Image Translation Service

2022 March

Application Description **3**

Application Instruction **4**

- **Interface of Frontend Interaction** **4**
  - 1.The Home page 4
  - 2. Upload New Menu page 5
  - 3. Retrieve Image 7
  - 4. View All Uploaded Menu Image 11

Application Architecture **12**

- **General Code Architecture** **12**
  - DynamoDB Scheme 13
  - The Web Front End 14
  - Backend database cleaning 15

Application AWS Cost Model **15**

Application Description

A short description of the application.
We named our App as the <Image Translation Service>, which is an App that allows you to upload images and get translation for the text content in the menu, in both text and audio style.

There are three core features in this App.

1. Recognizing the text content from the image.
2. Providing instant online translation over the recognized content in multi-language.
3. Providing a service that turns the text content into lifelike speech for different using scenarios and users that may have disabilities.

There are other three side features in this App.

4. Allow you to upload images from any device, tablet, phone, PC. etc…
5. Provides flash image memory to allow you to look up images you previously uploaded.
6. You can keep the translated result on the server to share with others.

Imagine that you and your friends are traveling in a foreign country. You walk into a restaurant and you have no idea what the exotic menu is showing. No worry, you can simply take out your smartphone, take a picture and upload to our App. There you go, you will get the translation in your language of the menu line by line in the same format with the original menu.

If the reading condition is not idealable, for example, you are eating outside and the sunlight is too bright for you to read text from your phone. Or if you have reading disabilities. We also provide audio features that can play the recognized menu on your device.

Once you are done uploading and getting the translation. There is no need for your friend to do the hassle of taking a picture and uploading one more time. They can simply access the App and check out the results but just retrieving the same picture you previously uploaded.

Application Instruction

Description on how to use the application

Interface of Frontend Interaction

1.The Home page

The home page of our web App frontend looks like the following:

