Image Converter

An image converter converts image having tables to excel file

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1.INTRODUCTION

This project is about converting image having tables to an excel files. It is a web application named = “” using Eureka Service discovery as a discovery server to detect microservices developed in Java Spring boot, python flask, and ReactJS.
This web application has following features:

1. Login using OAuth 2.0
2. Uploading an Image
3. Process the uploaded image
4. Display the converted excel sheet
5. Download the converted excel sheet

2.TECHNOLOGIES USED

Eureka service discover server - Discovery server developed by Netflix OSS using Spring boot framework.
Spring boot application framework - To build REST a microservice for calling other microservices endpoints.
Flask – To host python machine learning code, on REST endpoints.
ReactJS – For frontend, user can login, upload an image and then display the converted Excel file.
Auth0 – User can login using google credentials.

3. USER

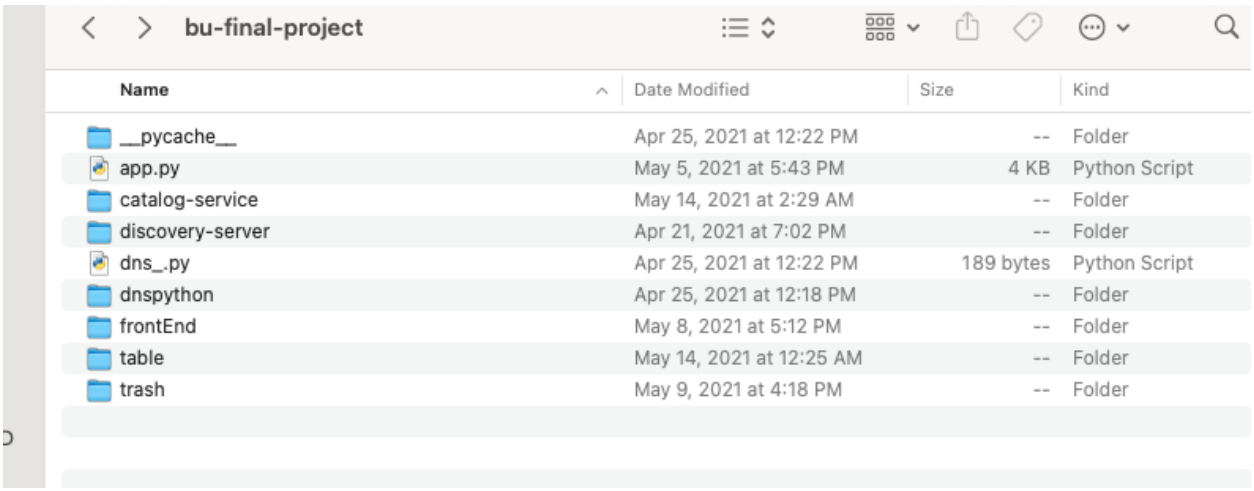
User – User will have to login using Google credentials, then user can upload image, convert it into excel and then display, download the excel file.

