Maintenance document

Team 27

Project Name: WhyIsDrought

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Table of Contents

1 Overview

This document is mainly used to help technicians maintain the website 'WhyIsDrought' and the back end of the application. The following content in the document will detail the structure of the website, as well as the security and privacy protection on the website, and the error will also be explained and handled.

2 System Application

The 'WhyIsDrought' website is developed to help children to learn with drought and teach them practical ways to fight against the drought in Australia. Drought has been threatening people's life and property in Australia due to the special climate and landform. However, in such a severe drought, the children living in metropolitan Melbourne are unaware of the current drought in Australia and preventive measures. This website can help children in the urban area to raise awareness of drought and teach them how to fight against drought, so as to make a contribution against drought in Australia. In Australia, the economic loss caused by drought every year has reached an inestimable value, even if the government has responded positively. However, if everyone has a clear understanding of drought and fights together that it can better fight against drought. This website can help children have a clear understanding of drought from an early age, and can involve them in fighting against drought.

3 System organization

3.0 System Structure
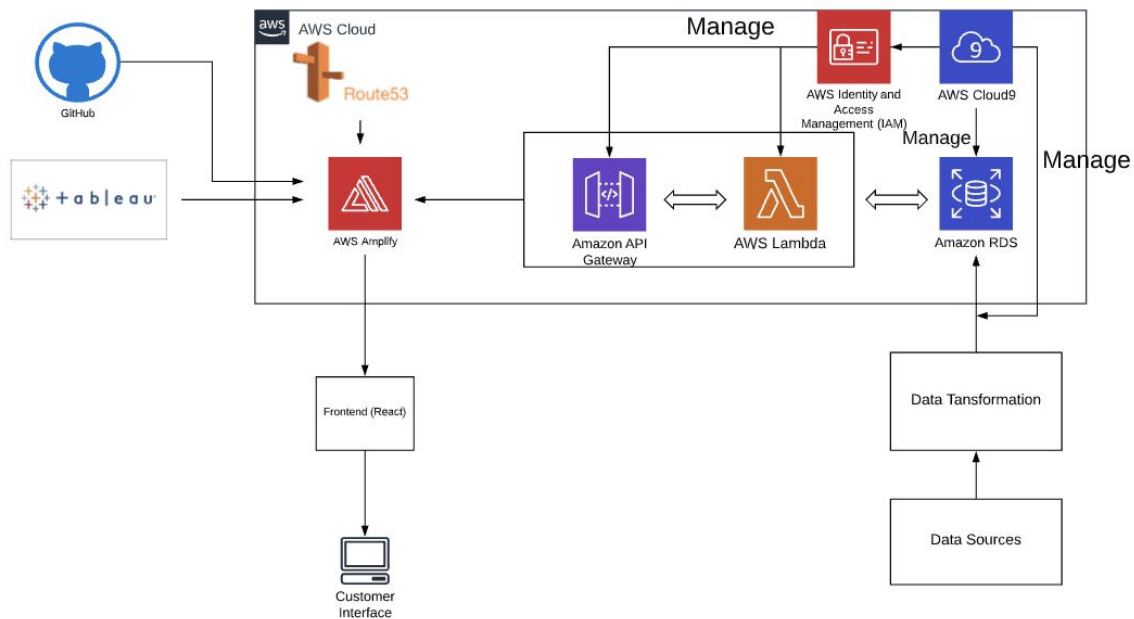
Figure 1: System Architecture

Figure 1 shows the structure of the website. The website is written by React and the code is hosted by Github. AWS Amplify is responsible for transfer code into a web application which could be assessed by users from Australia. AWS Route 53 is used to manage the domain https://whyisdrought.com and AWS amplify is also responsible for navigating visits from users to the domain. AWS RDS is used as a RMDB tool, which stores processed data. AWS API Gateway and AWS Lambda are responsible for querying data from AWS RDS and send required data to the frontend. Also, the climate data for data visualizations is stored in the tableau server, and the website uses embedded Tableau API to load pre-made data visualizations.