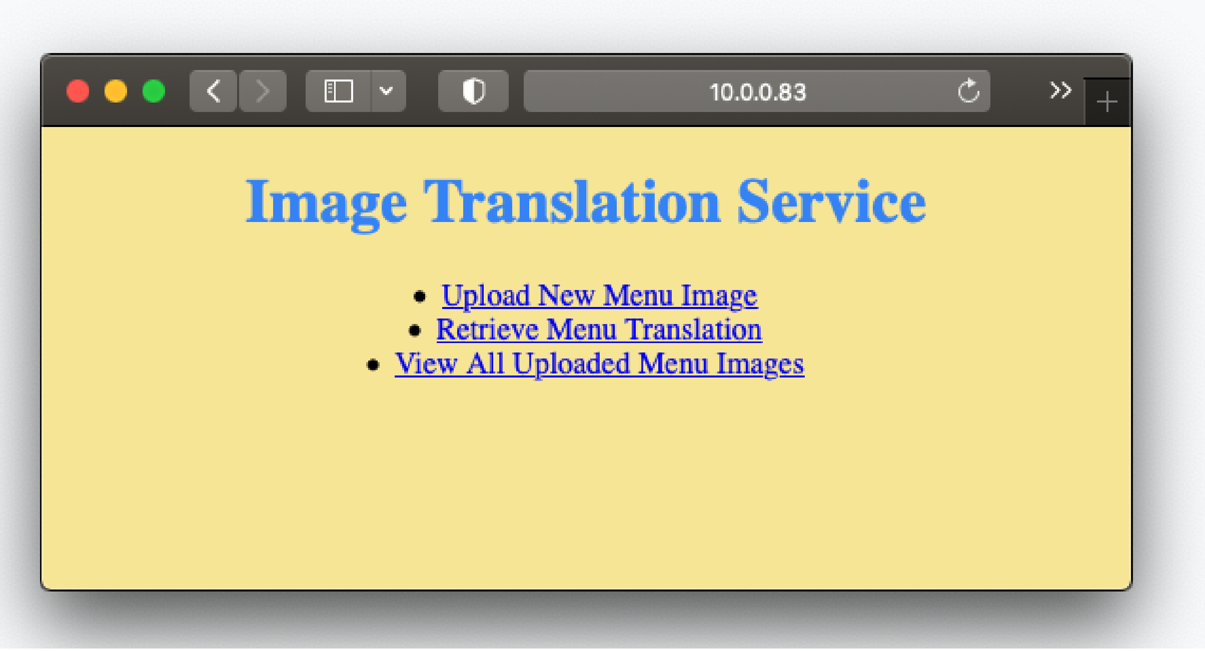


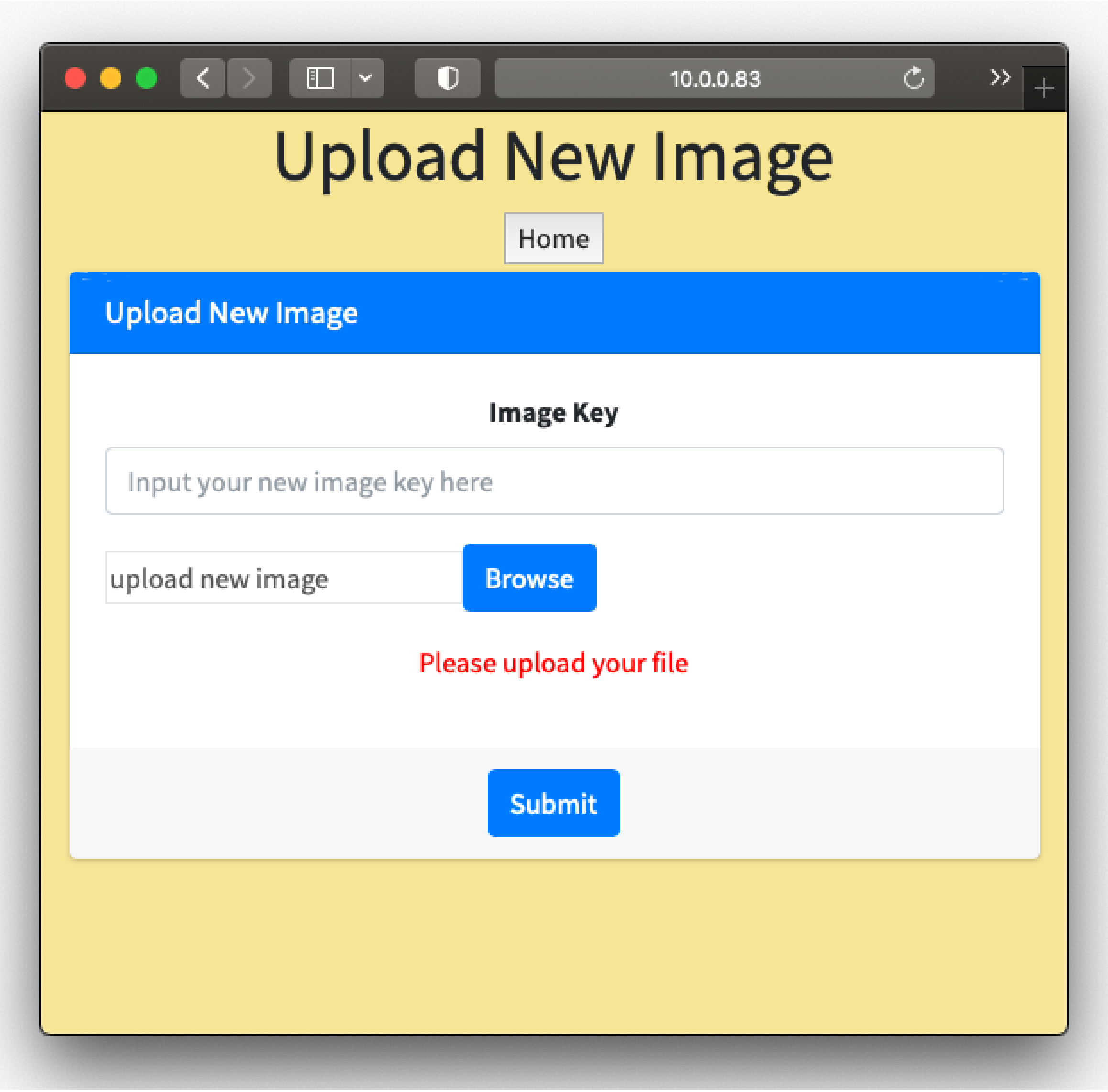
Image Translation Service

- Upload New Menu Image
- Retrieve Menu Translation
- View All Uploaded Menu Images

There are several pages for different functions.
In each of these web pages, the top left corner has a **Home** button, which can be pressed to go back to this Home web page.

2. Upload New Menu page

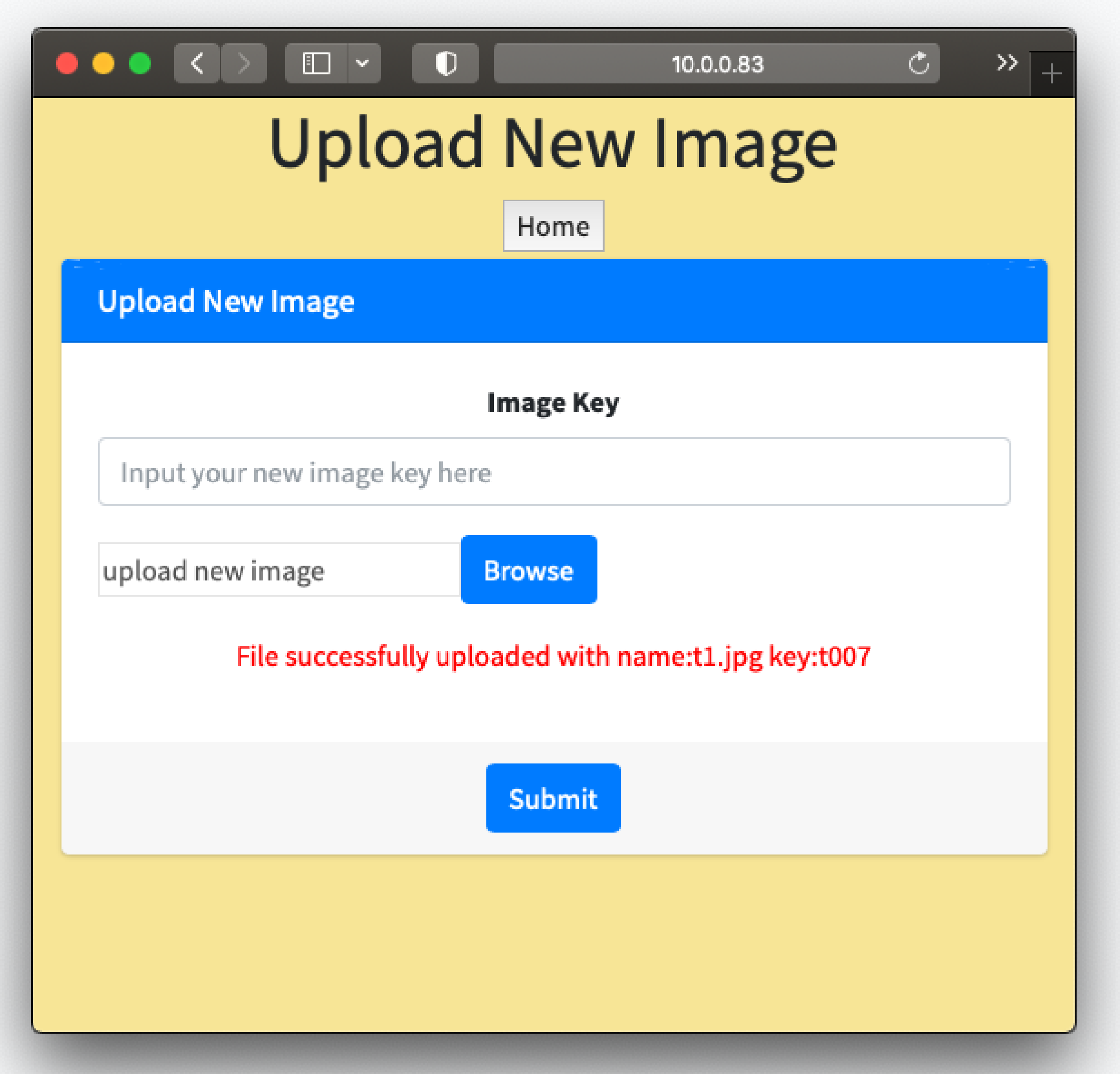
The Upload New Image page looks like the following.


10.0.0.83
Upload New Image
Home
Upload New Image
Image Key
Input your new image key here
upload new image
Browse
Submit

Please upload your file

Users can put the key into the box and select a file from local to upload. The red text is the message where the web page provides feedback to the user, such as upload results, error message, or instructions etc.

When users successfully upload an image file with a key. The web page will provide feedback as the following.



10.0.0.83

Upload New Image

Home

Upload New Image

Image Key

Input your new image key here

upload new image

Browse

File successfully uploaded with name:t1.jpg key:t007

Submit

3. Retrieve Image

This page is for users to retrieve an image with a key. Just input the key in the box. The red text is the feedback provided by the web page.