4. INSTALL TOOLS

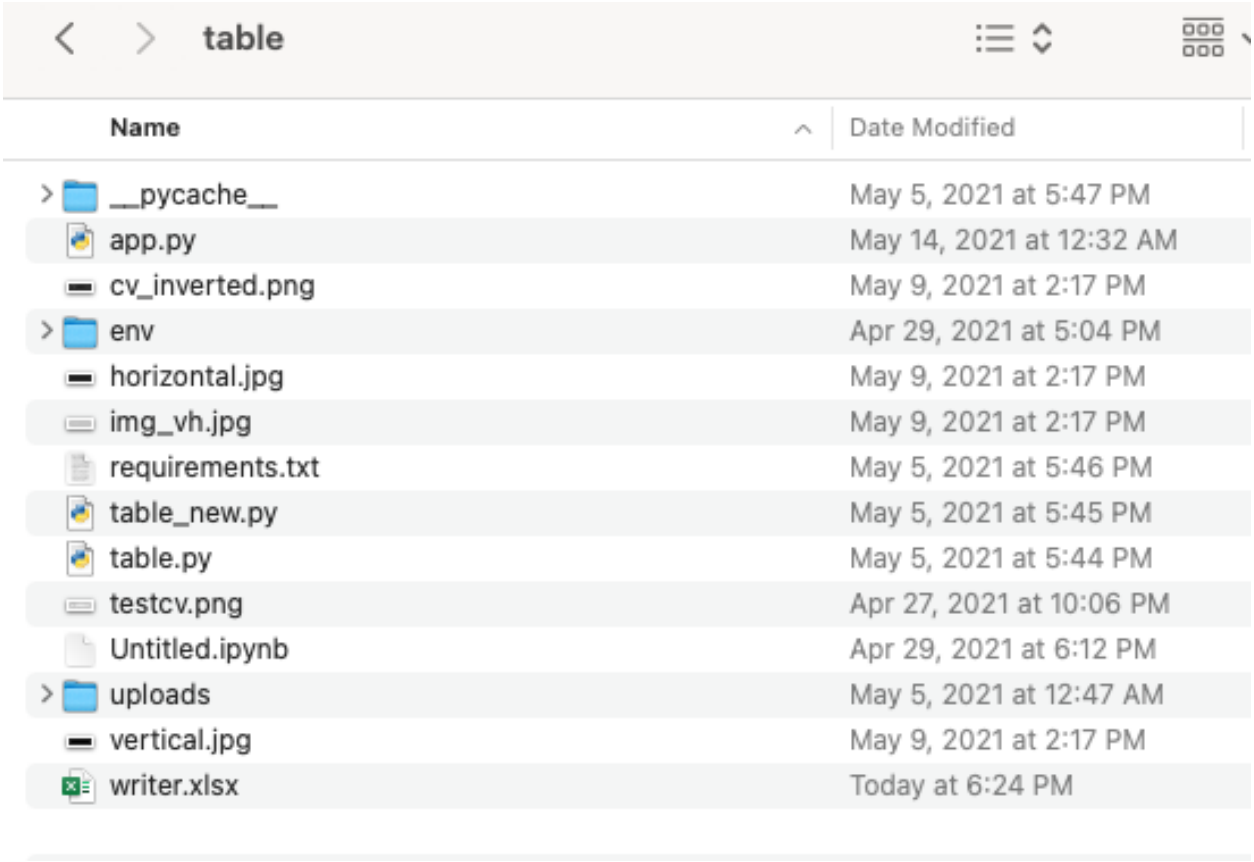
Code Editor – VS Code, Atom to write code and run it on
Web Browser – Google Chrome, OSX Safari
Languages – JAVA SE 1.8, python 3(using virtual environment), JavaScript for frontend
NPM – To install Node dependencies, ReactJS and NodeJS
POSTMAN – platform for API development, to test POST, GET API endpoints to check

5. FOLDER STRUCTURE

Discovery server – Discovers all the backend microservices (discovery-server)
Microservices – Spring boot application (catalog-service), flask backend to process image (table)
Frontend – ReactJS application, contains all the JS, CSS, HTML code for user interface (frontend)



The table folder having **app.py**, it is flask backend microservice.



6. What, why, how?

What?

