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# KnowYourDNA

## Business Description

KnowYourDNA provides a direct-to-consumer genetic testing service in which customers provide a saliva sample that is laboratory analyzed. It helps people access and understand their genome better by offering advanced DNA reports that deliver :

- An enriching view of a person's ancestry that helps discover their family history.
- In-depth information about genetic predispositions to health risks, wellness, and physical traits.

Customers have a choice to share this information with their primary healthcare provider who is then able to:

- Suggest lifestyle changes for a better outcome.
- Order more tests for further screening, if needed.

### System Request: KnowYourDNA Ordering and Reporting System

#### Business Need:

DNA sequencing a few years ago cost over billions of dollars and took years to get results. With the advent of Cloud computing and faster microprocessors, processing, and sequencing DNA information has become much easier and cheaper. From \$1000 in 2008, the price of DNA sequencing has fallen drastically to \$100 today.

The main purpose of this system "KnowYourDNA" is it sequences key information from the DNA and maps it to prior ancestral databases as a commercial service to the end-user via a web interface. There are current services that do provide ancestry and wellness information. But unfortunately, most of them are caught up in legalities due to FDA regulations and are unable to provide "not- sugar-coated" findings to their customers. This application, however, can be linked with your primary care doctor who can view and access the actual risk associated with the test results and better educate the customer about their test results or recommend tests or therapy routes to them.

#### Business Requirements:

Using the system, the customers can understand their genetic makeup better and take proactive health measures by involving their physicians early on. The specific functionalities the system must have are as follows:

- The system will grant access privileges based on the roles of the user, for eg, 'Physician', 'User'.

- The system will display the user's Ancestry information about the geographical origin of the User.
- The system will inform the user about the risk associated (in terms of presence or absence of certain genes) with the User's genetic predispositions to 25+ health conditions.
- The system will show in-depth information with regards to population statistics about the User's genetic predispositions to 25+ health conditions.
- The system will show in-depth information about their likelihood of developing 25+ physical traits and 7 wellness traits.
- The system will enable the user to send the health reports to his primary care provider with the user's consent.
- The system will allow the primary health care physician to look at the user's test results more elaborately.
- The system will facilitate the primary health care physician to prescribe additional genetic tests to the user if required.

### **Business Value:**

As the detailed health-related characteristics would be specified, the customer can identify the areas of improvement and could work on it. This system not only has a return on investment (ROI), but it also has a return on value (ROV).

- An electronic record of the user's genetic makeup that can be reviewed anytime by the user or his physician.
- It helps improve users' awareness and understanding of their DNA and its risk implications which helps them make more informed choices that may relate to healthy living.
- Comprehensive genetic testing highlights health risks that might help with early-on detection of risks which otherwise might not surface for years, therefore improving user's health outcomes by 15%.
- Improves early-on communication and interaction between the user and their primary care physician proactively which helps educate the user further.
- Encourages lifestyle changes and preventative measures before the incidence of health risks by 15 to 20%.

### **How the system will support operations:**

- Ease of ordering the tests
- Ease of viewing wellness and ancestry information on one portal
- Ability to send their reports to the physician within the system with ease
- The ability of physicians to review the reports and request additional tests.
- Tracking the orders (Starting Process from samples to generating reports and sending to physicians)

## **Functional Requirements**

- 1. The system should allow a user (customer/physician) to create an account.**

### **Process Requirements:**

- 1.1 The system should allow the user to create an account with their personal information like name and email.
- 1.2 The system should update the user information in the Customer/Physician Data Store.
- 1.3 The system should allow the user to enter their email address.
- 1.4 The system should allow users to enter their passwords.
- 1.5 The system should check for validity in terms of the strength of the password.
- 1.6 The system should update the username and password in the Customer Data Store.
- 1.7 The system should allow users to create an account with their approval.
- 1.8 The system should update the Customer/Physician Data Store (either physician or customer) with their account details.
- 1.9 The system should generate a confirmation for the user account creation.

### **Information Requirements:**

- 1.10 The system should have the user's personal information in the Physician/Customer Data Store.
- 1.11 The system should store the email ID and password of the user in the Physician/Customer Data Store.
- 1.12 The system should contain the user's account information in the Physician/Customer Data Store.

- 2. The system should allow the customer to order a kit.**

### **Process Requirements:**

- 2.1 The system should display the catalog of kits available for the customer to choose from.

- 2.2 The system should allow the customer to select from Wellness or Ancestry and Wellness kits.
- 2.3 The system should allow the customer to enter their shipping address.
- 2.4 The system should display the total order price.
- 2.5 The system should allow the customer to enter their payment details.
- 2.6 The system should allow the customer to confirm their purchase.
- 2.7 The system should validate the payment details through a credit card clearinghouse.
- 2.8 The system should update the order details in the Order Data Store, after payment.
- 2.9 The system should update the shipping information in the Order Data Store.
- 2.10 The system should display order receipt to the customer.

**Information Requirements:**

- 2.11 The system should contain the images, description, price, and details of both the kits.
- 2.12 The system should contain the customer's shipping address.
- 2.13 The system must contain order information once the order is finalized.

**3. The system should allow the processing of the order by the clerk.**

**Process Requirements:**

- 3.1 The system should display the order information for the clerk to process the order.
- 3.2 The system should allow the clerk to generate a UPS tracking number for shipping.
- 3.3 The system should allow the clerk to update the order information with the tracking number.
- 3.4 The system should store the updated order information.

**Information Requirements:**

- 3.5 The system should contain the tracking number associated with the order.
- 3.6 The system should contain the updated order information after the clerk has processed the order.

#### **4. The system should allow the processing of the order by the geneticist.**

##### **Process Requirement:**

- 4.1 The system should display the customer's order information to the geneticist.
- 4.2 The system should display the list of up- to date traits that the geneticist should analyze the sample for.
- 4.3 The system should allow the geneticist to update the customer's order to indicate they have started working on it.
- 4.4 The system should store the updated order information.
- 4.5 The system should allow the geneticist to update the wellness information in the Wellness Data Store.
- 4.6 The system should store the customer's wellness information in the Wellness Data Store.
- 4.7 The system should allow the geneticist to update the ancestry information in the Ancestry Data Store.
- 4.8 The system should store the customer's ancestry information in the Ancestry Data Store.

##### **Information Requirement:**

- 4.9 The system should contain a list of all the up to date traits to be sequenced.
- 4.10 The system should contain the customer's wellness reports.
- 4.11 The system should contain the customer's ancestry reports.
- 4.12 The system should contain the updated information of the customer's order after it has been processed by the geneticist.

#### **5. The system should display a personalized user dashboard for the customer.**

##### **Process Requirement:**

- 5.1 The system should allow customers to select either their ancestry, wellness or statistical information.
- 5.2 The system should display the customer's ancestry, wellness or statistical report.
- 5.3 The system should allow customers to send the report to the physician.
- 5.4 The system should allow customers to add their physician's information.
- 5.5 The system should prompt the customer to grant permission to use their payment details.
- 5.6 The system should allow customers to approve the request.

5.7 The system should update the customer order with the physician's details.

**Information Requirement:**

5.8 The system should contain the customer's ancestry information.

5.9 The system should contain the customer's wellness information.

5.10 The system should contain the customer's statistical information.

5.11 The system should contain updated customer order information with the physician's information.

**6. The system should display a personalized user dashboard for the physician**

**Process Requirement:**

6.1 The system displays a list of the physician's customers and their information.

6.2 The system should allow the physician to choose the patient whose report they want to view.

6.3 The system should allow the physician to access the patient's personalized report.

6.4 The system should display the patient's detailed wellness report.

6.5 The system should notify the customer that their physician has seen their report.

6.6 The system should display additional tests the physicians can order from.

6.7 The system should allow the physician to select tests to be ordered.

6.8 The system should allow the physician to confirm the ordering of these tests.

6.9 The system should update the order information in the Order Data Store and create a new order in the Physician Order Data Store.