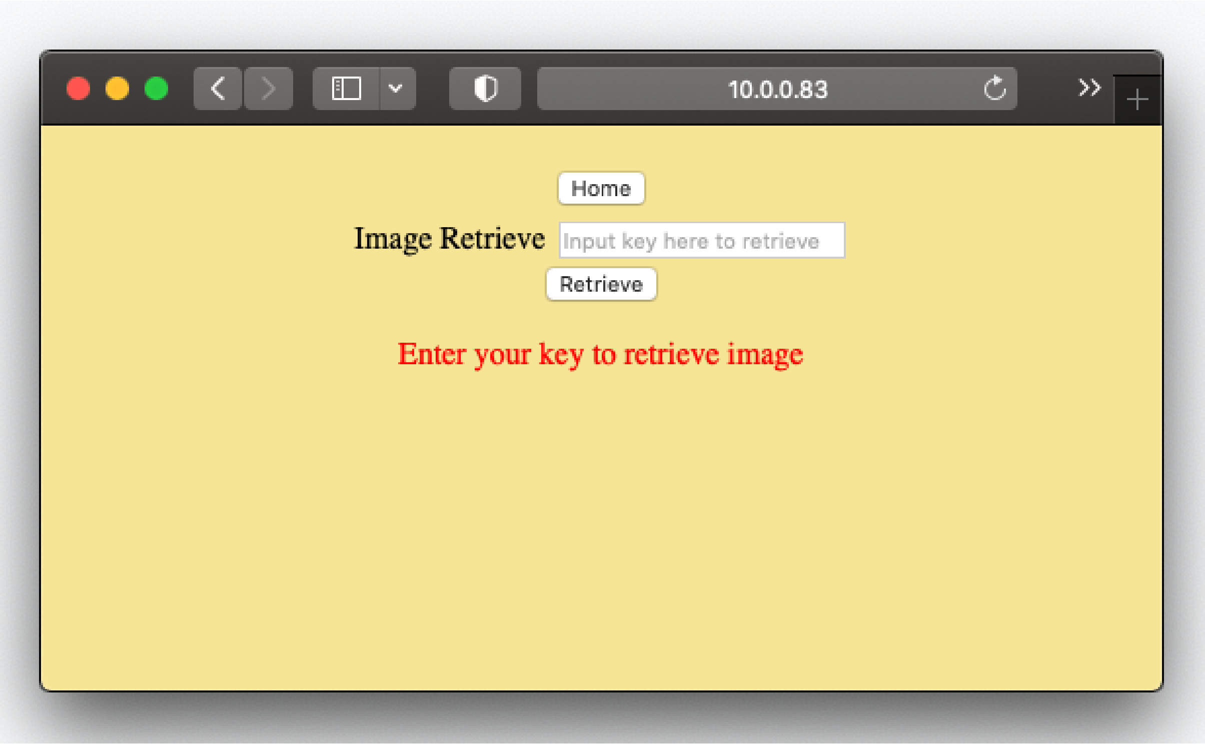


Image Retrieve

Input key here to retrieve

Enter your key to retrieve image

When the retrieve is successful, the image and the translation in different languages will be displayed as in the following picture.

And users can press the back to retrieve another image to go back to the image retrieve page to make another retrieve.

Currently, the App can recognize English and translate it to Chinese, French, Hindi, adn Spanish.

The <Read Text> button can be pressed to play the text on the menu.

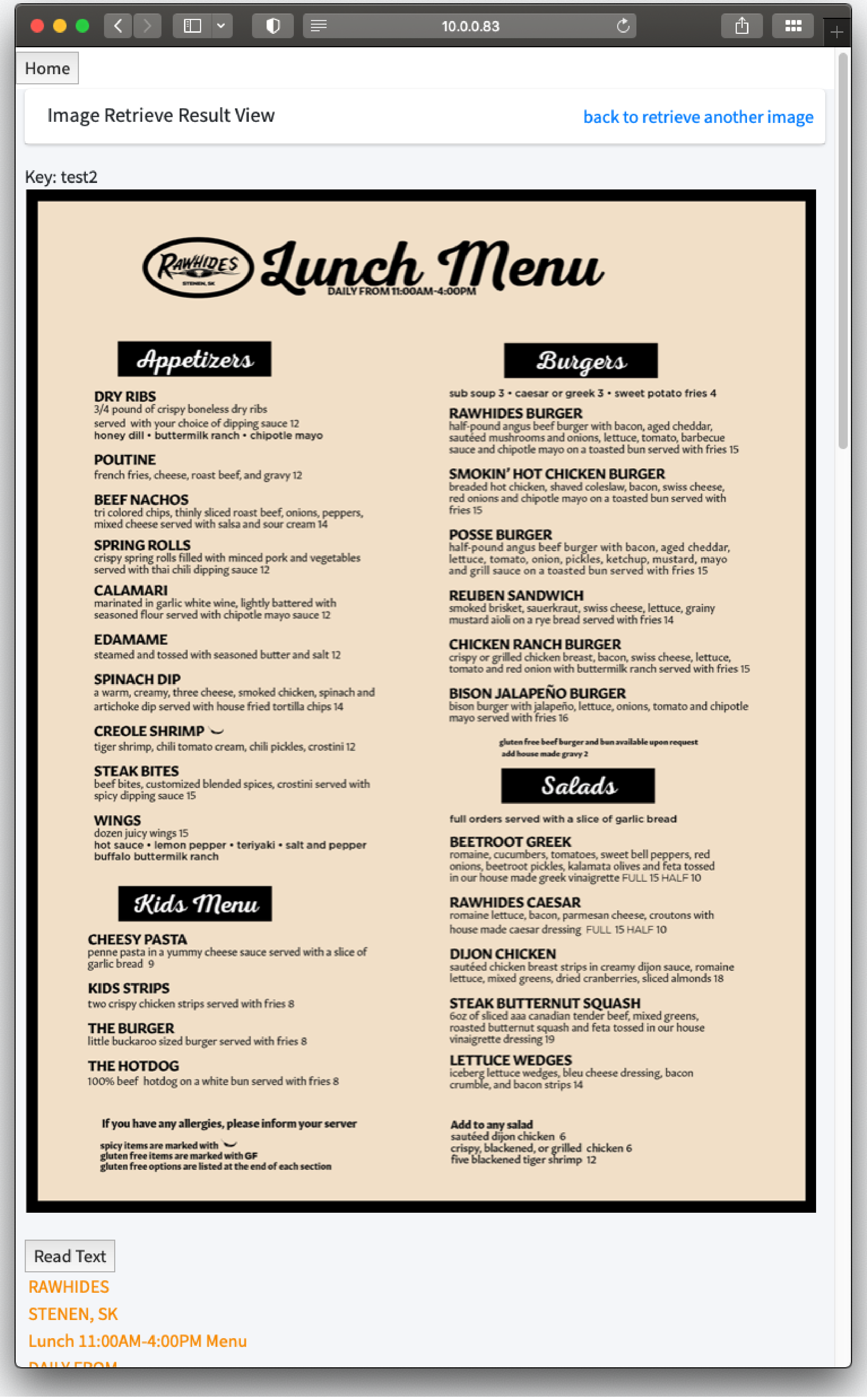


Image Retrieve Result View

Key: test2

RAWHIDES
STENEN, SK

Lunch Menu

DAILY FROM 11:00AM-4:00PM

Appetizers

DRY RIBS
3/4 pound of crispy boneless dry ribs
served with your choice of dipping sauce 12
honey dill • buttermilk ranch • chipotle mayo

POUTINE
french fries, cheese, roast beef, and gravy 12

BEEF NACHOS
tri colored chips, thinly sliced roast beef, onions, peppers, mixed cheese served with salsa and sour cream 14

SPRING ROLLS
crispy spring rolls filled with minced pork and vegetables served with thai chili dipping sauce 12

CALAMARI
marinated in garlic white wine, lightly battered with seasoned flour served with chipotle mayo sauce 12

EDAMAME
steamed and tossed with seasoned butter and salt 12

SPINACH DIP
a warm, creamy, three cheese, smoked chicken, spinach and artichoke dip served with house fried tortilla chips 14

CREOLE SHRIMP
tiger shrimp, chili tomato cream, chili pickles, crostini 12

STEAK BITES
beef bites, customized blended spices, crostini served with spicy dipping sauce 15