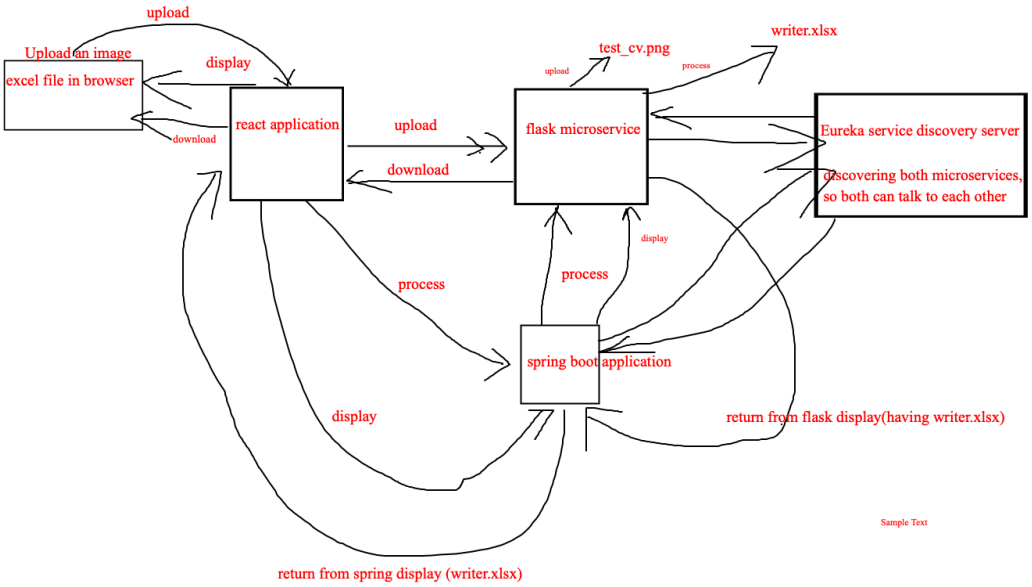
This project is about converting images to an excel files.

Why?

In real world, if we talk about places like warehouses, labs etc. data entries are still done manually, to transform those entries into computer readable excel files this tool will be helpful.

How?

By using machine learning algorithms, libraries (pytesseract, OpenCV) to transform an image to an Excel file.
ReactJS for user interface to upload file, process file and display file.
Flask and Spring Boot to enable microservices to perform REST operations.
Eureka service discovery server to help communicate microservices to each other.



- **Above arrows REST api calls**

7. Service Discovery Server

mvnw	Jan 26, 2019 at 3:11 PM	9 KB	Unix Ex...ab
mvnw.cmd	Jan 26, 2019 at 3:11 PM	6 KB	Document
pom.xml	Jan 26, 2019 at 3:11 PM	2 KB	XML Text
src	May 7, 2021 at 11:25 PM	--	Folder
eureka-curl-payload.json	May 7, 2021 at 11:25 PM	449 bytes	JSON file
main	May 7, 2021 at 11:25 PM	--	Folder
java	Apr 25, 2021 at 11:57 PM	--	Folder
io	Apr 25, 2021 at 11:57 PM	--	Folder
resources	Apr 25, 2021 at 12:05 PM	--	Folder
application.properties	Apr 26, 2021 at 5:45 PM	127 bytes	Java pr...rti
application.yml	May 7, 2021 at 11:32 PM	207 bytes	YAML docu
test	Jan 26, 2019 at 3:11 PM	--	Folder
java	Jan 26, 2019 at 3:11 PM	--	Folder
target	Apr 21, 2021 at 6:54 PM	--	Folder
classes	May 9, 2021 at 4:23 PM	--	Folder
test-classes	May 9, 2021 at 4:23 PM	--	Folder

spring Eureka

HOME LAST 1000 SINCE STARTUP

System Status

Environment	test	Current time	2021-05-16T18:22:34 -0400
Data center	default	Uptime	1 day 04:05
		Lease expiration enabled	false
		Renews threshold	5
		Renews (last min)	4

EMERGENCY! EUREKA MAY BE INCORRECTLY CLAIMING INSTANCES ARE UP WHEN THEY'RE NOT. RENEWALS ARE LESSER THAN THRESHOLD AND HENCE THE INSTANCES ARE NOT BEING EXPIRED JUST TO BE SAFE.

