ Password | Authorize |
| **3.5.2.** System will deny access to change the contents if the login/password/ both are incorrect by providing an error message. | System Administrator/ Software |  | Deny Access |