WINGS
dozen juicy wings 15
hot sauce • lemon pepper • teriyaki • salt and pepper
buffalo buttermilk ranch

Kids Menu

CHEESY PASTA
penne pasta in a yummy cheese sauce served with a slice of garlic bread 9

KIDS STRIPS
two crispy chicken strips served with fries 8

THE BURGER
little buckaroo sized burger served with fries 8

THE HOTDOG
100% beef hotdog on a white bun served with fries 8

If you have any allergies, please inform your server

spicy items are marked with
gluten free items are marked with GF
gluten free options are listed at the end of each section

Burgers

sub soup 3 • caesar or greek 3 • sweet potato fries 4

RAWHIDES BURGER
half-pound angus beef burger with bacon, aged cheddar, sautéed mushrooms and onions, lettuce, tomato, barbecue sauce and chipotle mayo on a toasted bun served with fries 15

SMOKIN' HOT CHICKEN BURGER
breaded hot chicken, shaved coleslaw, bacon, swiss cheese, red onions and chipotle mayo on a toasted bun served with fries 15

POSSE BURGER
half-pound angus beef burger with bacon, aged cheddar, lettuce, tomato, onion, pickles, ketchup, mustard, mayo and grill sauce on a toasted bun served with fries 15

REUBEN SANDWICH
smoked brisket, sauerkraut, swiss cheese, lettuce, grainy mustard aioli on a rye bread served with fries 14

CHICKEN RANCH BURGER
crispy or grilled chicken breast, bacon, swiss cheese, lettuce, tomato and red onion with buttermilk ranch served with fries 15

BISON JALAPEÑO BURGER
bison burger with jalapeño, lettuce, onions, tomato and chipotle mayo served with fries 16

gluten free beef burger and bun available upon request
add house made gravy 2

Salads

full orders served with a slice of garlic bread

BEETROOT GREEK
romaine, cucumbers, tomatoes, sweet bell peppers, red onions, beetroot pickles, kalamata olives and feta tossed in our house made greek vinaigrette FULL 15 HALF 10

RAWHIDES CAESAR
romaine lettuce, bacon, parmesan cheese, croutons with house made caesar dressing FULL 15 HALF 10

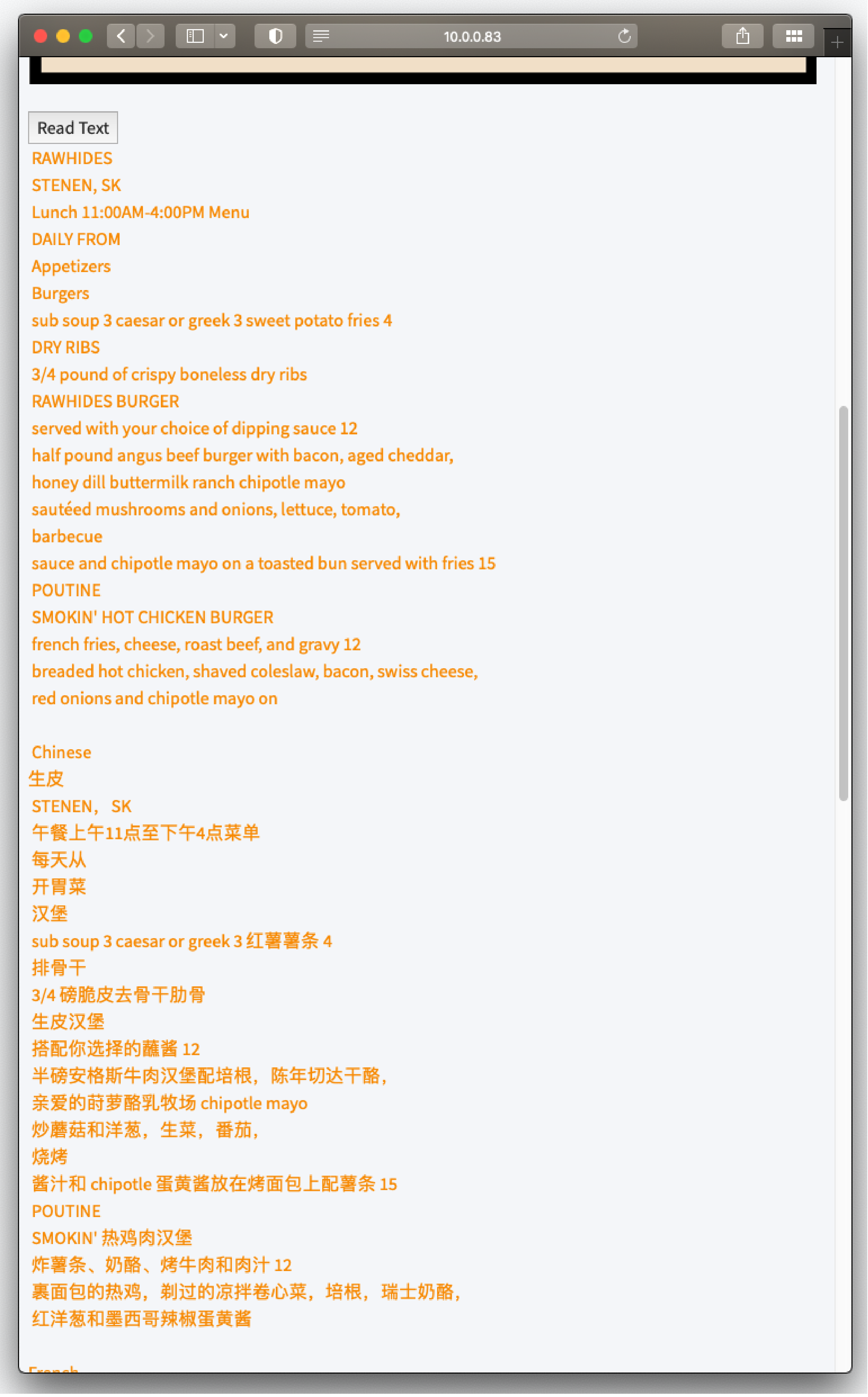
DIJON CHICKEN
sautéed chicken breast strips in creamy dijon sauce, romaine lettuce, mixed greens, dried cranberries, sliced almonds 18

STEAK BUTTERNUT SQUASH
6oz of sliced aaa canadian tender beef, mixed greens, roasted butternut squash and feta tossed in our house vinaigrette dressing 19

LETTUCE WEDGES
iceberg lettuce wedges, bleu cheese dressing, bacon crumble, and bacon strips 14