3.1 MySQL

The database is a MySQL database, which is hosted by AWS RDS. And the structure of the database is:
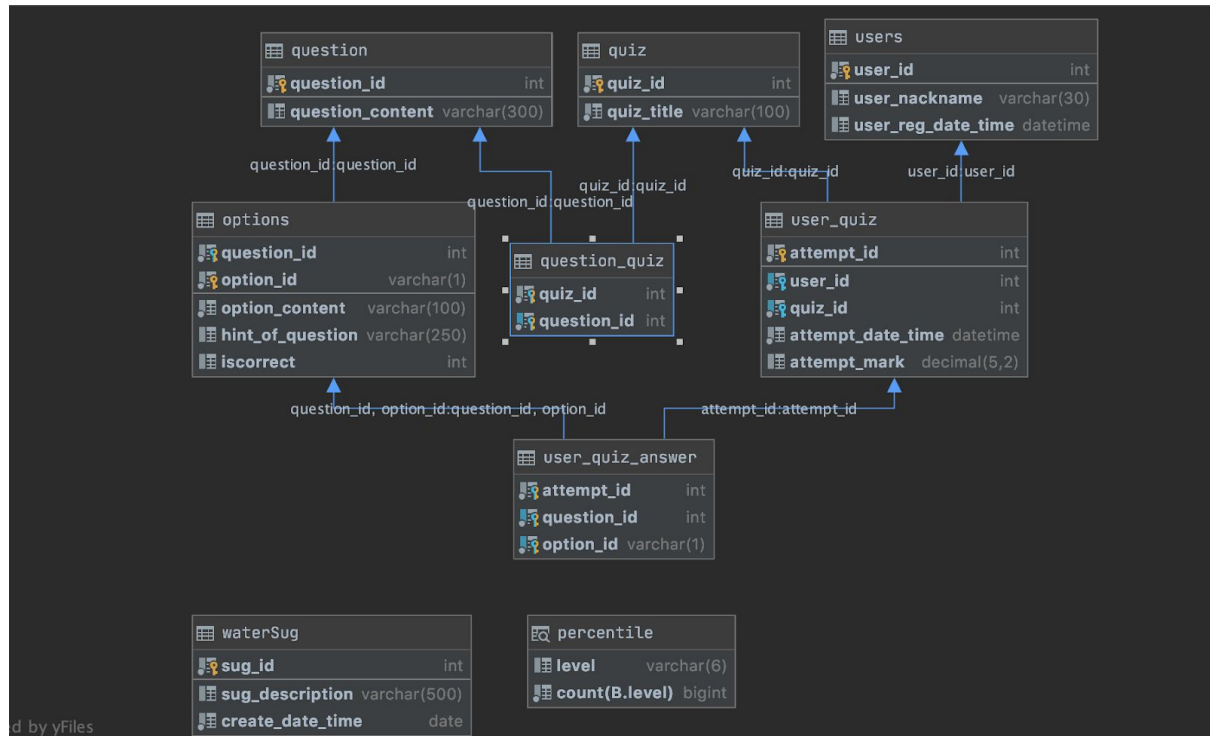
3.2 Tables of the quiz functionalities:

3.2.1 Users:

This table stores user information.

Column	Description	Type
user_id	PK, auto_increment	varchar(30)
user_nackname	User's nickname	varchar(30)
user_reg_date_time	User's registration time	datetime

3.2.2 quiz:

This table is used to store quiz information, we have 6 different quizzes (6 topics).

Column	Description	Type
quiz_id	There different quizzes, PK	int
quiz_title	The title of quizzes	varchar(100)

3.2.3 User_quiz

User_quiz records an attemption of a quiz of a user.

Column	Description	Type
attempt_id	Record users attemption, pk	int
user_id	User's id, FK	int
quiz_id	A user finished a quiz, FK	int
attempt_data _time	When does a user finish the quiz	datetime
attempt_mark	The result of the attempt, the range is (0.00, 1.00)	decimal(5,2)

3.2.4 Question

This table records questions.

Column	Description	Type
question_id	PK, ids of questions	int
question_content	The text of the question	varchar(300)

3.2.5 Options

This table records options of a question.

Column	Description	Type
question_id	Every option belongs to a question, PF	int
option_id	Ids of options, PK	varchar(1)
option_content	Text of options	varchar(100)
hint_of_question	The hint of the question	varchar(250)
iscorrect	Whether this option is true	int(1)

3.2.6 User_quiz_answer

This table stores user's attemption (including their choices).

Column	Description	Type
attempt_id	PF, a attempt done by a user	int
question_id	PF, the question	int
option_id	PF, user's choices	varchar(1)

3.2.7 Question_quiz

This table links the question table and quiz table. One quiz has many questions and one question may belong to many quizzes.

Column	Description	Type
quiz_id	PF	int
question_id	PF	int

3.3 The table of the saving water functionality

3.3.1 WaterSug

This table stores the suggestions about saving water.

