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Version 3.0

Maintenance Document

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Team Number: TA342

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Version Changing History

Version	Changing Description
1.0	Original version
1.1	Description added on each testing, document font changed
1.2	Security testing detail added
1.3	Integrity testing detail added
1.4	UX testing detail added
2.0	Load testing and backup testing added, all parts are done.
2.1	Introduction section added
2.2	Header and sub-header changed
2.3	Error condition section updated
3.0	Change the sequence of some sections, all parts are finished.

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1. Introduction

The website URL: https://www.sugarbattle.tk

The aim of our product is to provide a platform for parents with obesity or overweight children aged from 5 to 12 and help parent track their children's daily sugar intake as well as make the children healthy.

Team 'SuperNinja' website provides different functions for users and the main function is sugar calculator. Sugar calculator allows users to calculate much sugar in different snacks and drinks as well as help parent to know the total amount of sugar their children have taken every day. A map function combined with weather forecast function are also on the website to help users to find nearby parks or playgrounds. This will help them plan activities for their children. Healthy recipe function will give users some ideas on how to cook healthy food for their children. Sign in and sign up functions allow user to have a account on the website and use the account to track the sugar intake and activities plans.

In addition, the website provides information on how to differentiate obesity and overweight, the risk of over sugar intake and the overweight/obesity issues in Australia. This information section is to educate parents the issue of obesity and overweight and the importance of keeping their children from those issues.

2. System Architecture

Team ‘SuperNinja’ website is a .Net MVC application whose structure contains several parts as follow:

Folder Name	Description
APP_START	The folder used to store all start-up class for the application including routes bundling and filtering
bin	The folder used to store all referenced packages necessary for the application
Content	The folder used to store all static web resources including css and fonts style files
Controllers	The folder used to store all business rule C# classes. Six different controllers included in the application, which are Account, Daily Plan, Error, Home, Location and Recipe
img	The folder used to store all image files which would be used in the website
Models	The folder used to store all basic database and view models used for the controller. The entity framework file is also included in this folder
obj	The folder used to store all running and debugging config files for the application
Properties	The folder used to connect the local application with the Azure cloud web deploy application. The file would deploy all local application files to the cloud after every deployment
Scripts	The folder used to store all javascript files which are used to build the dynamic website
Views	The folder used to store all html view file for the application
Web.config	The configure file used to control the running of the whole application including connecting the database to the cloud database with connect string
packages.configure	The configure file used to integrate all plug in packages with the application
Global.asax	The configure file used to control the global variables setting for the application

3. Security

3.1 Server Security

The whole system is configured on Microsoft Azure cloud server with secure stream. The port 22 for SSH is closed so no SSH connections are allowed for users to access to the system. However, port 3389 is opened instead, to allow users to remotely access the system. RDP remote desktop connection service is provided by the Azure cloud server, so users can use remote desktop to visit the system. The RDP service requires users to authenticate themselves before they can get an access to the system. The username as well as the password for the system should be kept as secret and the password should be complex enough to prevent from breaking.

3.2 SQL Injection Prevention

SQL server is configured on the Azure cloud server and only allow connections from the Azure server. Users who has the access to cloud servers can connect to the database only. People who are not on the users list cannot visit the database. Data encryption are used on the connection channel of the database, data translation is secure in this case.

3.3 Hijacking prevention

SSL certificates are utilized on the website to generate the HTTPS service. Port 443 is opened for the HTTPS service, and SSL certificate are added on the website to encrypt sessions. Connections toward the website are kept as private and trust is established between server and visitor with the utilization of SSL certificates.

3.4 XSS Attack Prevention

The whole website is developed by using C# with ASP.Net. Although the website allowed users to enter and store data on the activity's description page, either SQL injection or XSS is impossible to be successful on the website because the developing language itself has already prevent those attack from happening.

3.5 Privacy Security

Sign in and sign up function are provided by the system to allow user to have a complete function on the website. The website will not ask users to store any personal data on the website, so it is not necessary to concern the privacy issues. In addition, users are asked to set a complex password which contains at least 8 characters with letters and digits. The password text will be hashed before it is sent to the server and if the password is matched on the system, user can login successfully.