6.10 The system should send a notification to the customer about the additional test orders being placed.

**Information Requirements:**

6.11 The system should contain a list of physician's patients.

6.12 The system should contain the physician's patient information.

6.13 The system should contain the physician's patient wellness report.

6.14 The system should contain a list of additional tests the physician can order from.

6.15 The system should contain the physicians' test order information.

6.16 The system should contain updated customer order information with additional test information.

## **Non-Functional Requirements:**

### **1. Operational Requirements:**

- 1.1 The system should be able to work on any Web browser.
- 1.2 The system should be able to run on mobile devices.
- 1.3 The system will log-off after a 10-minute timeout session.
- 1.4 The system should be able to integrate with the credit card clearing system.
- 1.5 The system should be able to integrate with the third-party shipper UPS.

### **2. Performance Requirements:**

- 2.1 The system should be available 24 hours per day, 365 days per year.
- 2.2 Interaction between the user and the system should not exceed 3 seconds.
- 2.3 The system should be able to support 100 simultaneous users at all times.

### **3. Cultural and Political requirements:**

- 3.1 Personal information is protected in compliance with the Data Protection Act.
- 3.2 The system should accept USD as the currency for transactions.

### **4. Security Requirements:**

- 4.1 The system should authorize Clerks to make updates to the Order Data Store.
- 4.2 The system should authorize Geneticists to make updates to the Wellness and Ancestry Data Store.
- 4.3 The system should validate every user's credentials during login.
- 4.4 The Physician should not be given access to view the Ancestry information of his/her patient.
- 4.5 User information should be accessed only by authorized personnel like Clerk, Geneticists.



## Use Cases

Blue: Input to the system

Orange: Output of the system

### Use Case 1

<b>Use Case Name:</b> User creates an account		<b>ID:</b> UC-1	<b>Priority:</b> High
<b>Brief Description:</b> User creates an account			
<b>Actor:</b> User			
<b>Trigger:</b> The User wants to create an account to access their dashboard.			
<b>Type:</b> <u>External</u> Temporal			
<b>Preconditions:</b>			
<b>Normal Course</b>		<b>Information for Steps</b>	
1. The user enters personal information like first and last names to initiate account creation (Alternative Course 1).		_____ Personal Information	
2. The system stores the user’s personal information in the corresponding data store.		_____ Personal Information	
3. The user enters the email address (Exception 2).		_____ Email address	
4. The user chooses a password. (Exception 3).		_____ Password	
5. The system checks for password strength.		_____ Approval of Password strength	
		_____ Email address and password	
6. The system stores the user’s email address and password.		_____ Approval for account creation	
7. The user approves the creation of the account.		_____ Account information	
8. The system stores the user’s account information.		_____ Confirmation of account creation	
9. The user receives a receipt confirming new account creation.			

**Alternative Course(s):**

1. The customer already has an account.
  - a. The system requests that the actor enter his/her name and password.
  - b. The actor enters his/her name and password (Exception 1).
  - c. The system validates the entered name and password and logs the actor into the system.

**Postconditions:**

1. The user logs in to the system.

**Exceptions:**

1. The User ID and password entered is invalid.
  - a. An error message is displayed.
  - b. The user can type in a new name or password or choose to cancel the operation.
2. The username is already taken.
  - a. The user is prompted to choose another username.
3. The Password doesn't match the strength criteria.
  - a. The customer is notified and asked to choose another password.
4. The passwords don't match.
  - a. An error message is displayed and the user is prompted to try again.

**Summary:**

Inputs	Source	Outputs	Destination
Personal information	User	Personal Information	Customer/Physician Data Store
Email Address	User	Email Address and Password	Customer/Physician Data Store
Password	User	Approval of Password strength	User
Approval for account creation	User	Account information	Customer/Physician Data Store
		Confirmation of account creation	User

## Use Case 2

<b>Use Case Name:</b> Place an order		<b>ID:</b> UC-2	<b>Priority:</b> High
<b>Brief Description:</b> The customer can place an order for a wellness or wellness and ancestry kit.			
<b>Actor:</b> Customer			
<b>Trigger:</b> The customer wants to order a genetic testing kit.			
<b>Type:</b> <u>External</u> Temporal			
<b>Preconditions:</b> 1. The customer should have logged into the system and been validated.			
<b>Normal Course</b>  1. The system shows the customer the details of the kit. 2. The customer selects the kit of preference. 3. The system shows the customer the total of their order. 4. The customer fills in payment information. 5. The customer fills in the shipping information. 6. The customer confirms the purchase of the order (Alternative course 1). 7. The system validates the customer’s payment information (Exception 1). 8. The system stores the customer’s order and shipping information in the Order Data Store. 9. The customer receives an order receipt		<b>Information for Steps</b>  _____ Details and cost of the kit  _____ Kit of Preference  _____ Total price order  _____ Payment information  _____ Shipping information  _____ Confirmation to purchase  _____ Payment authorization _____ Payment validation _____ Order information _____ Shipping information  _____ Order receipt	
<b>Alternative Course(s):</b> 1. The customer changes his mind and wants to order the alternative kit. a. Repeat steps 1-3			
<b>Postconditions:</b> 1. The customer order starts to be processed.			

**Exceptions:**

1. The payment information is invalid.
  - a. An error message is displayed.
  - b. The customer is asked to fill in their payment details again.

**Summary:**

Inputs	Source	Outputs	Destination
Details and cost of the kit	Customer	Payment authorization	CC clearing house
Kit of Preference	Customer	Order information	Order Data Store
Total price order	Item Data Store	Order receipt	Customer
Payment information	Customer	Shipping information	Order Data Store
Confirmation to purchase	Customer		
Shipping information	Customer		
Payment validation	CC clearing house		

**Use Case 3**

<b>Use Case Name:</b> Processing the Orders: Clerk	<b>ID:</b> UC-3	<b>Priority:</b> High
<b>Brief Description:</b> The order is processed by the clerk who sends the kit to the customer through UPS.		
<b>Actor:</b> Clerk		
<b>Trigger:</b> The clerk wants to ship the saliva kit to the customer. <b>Type:</b> <u>External</u> Temporal		

<b>Preconditions:</b> 1. The customer has placed the order.			
<b>Normal Course</b>		<b>Information for Steps</b>	
1. The system displays the clerk the customer order.		_____ Order information	
2. The clerk generates tracking information through UPS.		_____ Tracking information	
3. The system sends tracking information to the customer.		_____ Tracking information	
4. The clerk updates the order information.		_____ Updated order	
5. The system stores the updated order.		_____ Updated order	
<b>Alternative Course(s):</b>			
<b>Postconditions:</b> 1. The system should assign a geneticist to this order.			
<b>Exceptions:</b>			
<b>Summary:</b>			
<b>Inputs</b>	<b>Source</b>	<b>Outputs</b>	<b>Destination</b>
Order information	Order Data Store	Tracking information	Customer
Tracking information	Clerk	Updated order	Order Data Store
Updated order	Clerk		

## Use Case 4

<b>Use Case Name:</b> Processing the Orders: Geneticist	<b>ID:</b> UC-4	<b>Priority:</b> High
<b>Brief Description:</b> The order is then processed by the geneticist who sequences the sample for results.		
<b>Actor:</b> Geneticist		

**Trigger:** The geneticist receives the customer sample and wants to sequence it.

**Type:** External Temporal

**Preconditions:**

1. The customer has sent back the saliva sample for sequencing.
2. A geneticist has been assigned to this order.

**Normal Course**

1. The system displays the customer order information.
2. The system shows the list of up- to date traits that the geneticist should analyze the sample for.
3. The Geneticist updates the customer order to indicate they have started working on it.
4. The system stores the updated order information.
5. The Geneticist reports the wellness information.
6. The system stores the customer's wellness information.
7. The Geneticist reports the customer's ancestry information.
8. The system stores the customer's ancestry information.