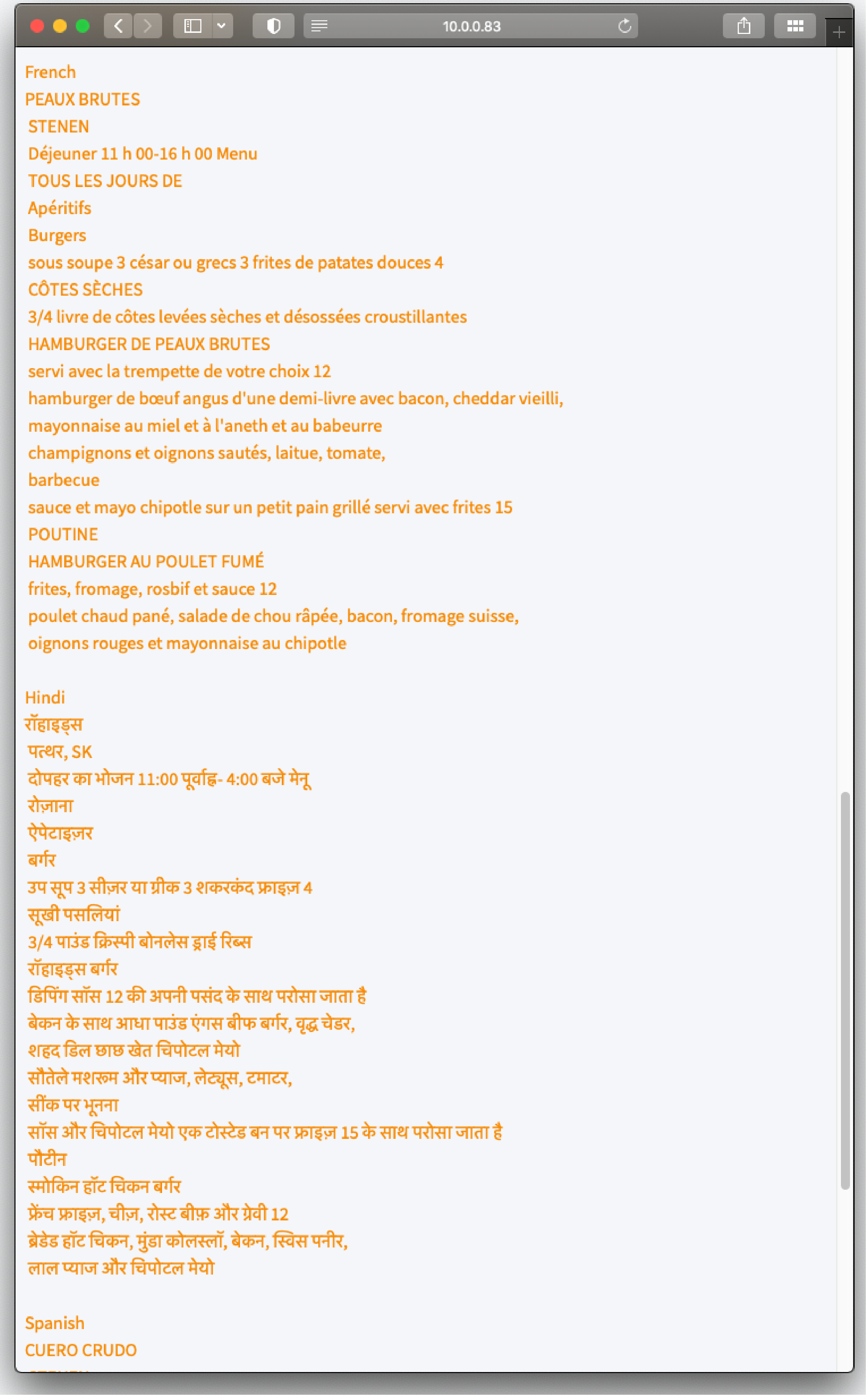
Add to any salad
sautéed dijon chicken 6
crispy, blackened, or grilled chicken 6
five blackened tiger shrimp 12

RAWHIDES
STENEN, SK
Lunch 11:00AM-4:00PM Menu



RAWHIDES
STENEN, SK
Lunch 11:00AM-4:00PM Menu
DAILY FROM
Appetizers
Burgers
sub soup 3 caesar or greek 3 sweet potato fries 4
DRY RIBS
3/4 pound of crispy boneless dry ribs
RAWHIDES BURGER
served with your choice of dipping sauce 12
half pound angus beef burger with bacon, aged cheddar,
honey dill buttermilk ranch chipotle mayo
sautéed mushrooms and onions, lettuce, tomato,
barbecue
sauce and chipotle mayo on a toasted bun served with fries 15
POUTINE
SMOKIN' HOT CHICKEN BURGER
french fries, cheese, roast beef, and gravy 12
breaded hot chicken, shaved coleslaw, bacon, swiss cheese,
red onions and chipotle mayo on

Chinese
生皮
STENEN，SK
午餐上午11点至下午4点菜单
每天从
开胃菜
汉堡
sub soup 3 caesar or greek 3 红薯薯条 4
排骨干
3/4 磅脆皮去骨干肋骨
生皮汉堡
搭配你选择的蘸酱 12
半磅安格斯牛肉汉堡配培根，陈年切达干酪，
亲爱的莳萝酪乳牧场 chipotle mayo
炒蘑菇和洋葱，生菜，番茄，
烧烤
酱汁和 chipotle 蛋黄酱放在烤面包上配薯条 15
POUTINE
SMOKIN' 热鸡肉汉堡
炸薯条、奶酪、烤牛肉和肉汁 12
裹面包的热鸡，剃过的凉拌卷心菜，培根，瑞士奶酪，
红洋葱和墨西哥辣椒蛋黄酱