4. Equipment Environment

4.1 Azure Cloud Server Environment

The whole website is hosted on the Microsoft Azure cloud server and resources group are created on the hosting server. SQL server with a SQL database is a essential part of the resources group because it response for the data store of the website. A Windows system virtual machine is required for the operation of the whole website as well as services. Network interface as well as public IP address are attached on the resources group to allow publication of the websites.

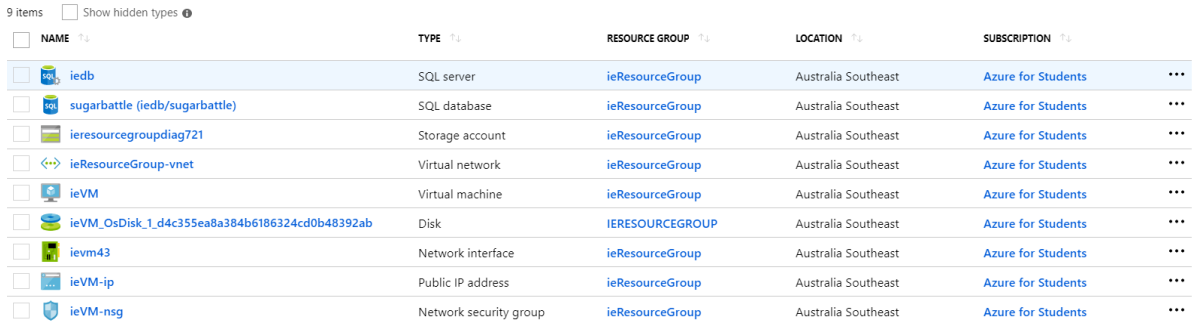


Figure 1 Sugarbattle serves structure on Azure cloud

4.2 Computer Hardware

This part will state the computer hardware requirement on which the software is hosted. The server is configured on the Azure cloud server, but it is also feasible to configure a server on the local like most large companies do. The computer hardware should at least satisfy the requirement shown on the table below, otherwise it could have a compatible issue or running issue on the server.

Hardware	Requirement
CPU	1 Intel(R) Xeon(R) CPU core @2.30 or 2.40 GHz
Installed RAM	2.0 GB
System Type	32-bit or 64 bit
Storage	128GB
NIC	100M
Opening Port	3389, 80, 443

4.3. Support Software

Support software are software that required to be installed on the computer or severs which will ensure the website running correctly. Support software for maintaining and operating the system are listed below:

Package Name	Usage
Windows 7 or above	Operating System
Apache 2.2 or above	Web Server
Microsoft Visual Studio 2017	Development IDE for website
Microsoft SQL Server	Database Engine
SQL Server Management Studio 2017	Database Administration GUI
C#	Web Programming Language
Microsoft Azure	Cloud Server
Bitbucket	Version Control Cloud Server
Git 2.19 or lastest	Version Control
Asp.net MVC 5.0	Core Web Application
RDP remote desktop	Remote desktop visiting tool

5. Database Characteristics

The web application use the relational database for the main framework. The database name is ‘sugarbattleEntities’ which is stored on the Microsoft Azure SQL cloud server, in the same machine group of the main web application. There are nine entities in the database which are connected with each other.

5.1 Data Model

The ER-diagram below shows relationships between all tables within the database.