**Information for Steps**

— Order information

— List of traits

— Updated order

— Updated order

— Wellness Results

— Wellness Results

— Ancestry Results

— Ancestry Results

**Alternative Course(s):**

**Postconditions:**

1. The system should alert the customer that their results are ready for viewing.









**Exceptions:**

**Summary:**

Inputs	Source	Outputs	Destination
Order information	Order Data Store	Updated order	Order Data Store
List of traits	Traits Master Data Store	Wellness Results	Wellness Data Store
Updated order	Geneticist	Ancestry Results	Ancestry Data Store
Wellness Results	Geneticist		

Ancestry Results	Geneticist		

### **Use Case 5**

<b>Use case Name:</b> Customer dashboard		<b>ID:</b> UC-5	<b>Priority:</b> High
<b>Brief Description:</b> The customer is able to see his/her personalized dashboard that contains his/her ancestry, wellness, and statistical information.			
<b>Actor:</b> Customer			
<b>Trigger:</b> The customer wants to see their genetic information.			
<b>Type:</b> <u>External</u> Temporal			
<b>Preconditions:</b> 1. The customer should be logged in. 2. The customer should have purchased a kit and the customer’s sample should have been processed.			
<b>Normal Course</b>  1. The customer requests to see their ancestry information (Alternative Course 1, Alternative Course 2). 2. The system displays the customer’s ancestry report. 3. The system allows customers to request to send the report to the physician. 4. The customer adds the physician’s information. 5. The systems prompt the customer to grant permission to use their payment details. 6. The customer approves the request. 7. The system updates the customer order with the physician’s details.		<b>Information for Steps</b>   Request to access   Ancestry information  Ancestry information   Request to send report to Physician   Physician Information   Prompt to seek permission for using the payment information   Approval to use payment information   Updated Order with Physician Details	
<b>Alternative Course(s):</b> 1. The customer requests to see their ancestry information.			

a. The system displays the customer's wellness report. 2. The customer requests to see their statistical information pertaining to the variants found. a. The system displays the statistical report.			
<b>Postconditions:</b> 1. The system sends out an email to the physician of the customer.			
<b>Exceptions:</b>			
<b>Summary:</b>			
<b>Inputs</b>	<b>Source</b>	<b>Outputs</b>	<b>Destination</b>
Request to access	Customer	Ancestry information	Customer
Ancestry information	Ancestry Data Store	Prompt to seek permission for using the payment information	Customer
Request to send report to Physician	Customer	Updated Order with Physician Details	Order Data Store
Physician Information	Customer	Wellness Information	Customer
Approval to use payment information	Customer	Statistical Information	Customer
Wellness Information	Wellness Data Store		
Statistical Information	Statistical Data Store		

## Use Case 6

<b>Use case Name:</b> Physician dashboard	<b>ID:</b> UC-6	<b>Priority:</b> High
<b>Brief Description:</b> The physician is able to see his/her personalized dashboard with reports of his patients and can order additional tests if required.		

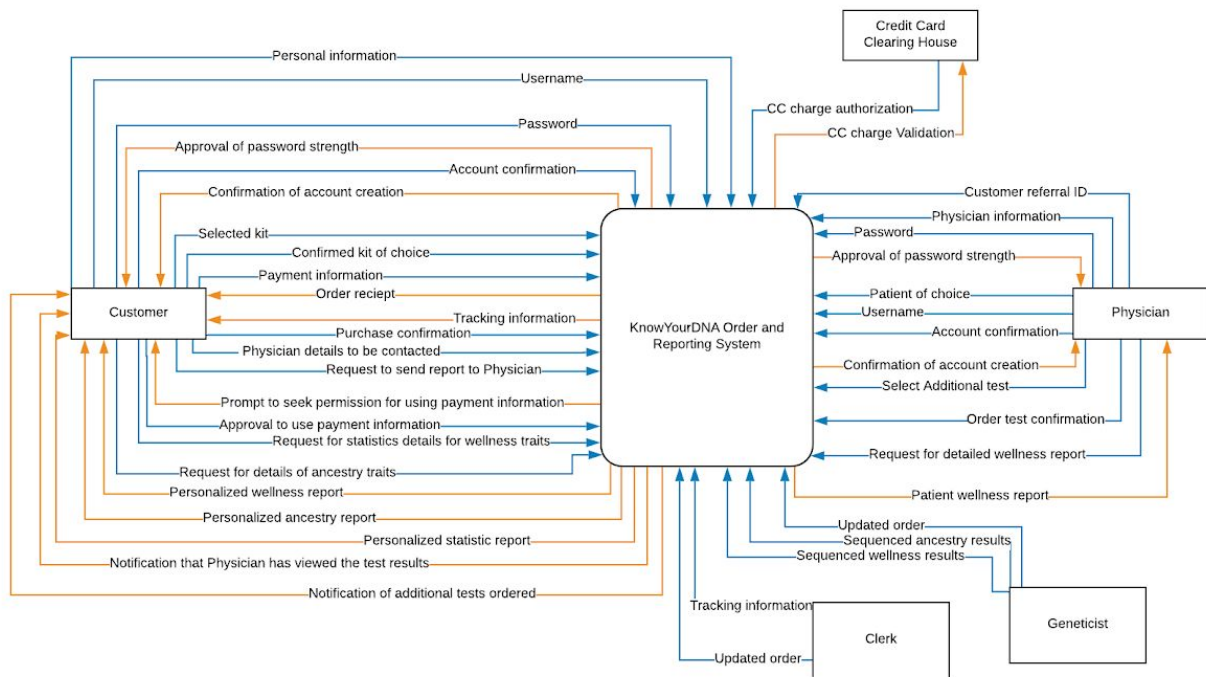


<b>Actor:</b> Physician			
<b>Trigger:</b> The physician wants to review the report of their patients and/or order additional tests.			
<b>Type:</b> <u>External</u> Temporal			
<b>Preconditions:</b> <div>1. The physician should be logged in.</div> <div>2. The customer should have agreed to share the reports with the physician.</div>			
<b>Normal Course</b> <div>1. The system displays a list of the physician’s customers and their information.</div> <div>2. The Physician chooses the patient whose report they want to view.</div> <div>3. The Physician requests to access the patient’s personalized report.</div> <div>4. The system displays the patient’s detailed wellness report.</div> <div>5. The system notifies the customer that their physician has seen their report.</div> <div>6. The system displays additional tests the physicians can order from.</div> <div>7. The Physician selects tests to be ordered (Alternative Course 1).</div> <div>8. The Physician confirms the ordering of these tests.</div> <div>9. The system updates the order information in the Order Data Store and creates a new order in the Physician Order Data Store.</div> <div>10. The system sends a notification to the customer about the additional test orders being placed.</div>		<b>Information for Steps</b> <div>_____ List of patients</div> <div>_____ Patient information</div> <div>_____ Patient of choice</div> <div>_____ Request to access a detailed report</div> <div>_____ Customer’s Wellness report</div> <div>_____ Patient’s wellness report</div> <div>_____ Notification: Physician viewed the results</div> <div>_____ List of Additional tests</div> <div>_____ List of selected tests</div> <div>_____ Confirmation for placing order</div> <div>_____ Updated order information</div> <div>_____ Physician Order information</div> <div>_____ Notification of additional tests ordered</div>	
<b>Alternative Course(s):</b> <div>1. The physician does not find the test he is looking for.<div>a. The physician returns to the dashboard.</div></div>			
<b>Postconditions:</b> <div>1. The geneticist will be notified of the additional test orders.</div>			
<b>Exceptions:</b>			
<b>Summary:</b>			
<b>Inputs</b>	<b>Source</b>	<b>Outputs</b>	<b>Destination</b>