DS Replicas

Instances currently registered with Eureka

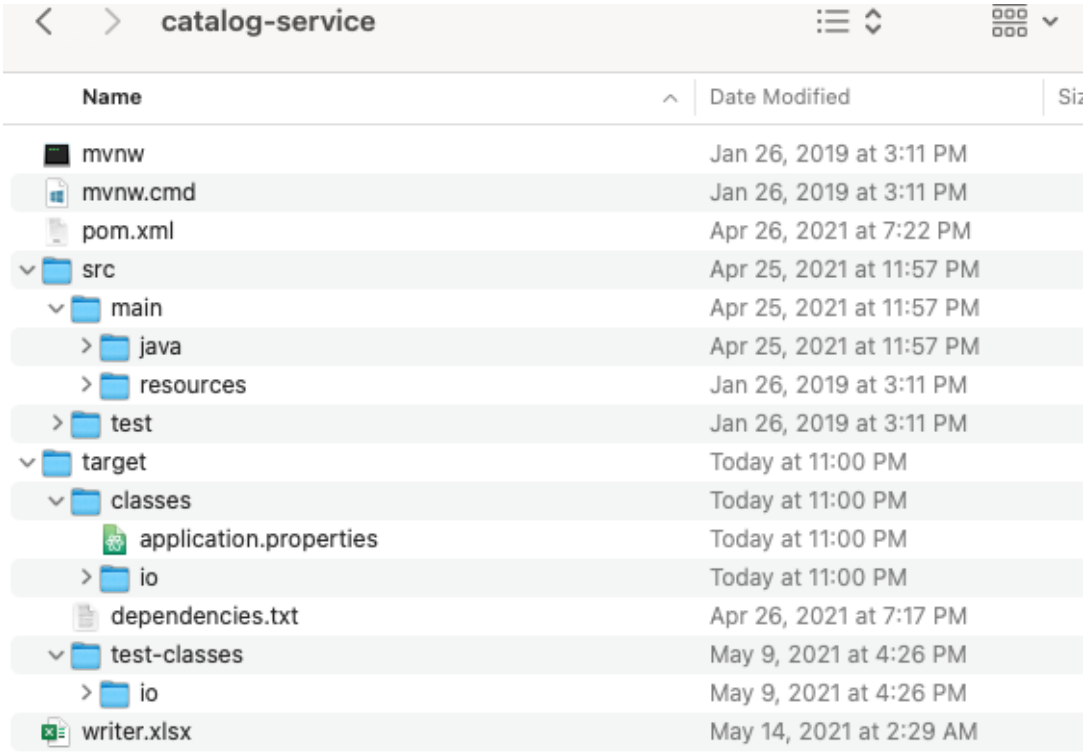
Application	AMIs	Availability Zones	Status
CATALOG-SERVICE	n/a (1)	(1)	UP (1) - tejeshs-air:catalog-service:8085
PYTHON-MODULE-1	n/a (1)	(1)	UP (1) - 127.0.0.1:python-module-1:5000