Column	Description	Type
sug_id	PK	int
sug_description	Text of suggestions	varchar(500)
create_date_time	The date of creating the record	date

3.4 AWS Lambda

The documentation of all lambda functions used in the website is at:

https://github.com/Wolphatch/industralExperience/blob/master/Lambda_documentation

3.5 Tableau data visualization

All data visualizations are stored in tableau's cloud, the link is:

https://public.tableau.com/profile/zac.hu7521#!/

4 Security and privacy

4.0 Web security

For the web security part, our website can be said secure in 5 aspects. First, our website has its own domain and qualified certification, so clients' browsers will believe our website is secure and can be accessed with no consideration. Second, our website uses HTTPS and all the income and outcome traffic will happen in the HTTPS channel. Third, our website uses AWS amplify service to connect our front end and back end which is a serverless and secure service, this service can defend most common web attacks such as DDOS. Fourth, our website checks every input in our front end and prevents malicious inputs from possible attackers, this also protects normal users from stored based XSS (cross-site scripting). Fifth, we do not have user login or anything to disclose user privacy information such as password or phone, this also protects our user from reflected XSS, DOM-based XSS and Cross-Site Request Forgeries (CSRF) attacks.

4.1 Database security

For database security. Our website uses AWS Lambda to connect our database, which hides from others. Our database only uses AWS Lambda and our Lambda function only returns data everyone can know, so it is secure when attackers want to get information from

a network channel since our returned data is public and private data or false logs in the database will not send in the network. Besides, we also use AWS to create a snapshot for the database and state to make sure it has backup. Our database data is stored in one personal computer and we use a hash function to detect the correctness of our data, we also have another backup in the hard disk drive to make sure we can still have the original database if the cloud service does not work.

4.2 Other resource security

Other resources include the front and back end codes, pictures we use and API gateway. We store our project both in the github and our own computers. If our website crashes we can look for the github to find the version we need since github can record every change of our codes. For other resources such as pictures used in the website, we also have backup in the google drive and our own computers. For API gateway, since our website is open for everyone including possible attackers, we can not use authorization or authentication to restrict users, so we set a protection mechanism in the front end. We set a button to call our API gateway and once the button is clicked, it will become grey and the user can not click it until the completion of one function, or it will link to the next page and the user can not click it again. Besides, for the consideration of the openness and flexibility of our website, we will improve API access times within one second in AWS API gateway service if necessary in the future.

5 Data source maintenance

Names	Physical Access Used	Frequency of Source Updates	Frequency of System Updates	Granularity	Copyright Details
Water Account https://www.abs.gov.au/statistics/environment/environmental-management/water-account-australia/latest-release#data-	CSV	Annual	Annual	Region Indicator, Unit, Amount	Creative Commons Attribution Share-Alike 3.0 Australia

download					
What is drought http://media.bom.gov.au/social/blog/2179/explainer-what-is-drought/	HTML	NA	NA	Text data	Creative Commons Attribution Share-Alike 3.0 Australia
What is a drought https://www.livescience.com/21469-drought-definition.html	PDF	NA	NA	Text data	Creative Commons Attribution Share-Alike 3.0 Australia
Drought lesson plan https://www.aidr.org.au/media/5268/aidr-drought-lesson-plan.pdf	PDF	NA	NA	Text data	non-commercial use
Daily rainfall http://www.bom.gov.au/climate/data-services/	CSV	Daily	Monthly	Number_id, Lat, Long, date, PRCP	Creative Commons Attribution Share-Alike 3.0 Australia
Monthly pan evaporation http://www.bom.gov.au/climate/data-services/	CSV	Monthly	Monthly	Number, Lat, Long, Name, Start_date, End_date, EVAP	Creative Commons Attribution Share-Alike 3.0 Australia
ACORN-SAT http://www.bom.gov.au/climate/dat	CSV	Daily	Monthly	Date, Maximum temperature	Creative Commons Attribution Share-Alike

|---|---|---|---|---|---|
| | | | | | |

All climate data used for data visualizations in this website are shown above. These datasets are well-designed and stored as CSV. That means data wrangling is barely required. Meanwhile, the team uses these data to design questions, which is used in the quiz functionality.