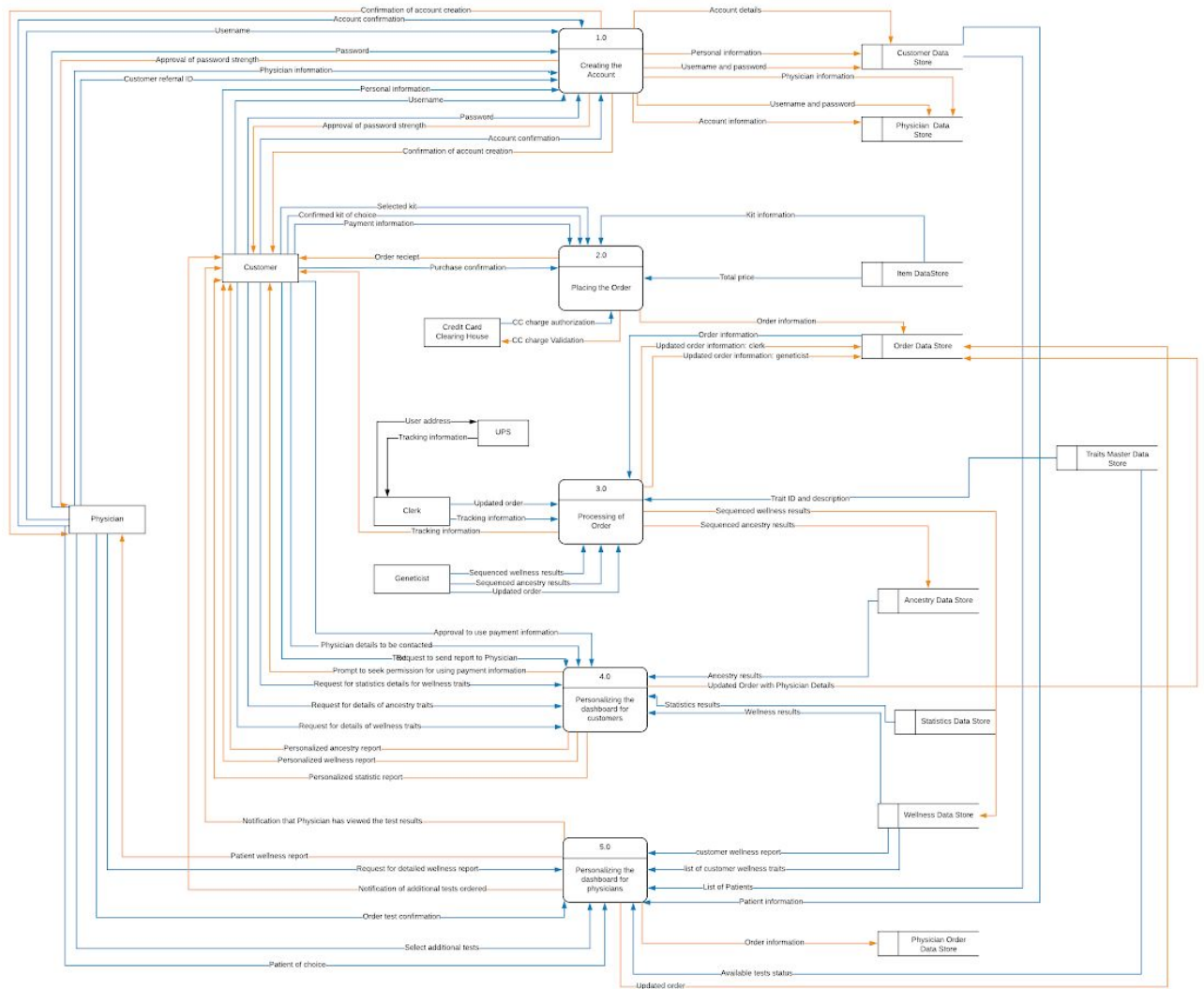
List of patients	Customer Data Store	Patient's wellness report	Physician
Customer information	Customer Data Store	Notification that Physician has viewed the test results	Customer
Patient of choice	Physician	Updated order information	Order Data Store
Request to access a detailed report	Physician	Physician Order information	Physician Order Data Store
Customer's Wellness report	Wellness Data Store	Notification of additional tests ordered	Customer
List of Additional tests	Traits Data Store		
Confirmation for placing order	Physician		