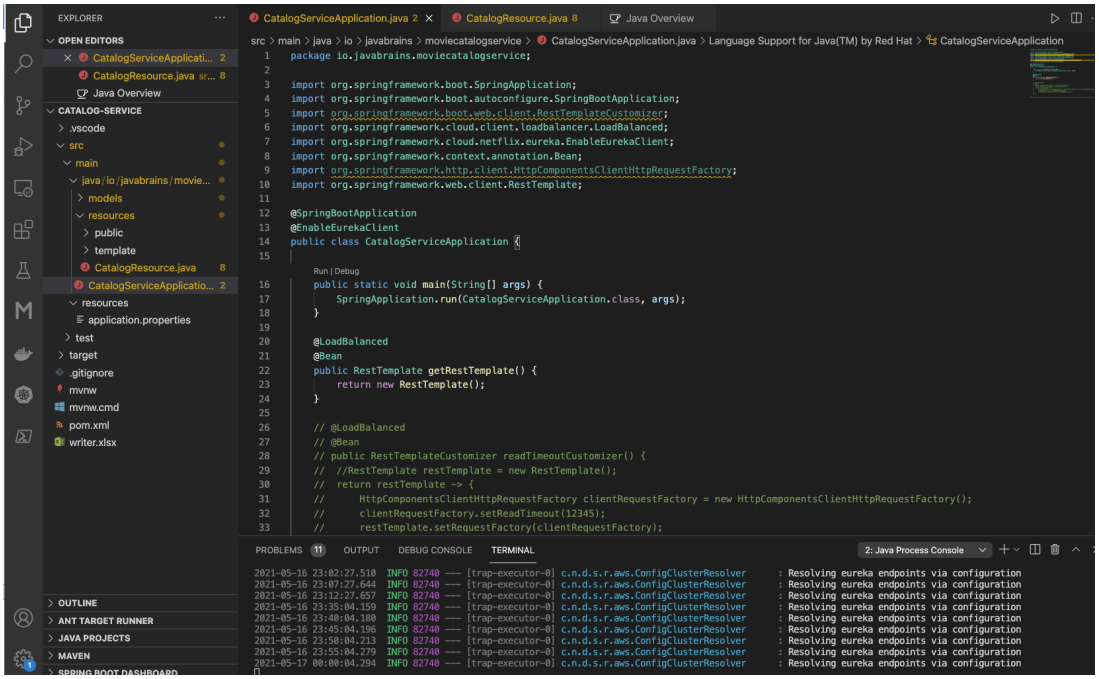
General Info

Name	Value
total-avail-memory	154mb
environment	test
num-of-cpus	4
current-memory-usage	76mb (49%)
server-uptime	1 day 04:05
registered-replicas	