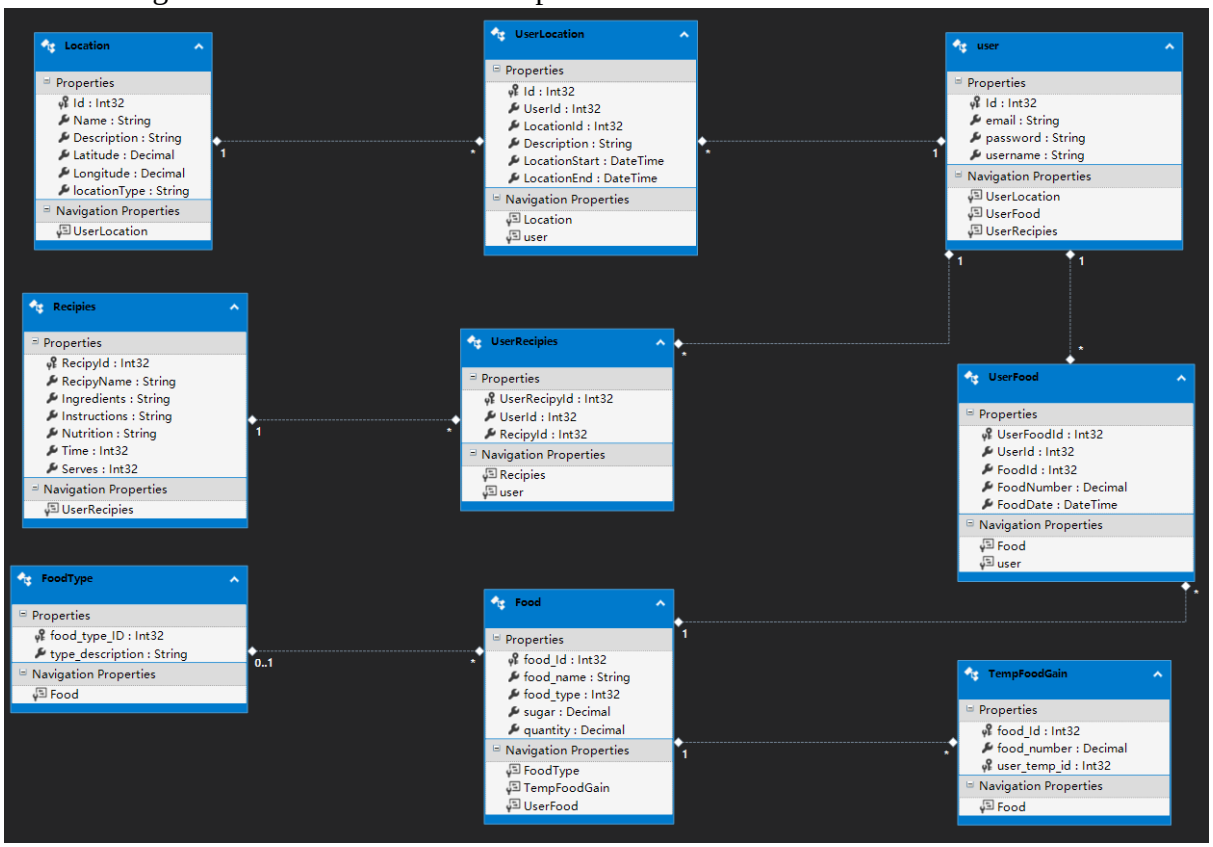


Figure 1 Detailed ER-Diagram for the System

5.2 User Table

‘User Table’ is used to record all users in the application to record their email address, hashed password and username. Its details are shown as the table below:

Field Name	Data Type	Data Format	Field Size	Description	Example
ID	INT	Not Null Numeric Auto Increment	Max	The Id to uniquely define different users	213
EMAIL	NVARCHAR	Not Null *@*.*	255	The field used to record user	12345@qq.com

				login email address	
PASSWORD	NVARCHAR	Not Null (8 character minimal with at least one Uppercase and one special character)	255	The field used to record all users' password	Wangjizhou123?
USERNAME	NVAECHAR	Not Null	255	The field used to record users' preferred name in the application	Tony

5.3 Food Type Table

'Food Type Table' is utilized to record all food types presented in the module of sugar calculator. Its details are shown as the table below:

Field Name	Data Type	Data Format	Field Size	Description	Example
FOOD_TYPE_ID	INT	Not Null Numeric Auto Increment	Max	The Id to uniquely define every food type	2
FOOD_TYPR_DESCRIPTION	NVARCHAR	Not Null	50	The field used to record food type detailed description	Chocolate

5.4 Food Table

'Food Table' is built to record all foods presented in the module of sugar calculator. Its details are shown as the table below:

Field Name	Data Type	Data Format	Field Size	Description	Example

FOOD_ID	INT	Not Null Numeric Auto Increment	Max	The Id to uniquely define every food	11
FOOD_NAME	NVARCHAR	Not Null	50	The field used to record food name	Blue Ribbon Vanilla 2L
QUANTITY	DECIMAL	Not Null With 2 decimal	18,2	The field used to record all food quantity	2.04
SUGAR	DECIMAL	Not Null With 2 decimal	18,2	The field used to record sugar amount of every 100 gram food	3.93
FOOD_TYPE	INT	FOREIGN KEY	MAX	Field to match the food type table data	2

5.5 Temp Food Gain Table

'Temp Food Gain Table' is a table to record all temp food records presented chosen by the user before log in the application in the module of sugar calculator. This table would be truncated regularly in order to clear all redundant data. Its details are shown as the table below:

Field Name	Data Type	Data Format	Field Size	Description	Example
FOOD_ID	INT	Not Null FOREIGN KEY	Max	The field to connect with the row in food table	123
FOOD_NUMBER	DECIMAL	Not Null With 2 decimals	18, 2	The field used to record food number input by users	4.20

USER_TEMP_ID	INT	NOT NULL FOREIGN KEY	8	The field to record the temp user session id before log in	44555519

5.6 User Food Table

'User Food Table' is used to record all food consumption records in different user accounts presented in the module of sugar calculator. Its details are shown as the table below:

Field Name	Data Type	Data Format	Field Size	Description	Example
USER_FOOD_ID	INT	Not Null	Max	The field to uniquely identify user food record	231
USER_ID	INT	Not Null FOREIGN KEY	MAX	The field connected to the row in user table	23
FOOD_ID	INT	NOT NULL FOREIGN KEY	MAX	The field connected to the row in food table	1234
FOOD_NUMBER	DECIMAL	Not Null With 2 decimals	18, 2	The field used to record food number input by users	4.20
FOOD_DATE	DATE	NOT NULL YYYY/M/D	10	The field used to record the date when user food is recorded	2018/9/24

5.7 Location Table

'Location Table' is built to record all location information presented in the module of activities. Its details are shown as the table below:

Field Name	Data Type	Data Format	Field Size	Description	Example
ID	INT	Not Null	Max	The field to uniquely identify activity location	121
NAME	NVARCHAR	Not Null	255	The field recording location name	Birrarung Marr Artplay
DESCRIPTION	NVARCHAR	NOT NULL	255	The field recording location detailed information	Birrarung Marr, Russell Street Extension, Melbourne VIC 3000
LATITUDE	NUMERIC	Not Null With 8 decimals	10, 8	The field used to record location latitude	-37.81796500
LONGITUDE	NUMERIC	Not Null With 8 decimals	10, 8	The field used to record location longitude	144.97154100
LOCATION_TYPE	NVARCHAR	Not Null	255	The field recording the location type	Park

5.8 User Location Table

‘User Location Table’ is on the system to record all locations saved in different user accounts presented in the module of activities calculator. Its details are shown as the table below:

Field Name	Data Type	Data Format	Field Size	Description	Example
ID	INT	Not Null	Max	The field to uniquely identify user	123

				location record	
USER_ID	INT	Not Null FOREIGN KEY	MAX	The field connected to the row in user table	23
LOCATION_ID	INT	NOT NULL FOREIGN KEY	MAX	The field connected to the row in location table	1234
LOCATION_START	DATETIME	Not Null YYYY/M/D h:mm:ss	MAX	The field used to record start time of activity	2018/10/10 10:35:00
LOCATION_END	DATETIME	Not Null YYYY/M/D h:mm:ss	MAX	The field used to record endtime of activity	2018/10/10 12:35:00
DESCRIPTION	NVARCHAR	Allow Null	MAX	The field used to record detailed description of each user's activity	go breakfast

5.9 Recipes Table

This table records all recipe information presented in the module of recipes. Its details are shown as the table below:

Field Name	Data Type	Data Format	Field Size	Description	Example
Recipe_ID	INT	Not Null Numeric Auto Increment	Max	The Id to uniquely define every recipe	21
Recipe_NA	NVARCHA	Not Null	255	The field	Mushroom