6 Testing

6.0 Integrity Testing

Epic 1			
Background information about drought			
User story 1			
As Alice, I want to know the information about drought so that I will take the necessary steps to avoid drought.			
Activity	**Pass/Fail**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "Background information" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "What is drought"	Pass	Page shows quick	October 24th
Scroll down on the "What is drought" page.	Pass	Scroll down is convenient	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th
User story 2			
As Alice, I want to know the causes of drought so that I will take the necessary steps to avoid drought.			
Activity	**Pass/Fail**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "Background information" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "Why drought happens"	Pass	Page shows quick	October 24th
Scroll down on the "Why drought happens" page.	Pass	Scroll down is convenient	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th

User story 3			
As Alice, I want to know the history of drought in Australia so that I learn how people in the past had coped with drought.			
Activity	**Pass/Fail**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "Background information" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "History of drought"	Pass	Page shows quick	October 24th
Scroll down on the "History of drought" page.	Pass	This page is colorful	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th
Epic 2			
Analyze drought in Australia visually			
User story 1			
As Alice, I want to know the damage caused by drought so that I can help those who were affected by it.			
Activity	**Pass/Fail**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "Background information" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "Damage"	Pass	Page shows quick	October 24th
Scroll down on the "Damage" page.	Pass	Scroll down is convenient	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th
User story 2			
As Alice, I want to know the rainfall information so that I can know which area of Australia rainfall is small.			
Activity	**Pass/Fail**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "visualization" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "Rainfall"	Pass	Page shows slow	October 24th
Click "cloud" in the first slide "Rainfall" page.	Pass	Interesting to play	October 24th
Click "right arrow" to go to the next slide	Pass	Speed is quick	October 24th
Click "cloud" in the Australia map in the second slide "Rainfall" page.	Pass	Interesting to play	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th
User story 3			
As Alice, I want to know the temperature information so that I can know which area of Australia is too hot.			
Activity	**Pass/Fail**	**Comments**	**Date**

Open homepage	Pass	Null	October 24th
Click "visualization" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "Temperature"	Pass	Page shows slow	October 24th
Click "thermometer" in the first slide "Temperature" page.	Pass	Interesting to play	October 24th
Click "right arrow" to go to the next slide	Pass	Speed is quick	October 24th
Click "fire" in the Australia map in the second slide "Temperature" page.	Pass	Interesting to play	October 24th
Click "right arrow" to go to the next slide	Pass	Speed is quick	October 24th
Click "thermometer" in the third slide "Temperature" page.	Pass	Interesting to play	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th

User story 4			
As Alice, I want to know the water information so that I can know which area of Australia lacks water.			
Activity	**Pass/Fai l**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "visualization" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "evaporation"	Pass	Page shows slow	October 24th
Click "color bar" in the first slide "evaporation" page.	Pass	Interesting to play	October 24th
Click "right arrow" to go to the next slide	Pass	Speed is quick	October 24th
Click "wind" in the Australia map in the second slide "evaporation" page.	Pass	Interesting to play	October 24th
Click "right arrow" to go to the next slide	Pass	Speed is quick	October 24th
Click "bar" in the third slide "evaporation" page.	Pass	Interesting to play	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th

Epic 3			
Information about the solution of drought			
User story 1			
As Bob, I want to know what kind of methods could be useful to prevent drought so that I can protect me when I am affected by drought.			
Activity	**Pass/Fai l**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "How to prevent drought" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "countermeasure"	Pass	Page shows quick	October 24th

Click "do by ourselves" in "countermeasure" page.	Pass	React speed is quick	October 24th
Click "do with parents" in "countermeasure" page.	Pass	React speed is quick	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th

User story 2			
As Alice, I want to know what kind of tools could be useful against drought so that I can use those tools to protect me from it.			
Activity	**Pass/Fail**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "How to prevent drought" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "countermeasure"	Pass	Page shows quick	October 24th
Click "useful tools" in "countermeasure" page.	Pass	React speed is quick	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th

Epic 4			
Information about water consumption in Australia and its relationship to drought			
User story 1			
As Bob, I want to know whether my family has consumed too much water so that my family members can help those who have been affected by drought by saving water.			
Activity	**Pass/Fail**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "How to prevent drought" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "water"	Pass	Page shows quick	October 24th
Enter correct information in the third slide in the "Water" page.	Pass	Feedback information is useful	October 24th
Click the "CHECK RESULT" button in the third slide in the "Water" page.	Pass	Speed is slow	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th