## **Data Flow Diagrams**

### **Context Diagram**

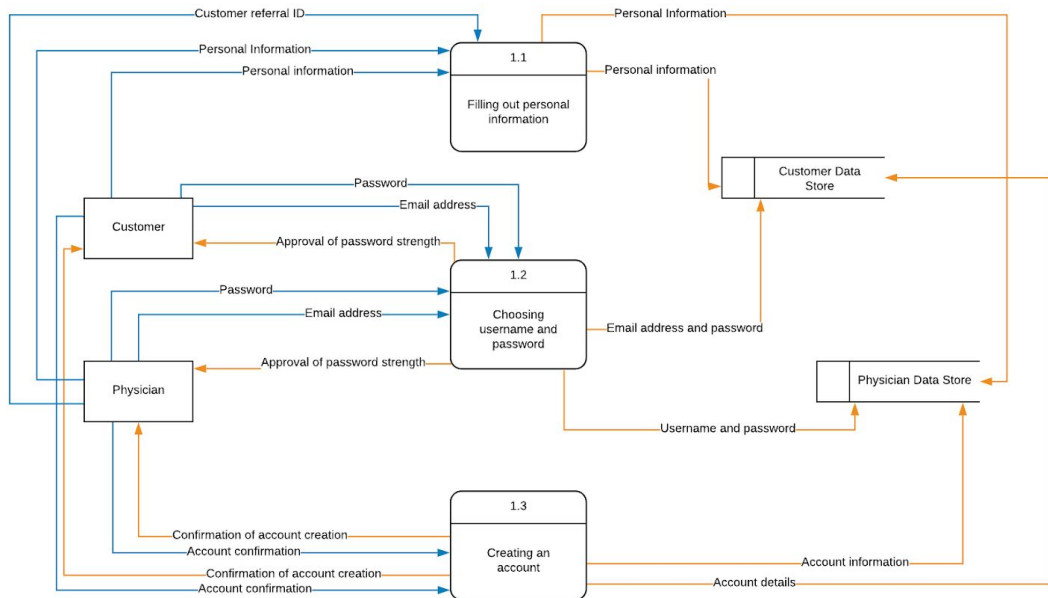


**Level 0 Diagram**

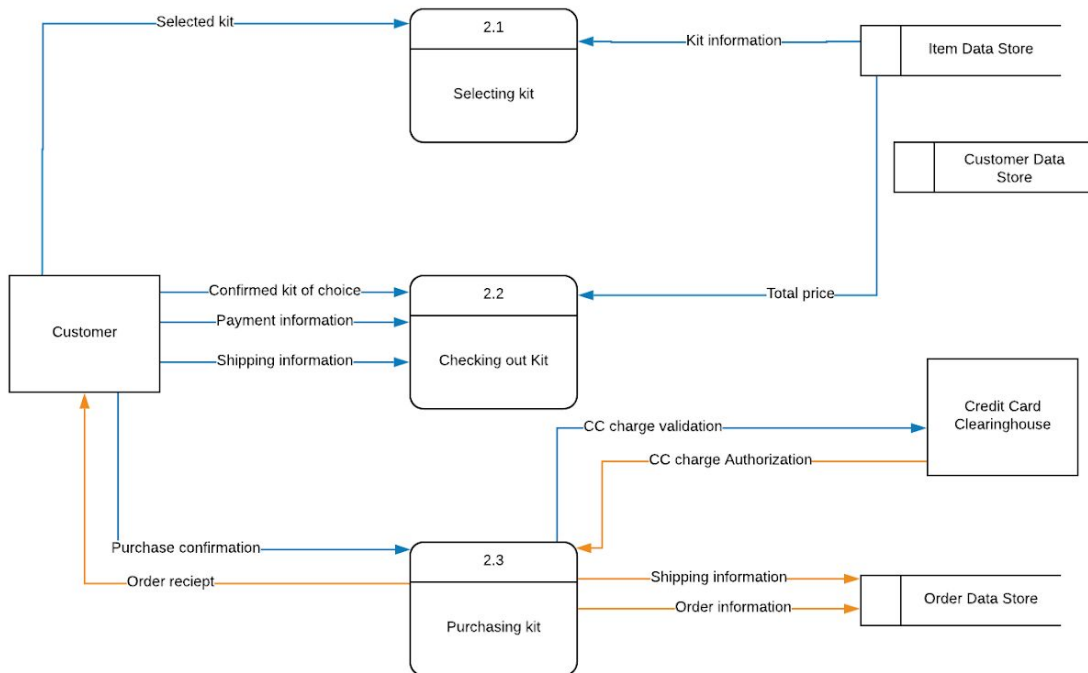


**Level 1 Diagram**

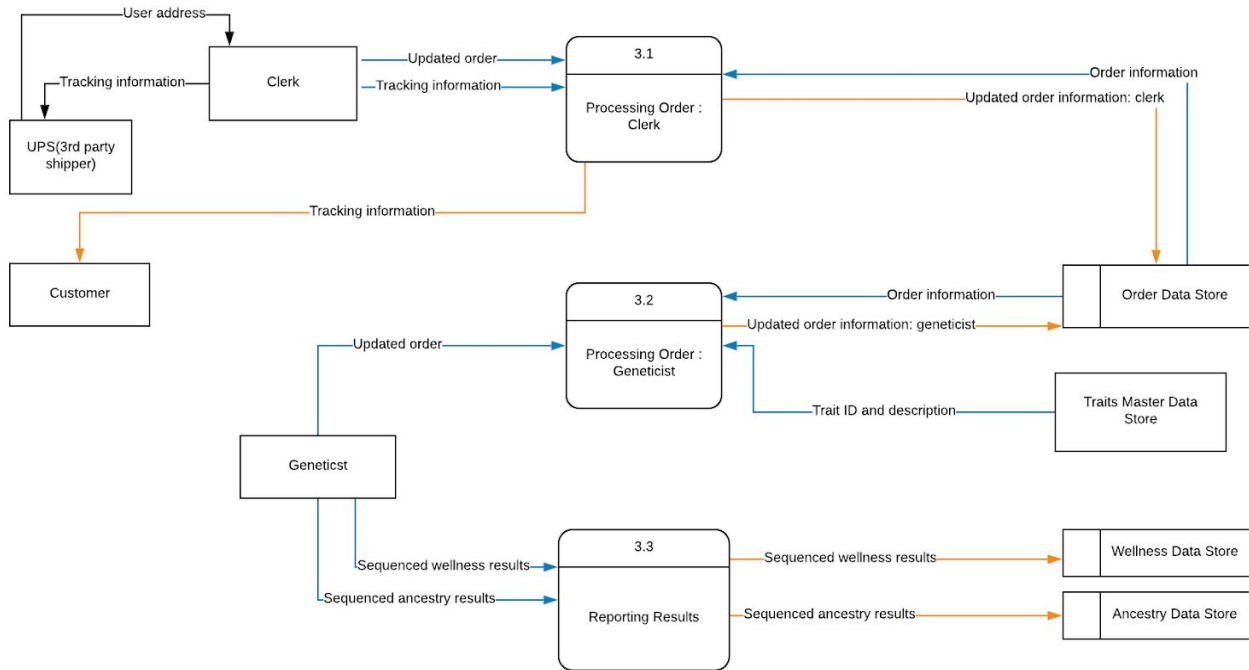
## 1: Creating an account



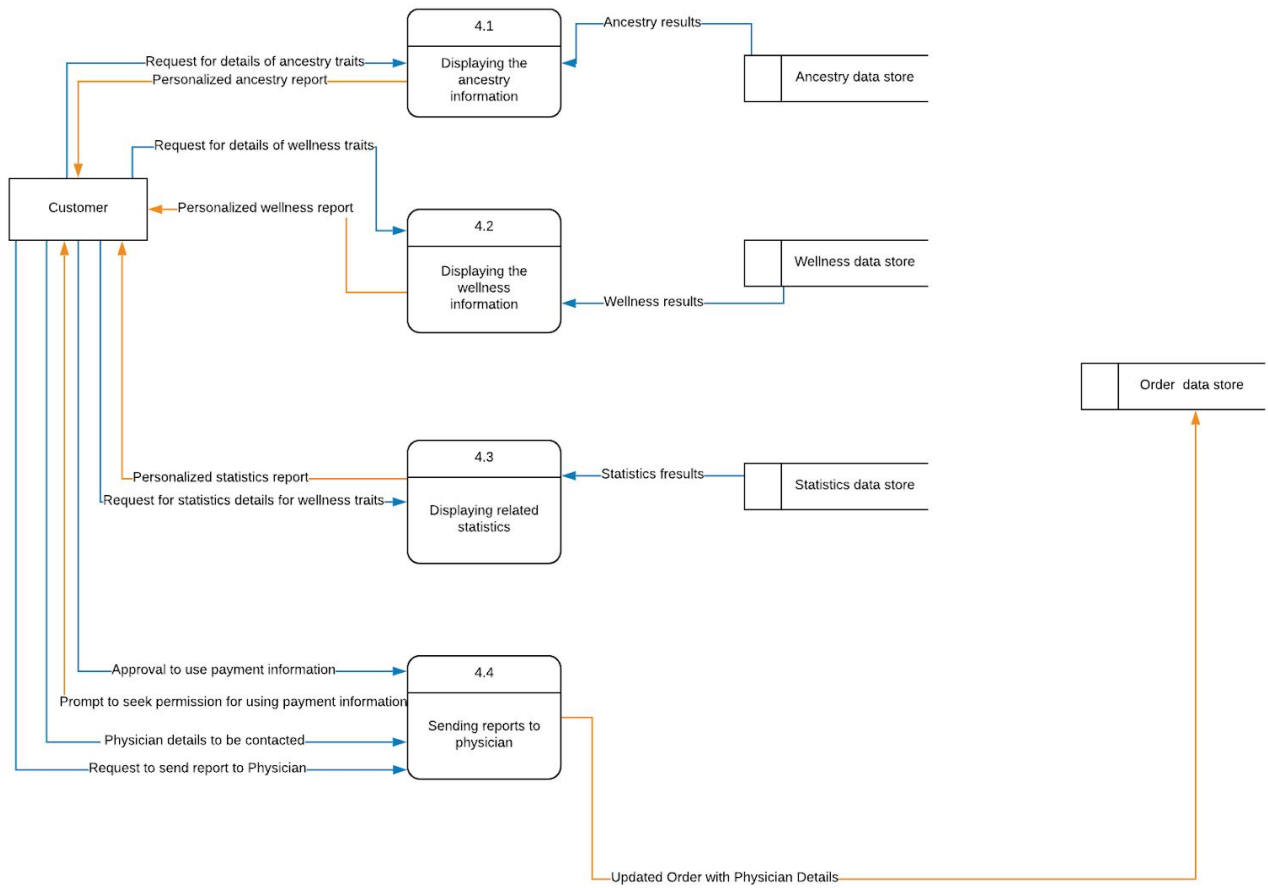
## 2: Placing an order



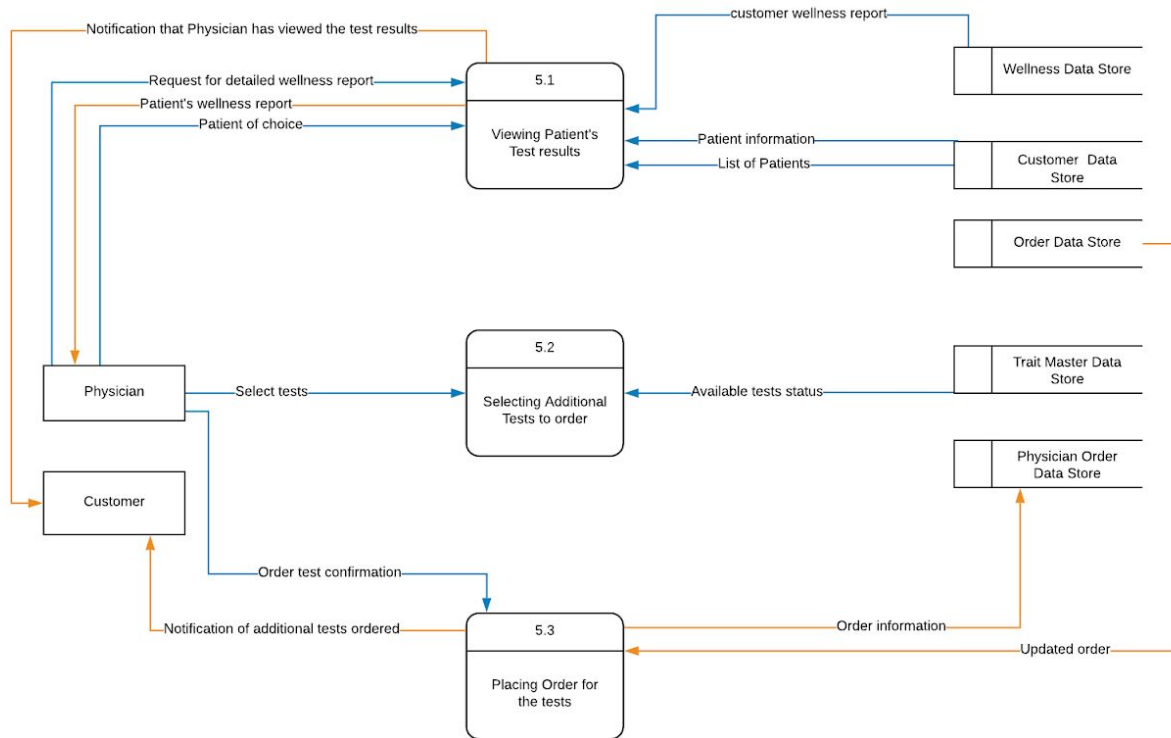
## 3: Processing of the Order by Clerk and Geneticist



## 4: Displaying personalized Dashboard to the user

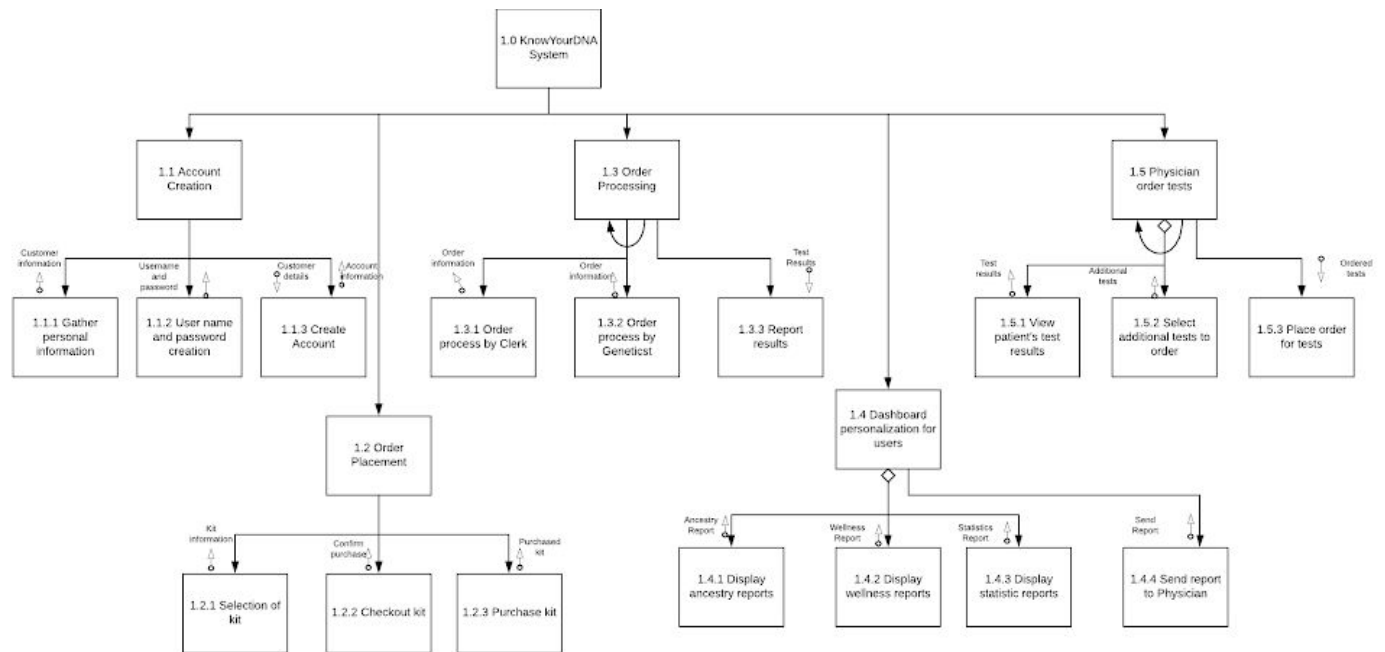


## 5: Displaying personalized dashboard to the physician





## Structure Chart



## Data Dictionary

### 1. Customer\_Data\_Store

Field/Column Name	Data Type	Domain	Description
Customer_ID	string	5	Unique customer ID identifying the customers
Customer_FirstName	string	10-15	Stores customers first name
Customer_LastName	string	10-15	Stores customer last name
Customer_Address	string	30-40	Stores customer address
Customer_ZipCode	char	5	Stores customer zip code
Customer_PhoneNumber	int	10	Stores customer phone number
Customer_EmailAddress	varchar	10-15	Stores customer email address
Created_Date	date	System-specific	The date the customer record was created
Last_Updated_Date	date	System-specific	The date the customer record was updated