ME	R			used to record recipe name	Parmigiana
INGREDIENTS	NVARCHAR	Not Null	MAX	The field used to record ingredients of each recipe	8 large (80g each) flat mushrooms
INSTRUCTIONS	NVARCHAR	Not Null	MAX	The field used to record instructions of cooking each recipe	Bake in a hot oven (200°C) for 12-15 minutes
NUTRITION	NVARCHAR	NOT NULL	MAX	The field used to record nutrition contained in each recipe	Energy 724kj_Sugar 12g
TIME	INT	NOT NULL	11	The field used to record cooking time of each recipe	24
SERVES	INT	NOT NULL	11	The field used to record number of kids served by each recipe	3

5.10 User Recipes Table

'User Recipes Table' is utilized to record all recipes records saved in different user accounts presented in the module of recipes. Its details are shown as the table below:

Field Name	Data Type	Data Format	Field Size	Description	Example
USER_RECIPE_ID	INT	Not Null	Max	The field to uniquely identify user recipe record	12
USER_ID	INT	Not Null FOREIGN KEY	MAX	The field connected to the row in user table	23
RECIPE_ID	INT	NOT NULL FOREIGN KEY	MAX	The field connected to the row in recipe table	21

6. Error Conditions

This section will describe all possible error users may come across when they using the website. This section will state the reason of errors and the result of errors.

Error	**Condition**	**Remedy**
Page 404 not found	Incorrect URL input which cause the page not found	Show the error page of page not found
400 Bad Request	Indicate the server is unable to process the request from users	Show a new page which includes the information of wrong request
403 Forbidden	The error means that the browser could not access the URL	Check the correctness of the username and password and ensure all files uploaded correctly
408 Timing out request	Error when the time server responds to the client for a long time	Show message of timeout, checking the developer tools if necessary
500 Internal Server Error	Error that server cannot process the request for some reasons	Check all config files which are correctly coded
503 Unavailable Service	Error when overloading and maintaining the server	Check the cloud server on the Azure is concise and operate greatly

7. Testing information

7.1 Integrity Testing

Integrity testing is running by the 'SuperNinja' team to check every function within the system. Testing details are displayed as the table below:

Activity (ADMIN)	Pass/ Fail	Comments
Epic 1: As a user, I want to know the sugar level of different snacks and drinks and I want to calculate the total sugar level of snacks or drinks I provided for my children, so that I can know whether my children have taken too much sugar and I can adjust the amount of snack for my children based on the result.		
User story 1.2: As a user, I want to know how much sugar in drinks or snacks so that I can knows whether my child is having too much sugar.		
1.1.1. Successfully open the website	Pass	
1.1.2. View drinks and dessert information and details	Pass	
1.1.3. Select different categories	Pass	
User story 1.2: As a user, I want to calculate the total amount of sugar I provided to my children so that I can adjust the sugar plan for my children based on the calculation result.		
1.2.1. Select the drinks or desserts	Pass	
1.2.2. Choose quantity of drinks or desserts	Pass	
1.2.3. Save drinks or desserts	Pass	
1.2.4. View Result	Pass	
1.2.5. Delete the drinks or desserts from "My Item List"	Pass	
User story 1.3: As a user, I want to know how much sugar is appropriate for my daughters so that I can save my time and provide low sugar level food for my daughters.		
1.3.1. View the information about sugar in home page	Pass	
Epic 2: As a user, I want to look for nearby playgrounds and parks for my children and add an activity to the calendar and go back to track the activity in the future so that I can know where I have taken my children to and how much time we spent on the parks or playground.		
User story 2.1: As a user, I want to know the parks near his home so that I can know where to take my daughter to play.		
2.1.1. Successfully open the "Location" page	Pass	
2.1.2. Map shows in the web page successfully	Pass	
2.1.3. Search and show the parks in the map	Pass	