User story 2			
As Alice, I want to know the water consumption in Australia so that I can make appeals about saving water to relieve the drought.			
Activity	**Pass/Fail**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "How to prevent drought" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "water"	Pass	Page shows quick	October 24th
Click "Blue bubble" on the map in the second slide on	Pass	Speed is slow	October 24th

the "Water" page.			
Read information on the bar graph in the second slide in the "Water" page.	Pass	Information is clear	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th
User story 3			
As Alice, I want to be given the suggestions for saving water so that my family and I can consume less water and can relieve the drought.			
Activity	**Pass/Fai l**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "How to prevent drought" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "water"	Pass	Page shows quick	October 24th
Enter correct information in the third slide in the "Water" page.	Pass	Feedback information is useful	October 24th
Click the "CHECK RESULT" button in the third slide in the "Water" page.	Pass	Speed is slow	October 24th
Read the "result" in the third slide on the "Water" page.	Pass	Suggestion is useful	October 24th
Click the "show tips" button on the third slide in the "Water" page.	Pass	Tips are useful	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th
Epic 5			
Test personal understanding of drought conditions.			
User story 1			
As Alice, I need quizzes about drought so that I can evaluate the outcome of learning.			
Activity	**Pass/Fai l**	**Comments**	**Date**
Open homepage	Pass	Null	October 24th
Click "Quizzes" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "Quizzes"	Pass	Page shows quick	October 24th
Enter a qualified name in the "Quizzes" page.	Pass	Feedback information is useful	October 24th
Click the "START TEST" button in the "Quizzes" page.	Pass	Speed is slow	October 24th
Do real quizzes on the "Quizzes" page.	Pass	Quizzes is a little hard	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th
User story 2			
As Alice, I want the feedback of the quiz so that I can learn and improve my knowledge.			

Activity	Pass/Fail	Comments	Date
Open homepage	Pass	Null	October 24th
Click "Quizzes" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "Quizzes"	Pass	Page shows quick	October 24th
Enter a qualified name in the "Quizzes" page.	Pass	Feedback information is useful	October 24th
Click the "START TEST" button on the "Quizzes" page.	Pass	Speed is slow	October 24th
Do real quizzes on the "Quizzes" page.	Pass	Quizzes is a little hard	October 24th
Click one option in real quizzes on the "Quizzes" page.	Pass	React quick	October 24th
Read the result and hint of this question in the "Quizzes" page.	Pass	Suggestion is useful	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th

User story 3

As Alice, I want an evaluation of my learning so that I can show my learning outcome to my friends.

Activity	Pass/Fail	Comments	Date
Open homepage	Pass	Null	October 24th
Click "Quizzes" in the navigation bar.	Pass	Navigation bar is clear	October 24th
Click "Quizzes"	Pass	Page shows quick	October 24th
Enter a qualified name in the "Quizzes" page.	Pass	Feedback information is useful	October 24th
Click the "START TEST" button on the "Quizzes" page.	Pass	Speed is slow	October 24th
Do real quizzes on the "Quizzes" page.	Pass	Quizzes is a little hard	October 24th
Click "SUBMIT AND FINISH" button to see results	Pass	Speed is quick	October 24th
Read result and suggestion in "Quizzes" page.	Pass	Suggestion is useful	October 24th
Click "go back" button to go back home	Pass	"Go back" button reacts quickly.	October 24th

User story 4

As Alice, I want to do totally different quizzes every time so that I can keep on improving my knowledge of drought.

Activity	Pass/Fail	Comments	Date
Open homepage	Pass	Null	October 24th
Click "Quizzes" in the	Pass	Navigation bar is	October 24th

navigation bar.		clear	
Click "Quizzes"	Pass	Page shows quick	October 24th
Enter a qualified name in the "Quizzes" page.	Pass	Feedback information is useful	October 24th
Click the "START TEST" button on the "Quizzes" page.	Pass	Speed is slow	October 24th
Do real quizzes click "SUBMIT AND FINISH" button to see results	Pass	Quizzes is a little hard	October 24th
Click "UPLOAD MY SCORE" button to see results	Pass	Speed is slow	October 24th
Click the "GO BACK" button to go back to the first page of the "Quizzes" page.	Pass	Speed is quick	October 24th
Enter a qualified name and try other quizzes on the "Quizzes" page.	Pass	The pie chart changes.	October 24th