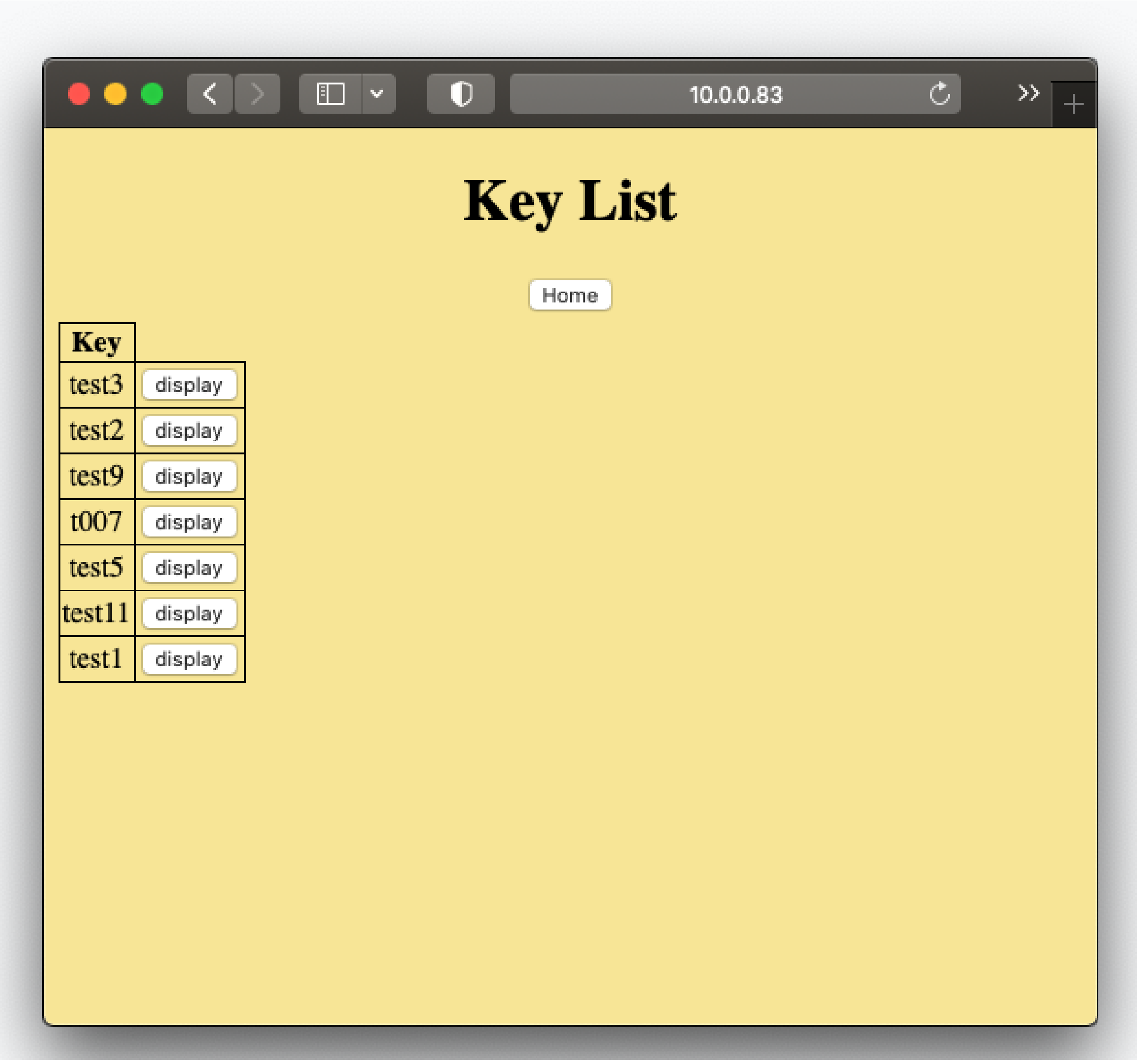
French
PEAUX BRUTES
STENEN
Déjeuner 11 h 00-16 h 00 Menu
TOUS LES JOURS DE
Apéritifs
Burgers
sous soupe 3 césar ou grecs 3 frites de patates douces 4
CÔTES SÈCHES
3/4 livre de côtes levées sèches et désossées croustillantes
HAMBURGER DE PEAUX BRUTES
servi avec la trempette de votre choix 12
hamburger de bœuf angus d'une demi-livre avec bacon, cheddar vieilli,
mayonnaise au miel et à l'aneth et au babeurre
champignons et oignons sautés, laitue, tomate,
barbecue
sauce et mayo chipotle sur un petit pain grillé servi avec frites 15
POUTINE
HAMBURGER AU POULET FUMÉ
frites, fromage, rosbif et sauce 12
poulet chaud pané, salade de chou râpée, bacon, fromage suisse,
oignons rouges et mayonnaise au chipotle

Hindi
रॉहाइड्स
पत्थर, SK
दोपहर का भोजन 11:00 पूर्वाह्न- 4:00 बजे मेनू
रोज़ाना
ऐपेटाइज़र
बर्गर
उप सूप 3 सीज़र या ग्रीक 3 शकरकंद फ्राइज़ 4
सूखी पसलियां
3/4 पाउंड क्रिस्पी बोनलेस ड्राई रिब्स
रॉहाइड्स बर्गर
डिपिंग सॉस 12 की अपनी पसंद के साथ परोसा जाता है
बेकन के साथ आधा पाउंड एंगस बीफ बर्गर, वृद्ध चेडर,
शहद डिल छाछ खेत चिपोटल मेयो
सौतेले मशरूम और प्याज, लेट्यूस, टमाटर,
सींक पर भूनना
सॉस और चिपोटल मेयो एक टोस्टेड बन पर फ्राइज़ 15 के साथ परोसा जाता है
पौटीन
स्मोकिन हॉट चिकन बर्गर
फ्रेंच फ्राइज़, चीज़, रोस्ट बीफ़ और ग्रेवी 12
ब्रेडेड हॉट चिकन, मुंडा कोलस्लॉ, बेकन, स्विस पनीर,
लाल प्याज और चिपोटल मेयो

Spanish
CUERO CRUDO

4. View All Uploaded Menu Image

This page lists all the processed Menu image that are currently stored in our database.
And you can press the **display** button right beside each key name to view the corresponding recognition and translation result..



Key List

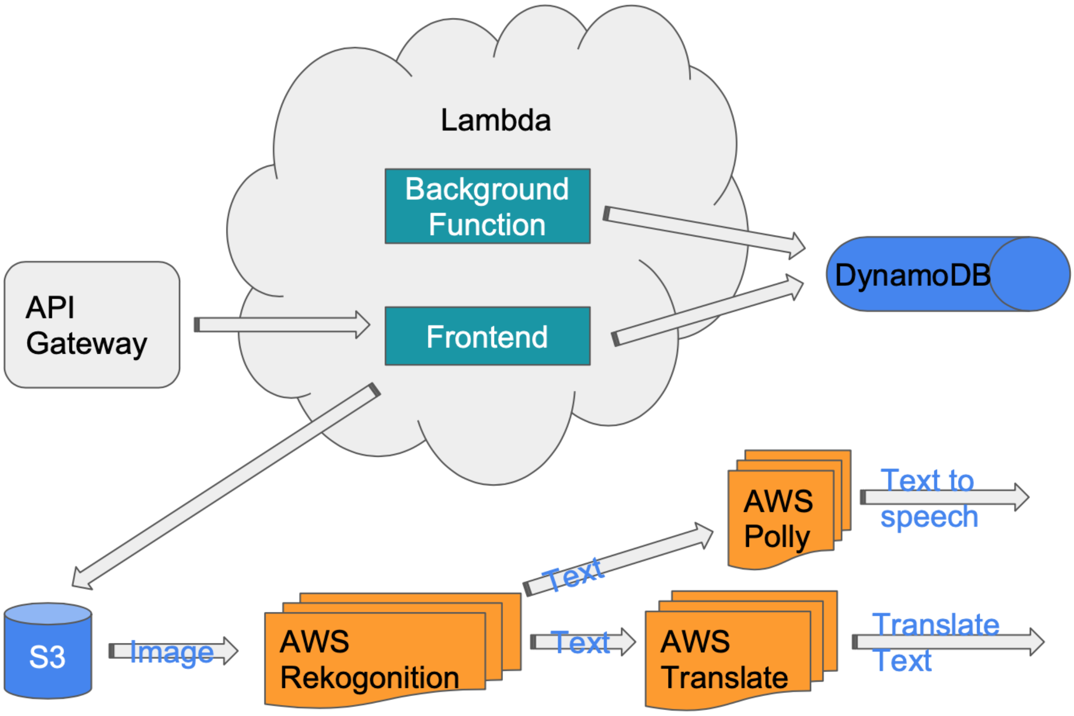
Key	
test3	display
test2	display
test9	display
t007	display
test5	display
test11	display
test1	display