## 2. Physician\_Data\_Store

Field/Column Name	Data Type	Domain	Description
Physician_ID	string	5	Unique physician ID
Physician_License_Number	string	6	Physician's unique medical license number
Physician_FirstName	string	10-15	Physician First Name
Physician_LastName	string	10-15	Physician Last Name
Physician_ZipCode	char	5	Physician zip code
Physician_PhoneNumber	int	10	Physician phone number
Physician_EmailAddress	varchar	10-15	Physician email address
Created_Date	date	System-specific	The date the physician record was created
Last_Updated_Date	date	System-specific	The date the physician record was updated

## 3. Item\_Data\_Store

Field/Column Name	Data Type	Domain	Description
Kit_ID	string	5	Unique registration kit number
Kit_Name	string	20-25	Registration kit name
Kit_Description	string	100-150	Registration kit description
Kit_Image	BLOB	png, jpeg	Registration kit image
Kit_Price	float	2-3	Registration kit selling price in float
Created_Date	date	System-specific	The date the item record was created
Last_Updated_Date	date	System-specific	The date the item record was updated

#### 4. Order\_Data\_Store

Field/Column Name	Data Type	Domain	Description
Order_ID	string	10	Order of the tests placed by the customer
Order_Date	date	mm-dd-yyyy	Date on which order request was placed
Customer_ID	string	5	Unique customer ID identifying the customers
Kit_ID	string	5	Unique registration kit number
Cust_Ship_Address	string	30-40	Shipping address of the customer to collect his sample
Cust_Payment_Info	string	Debit, Credit	Payment information of the customer
Clerk_Employee_ID	string	5	Employee ID of the clerk who maintains the Order Data Store
Order_Tracking_ID	string	10-12	Tracking ID provided by UPS
Geneticist_Employee_ID	string	5	Employee ID of the geneticist
Physician_ID	string	5	Unique physician ID
Order_Comments	string	100-120	Comments provided by the clerk and geneticist
Order_Status	string	New, Assigned, In Progress, Hold, Completed	Current status of the order
Created_Date	date	System-specific	The date the order record was created
Last_Updated_Date	date	System-specific	The date the order record was updated
Last_Updated_By	string	10-15	Employee name who updates the order record

## 5. Traits\_Data\_Store

Field/Column Name	Data Type	Domain	Description
Trait_ID	string	7	Unique trait id
Trait_Type	string	Wellness, Health, Ancestry	Store the categories of trait type
Trait_Description	string	100-150	Describes the characteristics of traits
Trait_Availability_Status	Boolean	Yes, No	Holds information regarding the availability of traits for testing
Trait_Included_Kit	Boolean	Yes, No	If trait included in the kit - yes, otherwise no
Created_Date	date	System-specific	The date the trait record was created
Last_Updated_Date	date	System-specific	The date the trait record was updated

## 6. Ancestry\_Data\_Store

Field/Column Name	Data Type	Domain	Description
Customer_ID	string	5	Unique customer ID identifying the customers
Order_ID	string	10	Order of the tests placed by the customer
Trait_ID	string	7	Unique trait id
Ancestry_Report	string	200-250	Holds information regarding ancestry test results of customer
Created_Date	date	System-specific	The date the ancestry record was created
Last_Updated_Date	date	System-specific	The date the ancestry record was updated

## 7. Statistics\_Data\_Store

Field/Column Name	Data Type	Domain	Description
Customer_ID	string	5	Unique customer ID identifying the customers
Order_ID	string	10	Order of the tests placed by the customer
Trait_ID	string	7	Unique trait id
Statistics_Report	string	200-250	Holds information regarding statistics of customer
Created_Date	date	System-specific	The date the statistics record was created
Last_Updated_Date	date	System-specific	The date the statistics record was updated

## 8. Wellness\_Data\_Store

Field/Column Name	Data Type	Domain	Description
Customer_ID	string	5	Unique customer ID identifying the customers
Order_ID	string	10	Order of the tests placed by the customer
Trait_ID	string	7	Unique trait id
Customer_Wellness_Report	string	200-250	Holds information regarding wellness report for the customer
Physician_Wellness_Report	string	300-350	Holds information regarding wellness report of the customer for the physician
Created_Date	date	System-specific	The date the wellness record was created
Last_Updated_Date	date	System-specific	The date the wellness record was updated

## 9. Physician\_Order\_Data\_Store

Field/Column Name	Data Type	Domain	Description
Physician_ID	string	5	Unique customer ID identifying the customers
Customer_ID	string	5	Unique customer ID identifying the customers
Trait_ID	string	7	Unique trait id
Physician_Order_ID	string	10	Unique ID for the orders that are submitted by the physician
Created_Date	date	System-specific	The date the order record was created
Last_Updated_Date	date	System-specific	The date the order record was updated

## UI Mockups


UI Link: <https://mreddy03.wixsite.com/website>

### Landing Page



ANCESTRY + TRAITS

Welcome to you



Wellness Service


Price:\$99

- 1000+ Geographic regions
- 15+ Trait reports

Buy Now

HEALTH + ANCESTRY

Welcome to you



Ancestry + Wellness Service

Price:\$199

- Includes everything in Wellness Service
- PLUS
- 10+ Health Predisposition reports \*
- 5+ Wellness reports
- 10+ Carrier Status reports \*

Buy Now

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## Creating an account: Customer

[Products](#)[About Us](#)[Sign In](#)[Back To Login](#)

### Customer Registration

Create an account to register and link your kit.

First Name

Last Name

Email \*

Create a Password

Confirm Password

Date Of Birth

Zip Code

[Create Account](#)[CONNECT WITH US](#)[UNSUBSCRIBE](#)[CAREERS](#)

## Signing in: Customer

### Know Your DNA

USERNAME

PASSWORD

[Login](#)[Forget password?](#)[Reset password](#)

## Payments Page

**Payments Page**[Back To Account](#)

Step 1: Choose The Kit

☐ Wellness Kit

\$99

☒ Wellness + Ancestry Kit

\$199

Step 2: Shipping Information

Shipping Address

Street Address

Street Address

Step 3: Review and Checkout

Total

\$199

☐ I accept terms & conditions

Buy Now

VISA

Buy Now


## Customer Dashboard

Products

About Us

Sign In

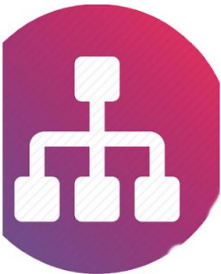
Welcome, Ananya [Logout](#)



Wellness

### Health Report


This report gives the genetic insights into your health, traits and wellness so you can learn more about your health conditions and make more informed decisions about your future.



Ancestry

### Ancestry Report


Know about your geographical composition and your DNA origins.



Statistics

### Statistics Report

Know how your genetic traits and variants compare to the rest of the population.



Add Physicians

### Add Your Physician

Send your health predisposition details to your primary care provider.