6.1 Functional Test

This includes tests for all our website "WhyIsDrought" functions. For more information about the functional test, please follow the link.
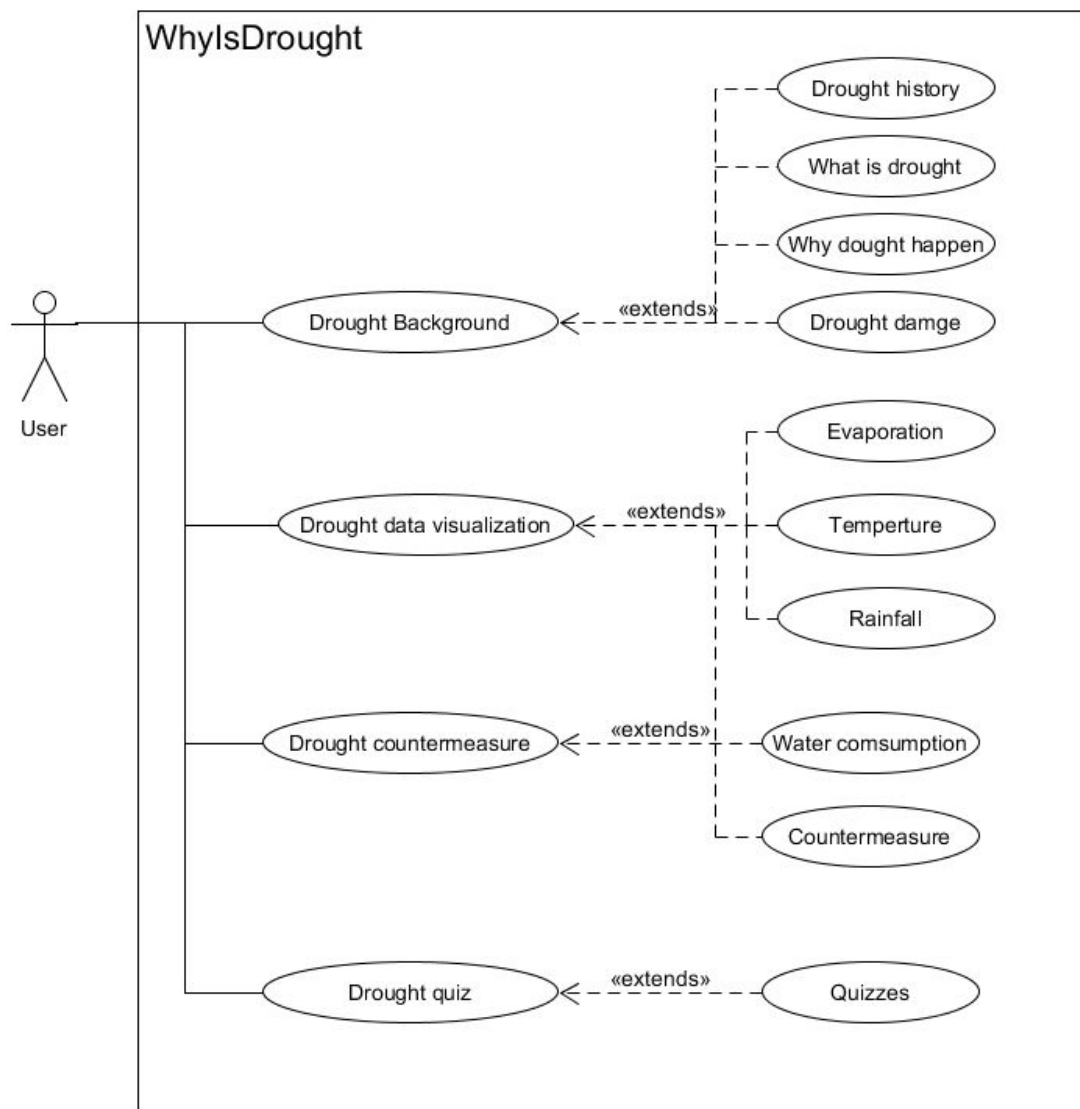https://github.com/Wolphatch/industralExperience/blob/master/functional%20test.pdf