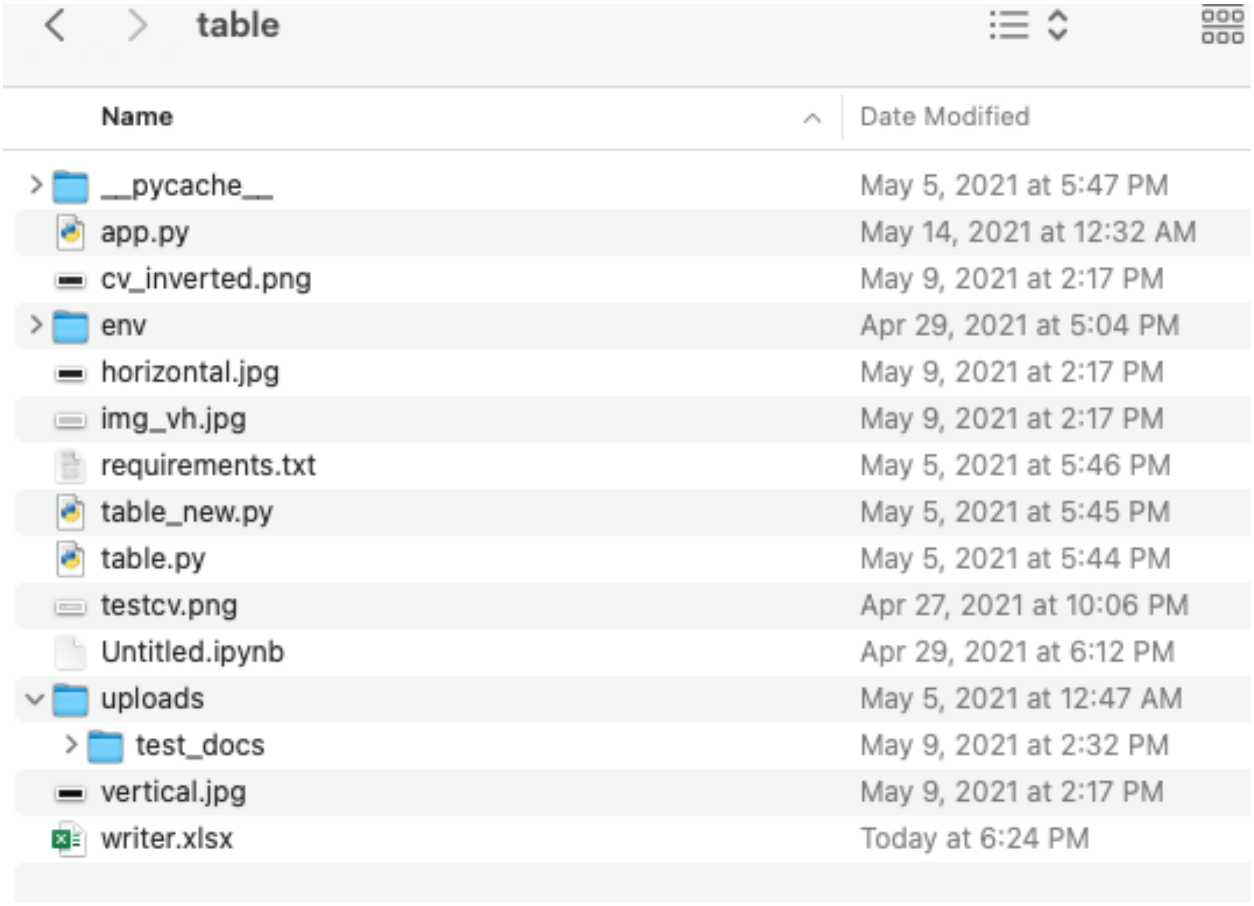
8. Microservices

Spring boot REST backend:





Flask ML backend microservice:

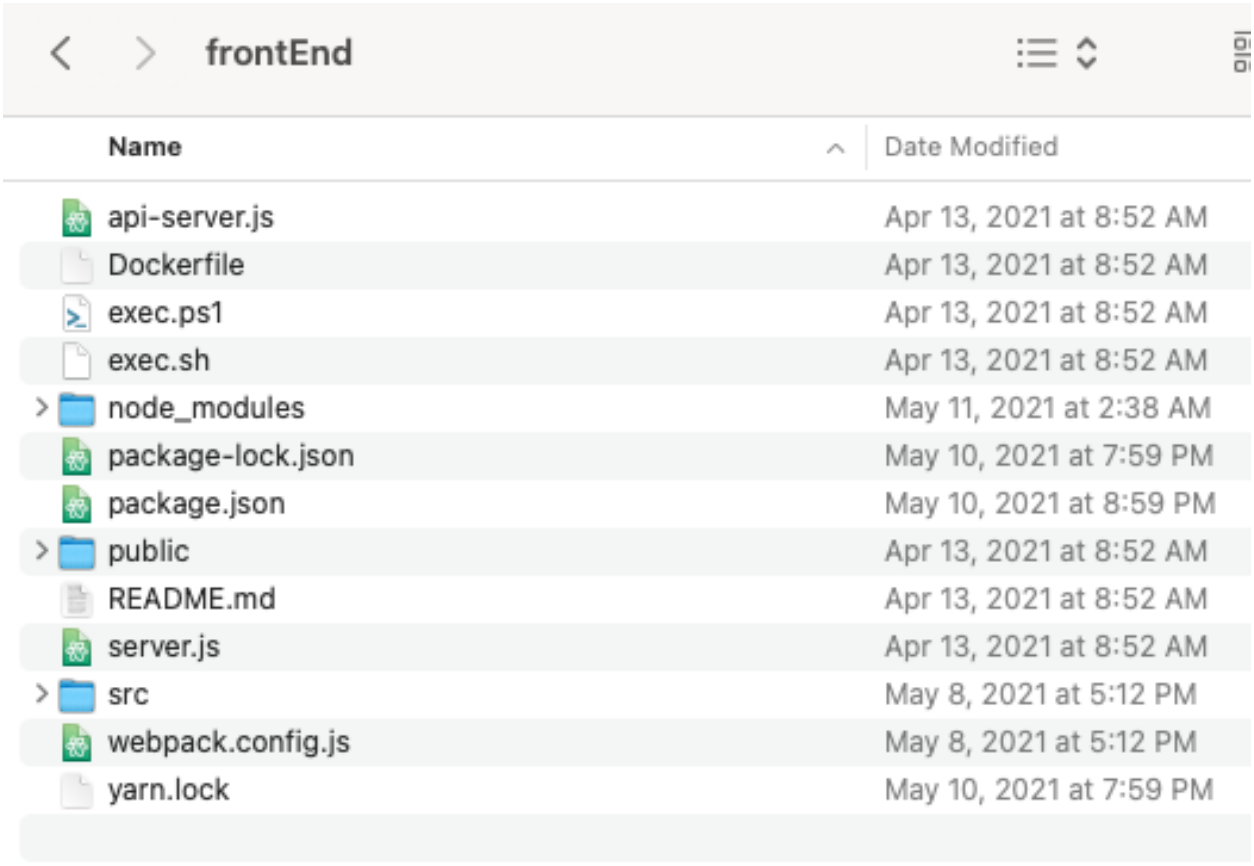



```
(env) Tejeshs-Air:table tejeshagrawal$ python3 app.py
 * Serving Flask app "app" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
INFO:werkzeug: * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:27:09] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:28:23] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:31:28] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:32:21] "GET /display HTTP/1.1" 200 -
^CTraceback (most recent call last):
  File "app.py", line 353, in <module>
    flask_cors.CORS(app, expose_headers='Authorization')
NameError: name 'flask_cors' is not defined
(env) Tejeshs-Air:table tejeshagrawal$ python3 app.py
 * Serving Flask app "app" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
INFO:werkzeug: * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:33:18] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:34:24] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:34:35] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:35:09] "GET /[object%20Object] HTTP/1.1" 404 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:35:30] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:36:14] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:37:35] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 00:43:18] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:24:09] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:24:54] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:26:03] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:26:19] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:29:54] "GET /display HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:33:02] "GET /download HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:33:58] "GET /download HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:38:37] "GET /download HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:41:40] "GET /download HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:43:23] "GET /download HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [14/May/2021 02:48:55] "GET /download HTTP/1.1" 200 -
```