# Customer Health and Wellness Report

## Health Predisposition Report

[Download Report](#)[Back](#)

Health Predispositions	Results
Alpha-1 Antitrypsin Deficiency	Variant detected
Hereditary Fructose intolerance	Variant detected
Late-onset Alzheimer's Disease	Variant not detected
Age- Related Macular Degeneration	Variant not detected
BRCA1/BRCA2	Variant not detected
Parkinson's Disease	Variant not detected
Celiac Disease	Variant not detected
G6PD deficiency	Variant not detected
Hereditary Hemochromatosis	Variant not detected
Hereditary Thrombophilia	Variant not detected

## Wellness

[Download Report](#)

Wellness	Result
Alcohol Flush Reaction	Likely to have Alcohol Flush Reaction
caffeine Consumption	Likely to consume more Caffeine
Deep Sleep	Very Likely to be a deep sleeper
Genetic weight	Likely to be less than 150 pounds
Lactose intolerance	Unlikely to be Lactose Intolerant
Muscle consumption	Unlikely to have high muscle consumption
Sleep Movement	Very likely to move in sleep

Traits

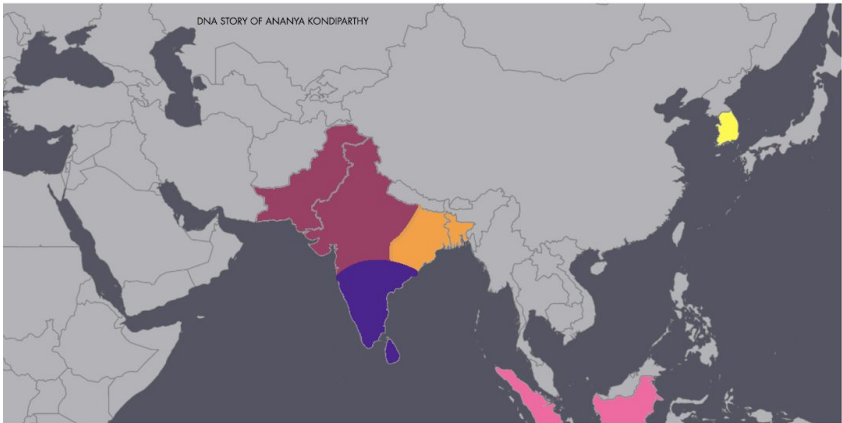
Download Report

Traits	Result
Ability to Match Musical Pitch	Likely matches musical pitch
Asparagus Oder Detection	Likely can smell
Back Hair	Unlikely to have Back Hair
Bald Spot	Unlikely to have Bald Spot
Bitter Taste	Likely to have Bitter Taste
Cheek Dimples	Unlikely to have Cheek Dimples
Dandruff	Unlikely to have Dandruff

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Customer Ancestry Report

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Ancestry Decomposition

Your DNA story tells the story of who you are and how you are connected to populations around the world.

Detailed Classification	Percentage
Southern Indian & Sri Lankan	72%
Northern Indian & Pakistani	18%
Bengali and Northeast Indian	4%
Indonesian	3%
Korean	4%

Download Report    Back

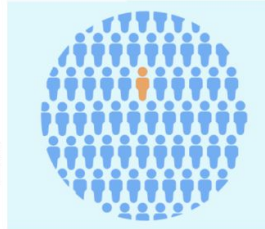
# Customer Statistics Report

## Population Statistics of the 2 Variants Detected

### 1 Variant Detected -Alpha-1 Antitrypsin Deficiency

WE DETECTED THE **TYPE 1**  
VARIANT IN THE  
**gene**

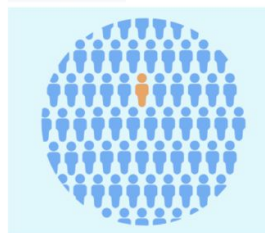
About 8% of the population has medium to high chance of developing this disease in their lifetime. Most people are under the age of 40 and it's more prevalent among Asian females.



### 1 Variant Detected -Hereditary Fructose intolerance

WE DETECTED THE **TYPE 2**  
VARIANT IN THE  
**gene**

About 1 in 50 people have high chances of developing this disease in their lifetime. Most people are under the age of 30 and it's more prevalent among Indian females.



## Adding Physician to send the report:

### Enter Physician Details



Physician Name

Physician Email

Type your message here...

☐

By clicking this you are confirming that , if your physician orders any additional tests, your payment information on file will be charged

Submit

## Signing in: Physician

### Know Your DNA

PHYSICIAN ID

Enter the License ID

USERNAME

Enter your username

PASSWORD

Enter your Password

Login

[Physician Registration](#)

[Forget password?](#)

[Reset password](#)

# Physician Dashboard

Products

About Us

Sign In

Dr.Randy [Logout](#)

## Patient Details



First Name	Last Name	DOB	Zip Code
Adam	Smith	02/08/1985	90345

[View Report](#)



First Name	Last Name	DOB	Zip Code
Ananya	Kondiparthi	08/10/1994	95550

[View Report](#)



First Name	Last Name	DOB	Zip Code
Mary	Baiden	01/05/1980	94560

[View Report](#)

# Physician's view of the Customer Wellness Report

Products      About Us      Sign In

Order Additional Tests

Back

Health Predisposition Reports	Results
Alpha-1 Antitrypsin Deficiency	70% above Normal
Hereditary Fructose intolerance	70% above Normal
Late-onset Alzheimer's Disease	Normal
Age- Related Macular Degeneration	Normal
BRCA1/BRCA2	Normal
Parkinson's Disease	Normal
Celiac Disease	Normal
G6PD deficiency	Normal
Hereditary Hemochromatosis	Normal
Hereditary Thrombophilia	Normal

# Physician view to Order more tests

Products      About Us      Sign In

List Of Tests

Back

Tests	
Cystic fibrosis	<input type="checkbox"/> Select
Celiac disease	<input type="checkbox"/> Select
Breast cancer	<input type="checkbox"/> Select
Alzheimer's disease	<input type="checkbox"/> Select
18p deletion syndrome	<input type="checkbox"/> Select

PLACE ORDER



## **Future Work**

Currently, our array of tests can inform patients and physician about their :

- carrier status of 25 inherited conditions and how their genetics can influence their chances of developing certain conditions,
- how their DNA influences 25 physical traits,
- how 7 genes play a role in their well- being and lifestyle choices, and
- where their DNA is from out of 600+ regions worldwide.

As a next step, on the wellness and health front, we would like to add 50 additional variant testing capability which would cover biomarkers for rare carcinomas and immunological diseases such as giant cell arteritis, where the patient's disease progression might take years and goes undiagnosed eventually leading to loss of vision or worse symptoms. Hence in such cases, early detection is crucial.

On the ancestry front, we would also like to give customers an option to connect with people who share DNA with them through the 'DNA Relative Finder' feature. Customers can also create family trees with the 'Tree Builder' feature. In addition to this, customers will be able to trace parts of their ancestry to a specific group of individuals from 1,000+ years ago and learn about which civilizations their forefathers descended from.

We also plan aiding the physician to help their patients better, and hence plan on adding 30 additional biomarker tests that the physicians can order. This helps keep the customer's test and genetic health records on one single portal which would facilitate easy access for the customers and their physicians. We believe that having a comprehensive and complete understanding of the customer's biomarker profile will prevent the progression of some serious conditions.

By 2023, we plan to partner with several research facilities that conduct genetic research. Customers can opt into our research program that can help drive scientific and medical discoveries. This kind of genetic research gives everyday people the opportunity to make a difference. Researchers would link the customer's genetic data to study topics from ancestry, to traits, to disease which can accelerate research and would help answer some scientific mysteries and solve for unmet medical needs.

## **Conclusion**

The Genome testing project was conceptualized with the intention to help customers gain knowledge about their genetic predispositions and ancestry. Currently, KnowYourDNA has 2 products: Wellness and Ancestry and Wellness kits. Customers can send samples of their DNA through a specimen that is then sequenced using standard procedures and then matched with a predefined set of patterns and ancestry sequences. The system also makes customers aware of how their genetic makeup is compared to the rest of the world through epidemiological statistics reports. In addition to this, customers can also send their reports to their physician who can better educate on what these results mean and how it would affect them. If their physicians feel like additional tests are required to gain a better understanding of the results presented they can choose from a list of available additional tests as well.

Currently, KnowYourDNA has carrier statuses of 25 inherited conditions, 25 physical traits, 7 wellness genes, and 600+ regions worldwide in their test profile. We plan on bringing in new functionalities and capabilities to our products that will continue to improve health outcomes and promote a better understanding of the human genome.