7 WhyIsDrought project

This section includes the documentation for code structure.
These documentation as follow will be represent and explain in order:
1. Use case diagram
2. Sequence diagrams
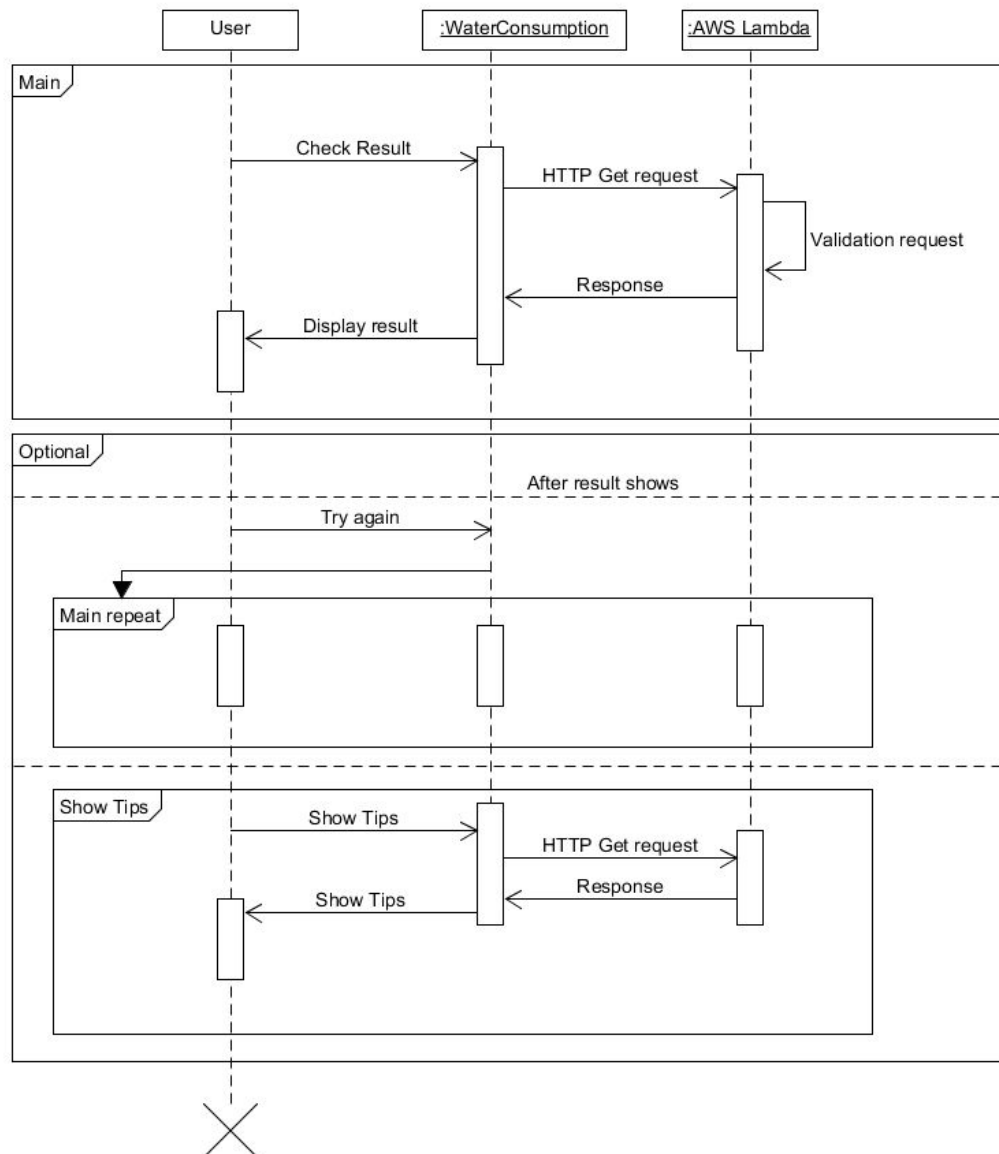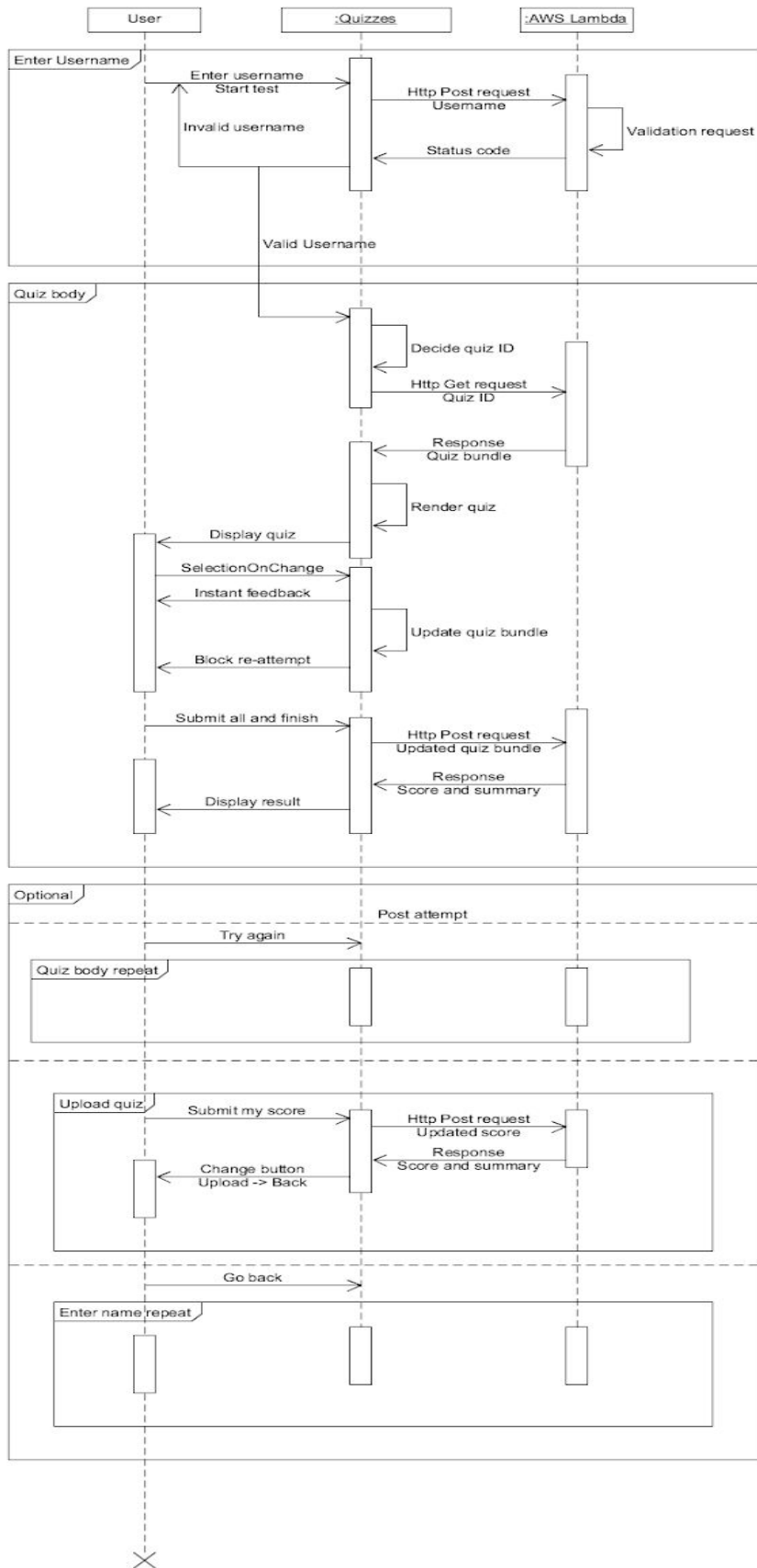3. Functional diagrams