User story 2.2: As a user, I want to have an account for the website so that I can go back and track the activity I has planned for my children.		
2.2.1. Register the account and have a new account	Pass	
2.2.2. Login the account	Pass	
2.2.3. Log off the account	Pass	
User story 2.3: As a user, I want to add activity on the calendar based on the parks or playgrounds so that I knows how much time I spent with my children on which parks or playgrounds		
2.3.1. Successfully open the "Location" page	Pass	
2.3.2. Select and show the park information	Pass	
2.3.3. Choose activity date	Pass	
2.3.4. Choose start date time	Pass	
2.3.5. Choose end date time	Pass	
2.3.6. Add activity description	Pass	
2.3.7. Add and save the activity into calendar	Pass	
2.3.8. View activity information after saving	Pass	
User story 2.4: As a user, I want to know the information of health disease related to over sugar intake so that I can remind me and my children not to take too much sugar.		
2.4.1. Successfully open the web page	Pass	
2.4.2. Show all information of diseases related to high sugar intake	Pass	
2.4.3. Show diseases detail after click "Learn more" button	Pass	
Epic 3: As a user, I want to record the sugar intake for my children every day and go back to track the sugar intake whenever I want so that I can monitor how much sugar my children have taken and provide appropriate amount of sugar for my children. I also want to look for diet food suggestions so that I can know what is good for my children.		
User story 3.1: As a user, I want to look for healthy food recipes so that I can prepare healthy food for my children.		
3.1.1. Successfully open the "Recipes" page	Pass	
3.1.2. Show all food recipes	Pass	
3.1.3. Show recipes details after selecting one specific recipe	Pass	
User story 3.2: As a user, I want to know the history of how much sugar provided for my child so that I can better control the sugar level for the upcoming date		
3.2.1. Successfully open the "Sugar Calculator" page	Pass	
3.2.2. Select and add drinks and desserts	Pass	
3.3.3. Log in the account	Pass	
3.3.4. Save drinks or desserts into "Save List"	Pass	
User story 3.3: As a user, I want to add the recipes on		

my account so that I can check the recipes easily and save more time.		
3.3.1. Successfully open the “Recipe” page	Pass	
3.3.2. Select one specific recipe	Pass	
3.3.3. Save the recipe into account	Pass	
3.3.4. View the recipe in “My Recipes”	Pass	
3.3.5. Cancel the recipe from “My Recipes”	Pass	
User story 3.4: As a user, I want to look for the weather of the following date so that I can know whether I can take my daughters to go picnic.		
3.4.1. Open the “Location” page successfully	Pass	
3.4.2. View the weather information	Pass	
3.4.3. Search for different weather in different places	Pass	

7.2 Backup and Recovery Testing

The backup testing is done by the developing expert of the ‘SuperNinja’ team.
The backup warehouse link is: https://bitbucket.org/jwan0061/sugarbattlereq
Testing details is listed as the table below:

No	Test	Expected Outcome	Actual Outcomes	Pass/Fail	Tester	Duration
1	Server	Able to recover each server including database server and web server	Recoverable and requiring time	pass	Tony	10 min
2	Site Recovery	Able to recover the source code from remote bitbucket repository	Recoverable and requiring little time	pass	Tony	10 min
3	Data	Able to recover all data sets used in the application	Recoverable and requiring time	pass	Tony	5 min
4	Library Recovery	Able to recover all libraries used in the application	Recoverable and requiring time	pass	Tony	5 min
5	Plug-in Recovery	Able to to recover all plug-in functions including weather forecast part as well as data visualization part	Recoverable and requiring little time	pass	Tony	5 min

7.3 Security Testing

Security testing is running by the security expert within the 'SuperNinja' team. This testing is to test any protentional security issues within the website and try to come up with solution on security issues.

No.	Description	Method	Anticipated Result	Pass/ Fail	Tester	Duration
1	Testing the SQL injection issues on the sign in/sign up page	Manually input SQL injection code	The SQL injection is not working on those page	Pass	Lin	15 min
2.	Testing the SQL injection issues on the activities description page	Manually input SQL injection code	The SQL injection is not working on the page	Pass	Lin	10 min
3	Testing the cross-site script issues on the activities description page	Manually input attack script on the website	The XSS attack is prevented and not working on the website	Pass	Lin	20 min
4	Testing the SSL security level of the website and check whether the channel is encrypted	Use Wireshark to scan the website and look up the packet manually	The data is encrypted and no private message will be leaked	Pass	Lin	30 min

7.4 UX Testing

User experiences testing is running by potential users and by 'SuperNinja' team. Testing detail is listed as the table below:

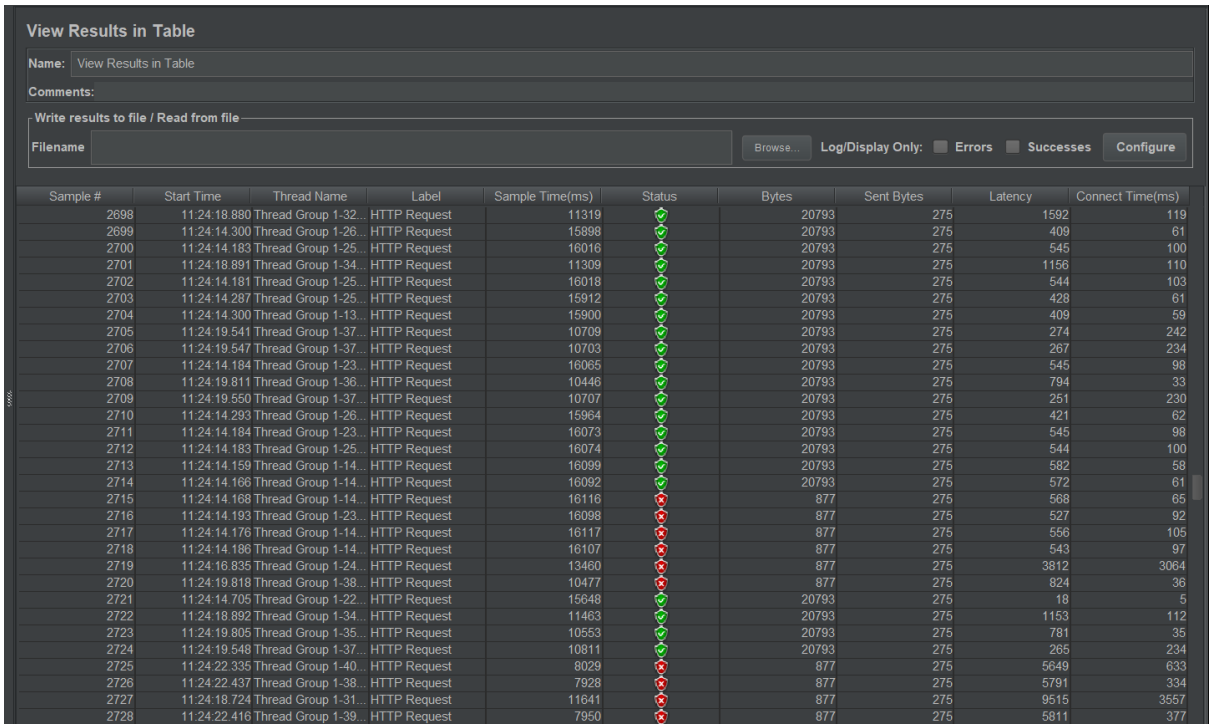
YouTube Link:
https://www.youtube.com/watch?v=7AlgjXG1AK4&feature=youtu.be
https://www.youtube.com/watch?v=fJctIy9XMSw&feature=youtu.be

Tester	Hours spent on testing functions	Methods used
Ken (User)	15min	User test the website by using the manual input. Users gave feedback for the website and discussed ideas for next iteration. https://www.youtube.com/watch?v=7AlgjXG1AK4&feature=youtu.be
Tony (team member)	20min	Test website using manual input. The layout of each website pages has been tested, and "sugar intake", "Disease", "recipes" and "Location" functions are tested.
Songnan Lin (team member)	20min	Test website using manual input. Testing the background and layout of the website pages. The functions of "Sugar intake", "Disease", "Location", "Location tracking", and "recipes" are tested step by step.
Lu Chen (team member)	20min	Test website using manual input. The website font and background consistency are tested. The functions of "Sugar intake", "Disease", "Sugar Tracking" and "Location" are tested step by step.
Ram (team member)	20min	Test website using manual input. Testing website layout and functions. Functions of "Sugar intake", "Disease", "Recipes", "Sugar Tracking" and "Location" are tested step by step.