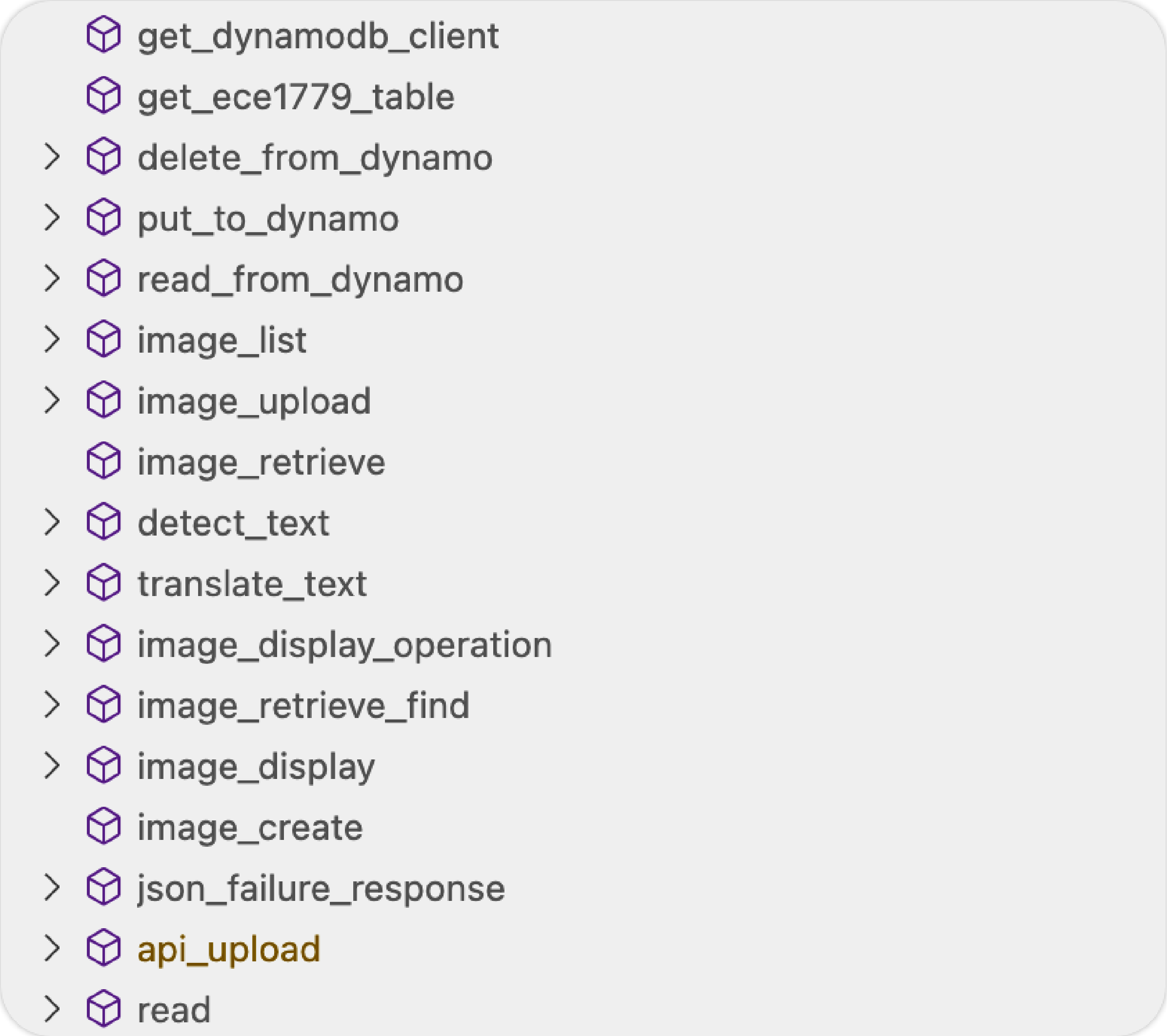
Application Architecture

The architecture of the application, the functions and their interactions in addition to the background process

General Code Architecture

https://docs.google.com/presentation/d/1E8EOrgEyETZJ6KLRJD615p2IjwjGwLRCLnmElsDdyPg/edit#slide=id.g120f8071802_0_0


Lambda
Background Function
Frontend
API Gateway
DynamoDB
S3
Image
AWS Rekogonition
Text
AWS Polly
Text to speech
Text
AWS Translate
Translate Text


get_dynamodb_client
get_ece1779_table
delete_from_dynamo
put_to_dynamo
read_from_dynamo
image_list
image_upload
image_retrieve
detect_text
translate_text
image_display_operation
image_retrieve_find
image_display
image_create
json_failure_response
api_upload
read

Delete_from_dynamo, put_to_dynamo, read_from_dynamo are operations for DynamoDB. We use them to read and write metadata of images. Image_list is used to show all image keys in dynamoDB. Image_upload is used to upload images to S3 and write metadata to DynamoDB. Image_retrieve will call image_display_operation, image_retrieve_find and image_display. After retrieving the photo, image_display will call detect_text which uses AWS Rekognition to get text from the image. Then image_display will call translate_text which uses AWS Translate to translate text to other languages. If the user clicks the read button, read will be called, which uses AWS Polly to convert text to speech.

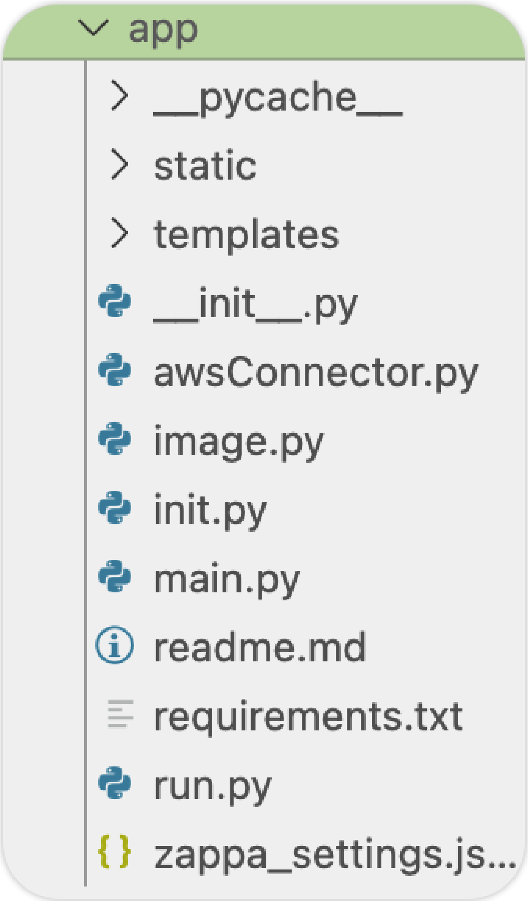
DynamoDB Scheme

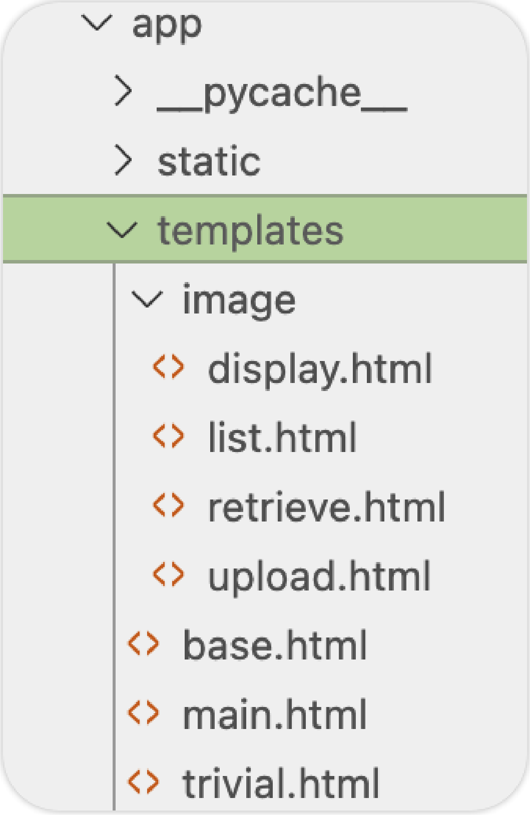
We have 1 DynamoDB table. Image_data uses image keys as the primary key and uses the path of image as column `value`. `Update_time` will be set when uploading an image. Background function will use update_time to delete the expired records.