7.0 Use case diagram

The WhyIsDrought system doesn't require login, everyone who views the site can use all features listed on the diagram above.

7.1 Sequence diagram

7.1.1 Test water consumption

7.1.2 User take quizzes

7.2 Functional diagram

8. Code documentation

This section is to provide the details of how each component and page are coded and how they work together on the website. All code has well formatted inline comment and package info. Components are coded to be reusable, pages are importing the component along with their basic structure. More detail can be found on git repo.

Please refer to the following link for code repository:
https://github.com/Wolphatch/industralExperience

9 Error Handling

9.0 Video API failure

When developers test this website, the video API used in the web page may become invalid due to the deletion of the video on Youtube. Although this possibility of this situation is very small, in this case we still provide a solution for this error. When this kind of error occurs, the

developer should first check whether the API is invalid because the video is deleted. If it is determined that the video has been deleted, the developers should delete the API link of the video in the front-end code documentation, and look for the video on related topics, then write its link into the front-end code documentation and check whether the new video can be played on the web page .

9.1 Database crash

When the user visits this website, the user may be unable to use most of the functionalities in this website due to the database crash. At this time, the developers should check the database connection and confirm whether the database has crashed. If it is determined that the database has already crashed, they can use the backup data in AWS to restore the database again. Since all the data in the previous database is backed up in AWS, the developers can quickly build the database and restore the data based on the backup data.

10 Hardware and Software require

10.0 hardware

10.0.1 computer with any system

10.1 software

10.1.1 AWS account
10.1.2 Visual studio code
10.1.3 MySql account
10.1.4 Tableau account
10.1.5 Github account

10.2 skill and knowledge

10.2.1 Knowledge in MySQL
10.2.2 Knowledge in Python
10.2.3 Knowledge in javaScript

10.2.4 Knowledge in react

10.2.5 Knowledge in AWS amplify, lambda function, API
gateway, and Route53

10.2.6 Knowledge in Github

10.2.7 Knowledge in Tableau

10.2.8 Knowledge in Data science