7.5 Load Testing

Load testing is operated by 'SuperNinja' team to test the website's capacity of handling stress. The testing schedule is to increase the threads of visiting the website simultaneously until finding the limitation of the website. When the number simultaneous threads reach around 2500 (shown as figure 2), the website will become inaccessible and 404 page will show up. Load testing details are shown as the table below:

No.	Description	Testing Tool	Anticipated Result	Pass/Fail	Tester	Duration
1	Testing the situation on 50 threads visit the website at the same time	JMeter	The website will run without errors	Pass	Lin	5 min
2.	Testing the situation on 100 threads visit the website at the same time	JMeter	The website will run without errors	Pass	Lin	5 min
3	Testing the situation on 1000 threads visit the website at the same time	JMeter	The website will run without errors	Pass	Lin	5 min
4	Setting the threads number to 5000 and get the maximum number of the simultaneous visiting	JMeter	The website will run normally but when the threads is adding, problems will occurs	Pass	Lin	5 min



Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
2698	11:24:18.880	Thread Group 1-32...	HTTP Request	11319		20793	275	1592	119
2699	11:24:14.300	Thread Group 1-26...	HTTP Request	15898		20793	275	409	61
2700	11:24:14.183	Thread Group 1-25...	HTTP Request	16016		20793	275	545	100
2701	11:24:18.891	Thread Group 1-34...	HTTP Request	11309		20793	275	1156	110
2702	11:24:14.181	Thread Group 1-25...	HTTP Request	16018		20793	275	544	103
2703	11:24:14.287	Thread Group 1-25...	HTTP Request	15912		20793	275	428	61
2704	11:24:14.300	Thread Group 1-13...	HTTP Request	15900		20793	275	409	59
2705	11:24:19.541	Thread Group 1-37...	HTTP Request	10709		20793	275	274	242
2706	11:24:19.547	Thread Group 1-37...	HTTP Request	10703		20793	275	267	234
2707	11:24:14.184	Thread Group 1-23...	HTTP Request	16065		20793	275	545	98
2708	11:24:19.811	Thread Group 1-36...	HTTP Request	10446		20793	275	794	33
2709	11:24:19.550	Thread Group 1-37...	HTTP Request	10707		20793	275	251	230
2710	11:24:14.293	Thread Group 1-26...	HTTP Request	15964		20793	275	421	62
2711	11:24:14.184	Thread Group 1-23...	HTTP Request	16073		20793	275	545	98
2712	11:24:14.183	Thread Group 1-25...	HTTP Request	16074		20793	275	544	100
2713	11:24:14.159	Thread Group 1-14...	HTTP Request	16099		20793	275	582	58
2714	11:24:14.166	Thread Group 1-14...	HTTP Request	16092		20793	275	572	61
2715	11:24:14.168	Thread Group 1-14...	HTTP Request	16116		877	275	568	65
2716	11:24:14.193	Thread Group 1-23...	HTTP Request	16098		877	275	527	92
2717	11:24:14.176	Thread Group 1-14...	HTTP Request	16117		877	275	556	105
2718	11:24:14.186	Thread Group 1-14...	HTTP Request	16107		877	275	543	97
2719	11:24:16.835	Thread Group 1-24...	HTTP Request	13460		877	275	3812	3064
2720	11:24:19.818	Thread Group 1-38...	HTTP Request	10477		877	275	824	36
2721	11:24:14.705	Thread Group 1-22...	HTTP Request	15648		20793	275	18	5
2722	11:24:18.892	Thread Group 1-34...	HTTP Request	11463		20793	275	1153	112
2723	11:24:19.805	Thread Group 1-35...	HTTP Request	10553		20793	275	781	35
2724	11:24:19.548	Thread Group 1-37...	HTTP Request	10811		20793	275	265	234
2725	11:24:22.335	Thread Group 1-40...	HTTP Request	8029		877	275	5649	633
2726	11:24:22.437	Thread Group 1-38...	HTTP Request	7928		877	275	5791	334
2727	11:24:18.724	Thread Group 1-31...	HTTP Request	11641		877	275	9515	3557
2728	11:24:22.416	Thread Group 1-39...	HTTP Request	7950		877	275	5811	377

Figure 2 Load testing result in 5000 simultaneous threads