key
value
update_time

The Web Front End

We use Zappa to deploy our Flask instance. Frontend/app folder contains the code for flask and the configuration for zappa. The python code is used for the Web Front End flask instance, which drives the html pages under the templates.


app
__pycache__
static
templates
__init__.py
awsConnector.py
image.py
init.py
main.py
readme.md
requirements.txt
run.py
zappa_settings.js...


app
__pycache__
static
templates
image
display.html
list.html
retrieve.html
upload.html
base.html
main.html
trivial.html

As shown in the above figures, the python files include the coding logics of the Web Front End, and the templates include the web page.

For example,the following figure shows the functions in **image.py,** where these functions are implemented to realize the functions of this App, such as the communication with DynamoDB, the html web page rendering, and API request processing.

Backend database cleaning

A single lambda instance is started after the frontend being successfully initialized. The lambda instance will periodically scan the DynamoDB records, and automatically remove records that have not been updated for a certain amount of time.
The scan period and time-to-live threshold needs to be provided through the lambda API when starting this backend instance.

Application AWS Cost Model

The cost model for AWS costs on application deployment. Also, predicted costs after six months for 10, 1000 and 1000,000 users using your model. Discuss your assumptions about the user behavior, such as requests per day, etc.

We use AWS pricing calculator to predict the cost(https://calculator.aws/#/).

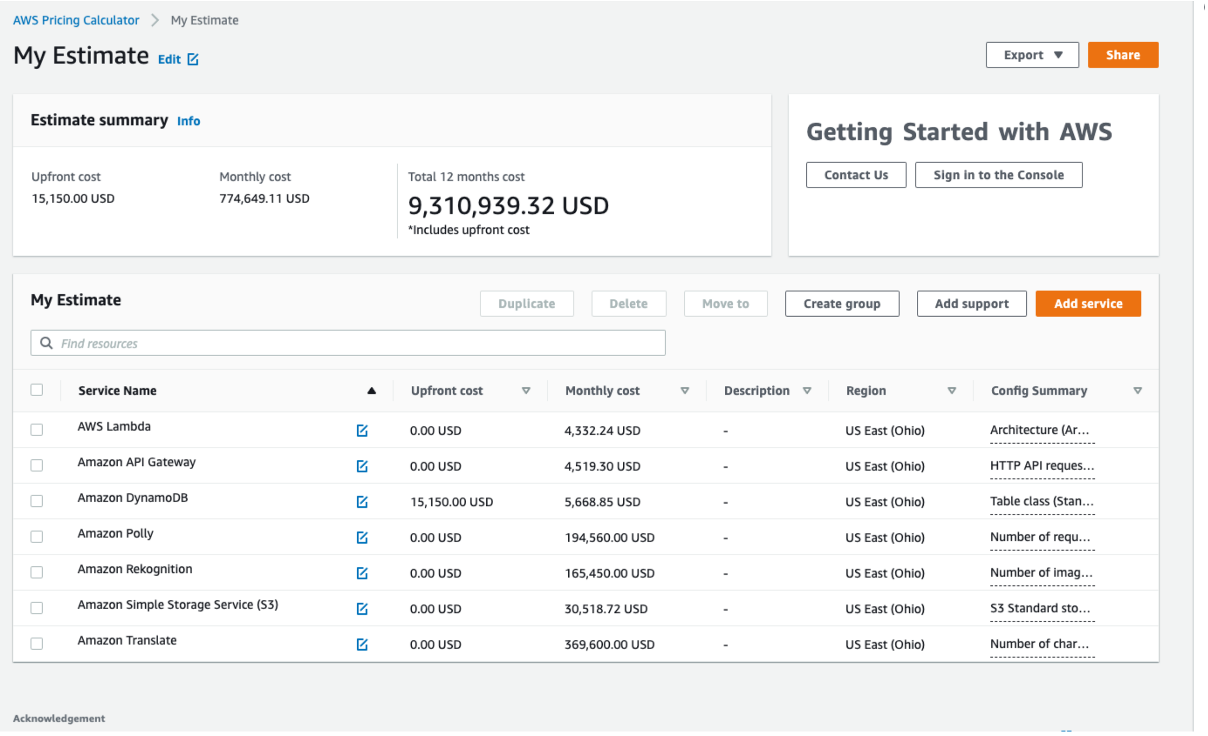
We assume that most typical users use the App during lunch time and dinner time everyday. Each typical using scenario contains around a translation of 10 pages, which is our estimation page number of most typical menus.

And we assume our users are addicted heavy App users, which means they would use the App everyday every meal in the 6 months period, and each meal they take 10 pages of menu pictures. We understand this estimation can only provide the cap for the usage.

Therefore we have:

User number	length	request#/ day	total usage(requests)	Total cost(6 months)
10	6 months	20	36500	0 USD（free tier）
1k	6 months	20	3650k	4.655k USD
1M	6 months	20	3650M	4.655M USD

For the detail of calculation we take the 1M user base as an example, and the calculation is shown below.


AWS Pricing Calculator > My Estimate
Edit
Export ▼
Share
Info
Getting Started with AWS
Contact Us
Sign in to the Console
Duplicate
Delete
Move to
Create group
Add support
Add service
Find resources
Acknowledgement

My Estimate

Estimate summary

Upfront cost	Monthly cost	Total 12 months cost
15,150.00 USD	774,649.11 USD	9,310,939.32 USD *Includes upfront cost

My Estimate

☐	Service Name	Upfront cost	Monthly cost	Description	Region	Config Summary
☐	AWS Lambda	0.00 USD	4,332.24 USD	-	US East (Ohio)	Architecture (Ar…
☐	Amazon API Gateway	0.00 USD	4,519.30 USD	-	US East (Ohio)	HTTP API reques…
☐	Amazon DynamoDB	15,150.00 USD	5,668.85 USD	-	US East (Ohio)	Table class (Stan…
☐	Amazon Polly	0.00 USD	194,560.00 USD	-	US East (Ohio)	Number of requ…
☐	Amazon Rekognition	0.00 USD	165,450.00 USD	-	US East (Ohio)	Number of imag…
☐	Amazon Simple Storage Service (S3)	0.00 USD	30,518.72 USD	-	US East (Ohio)	S3 Standard sto…
☐	Amazon Translate	0.00 USD	369,600.00 USD	-	US East (Ohio)	Number of char…

https://calculator.aws/#/estimate?id=1d144df428b7d63e2b0f65173060c2592260de7b