9. FRONTEND

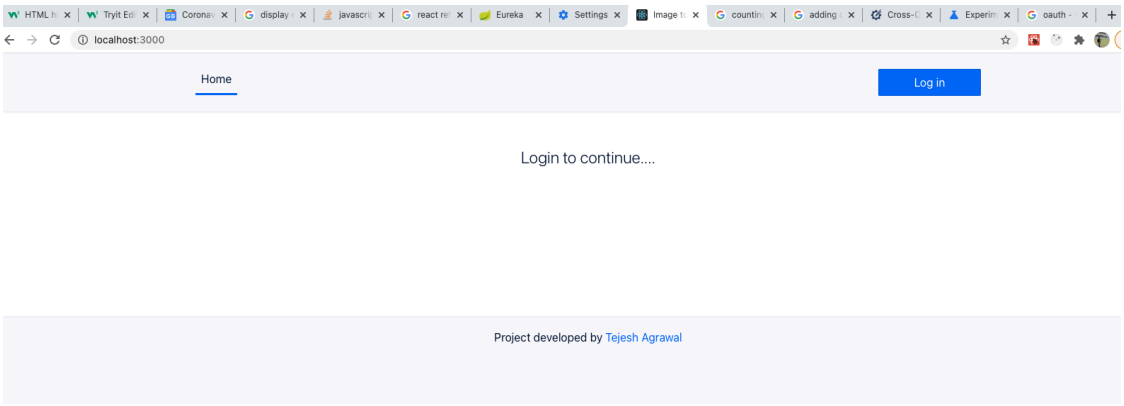
TECHNOLOGICAL COMPONENTS USED

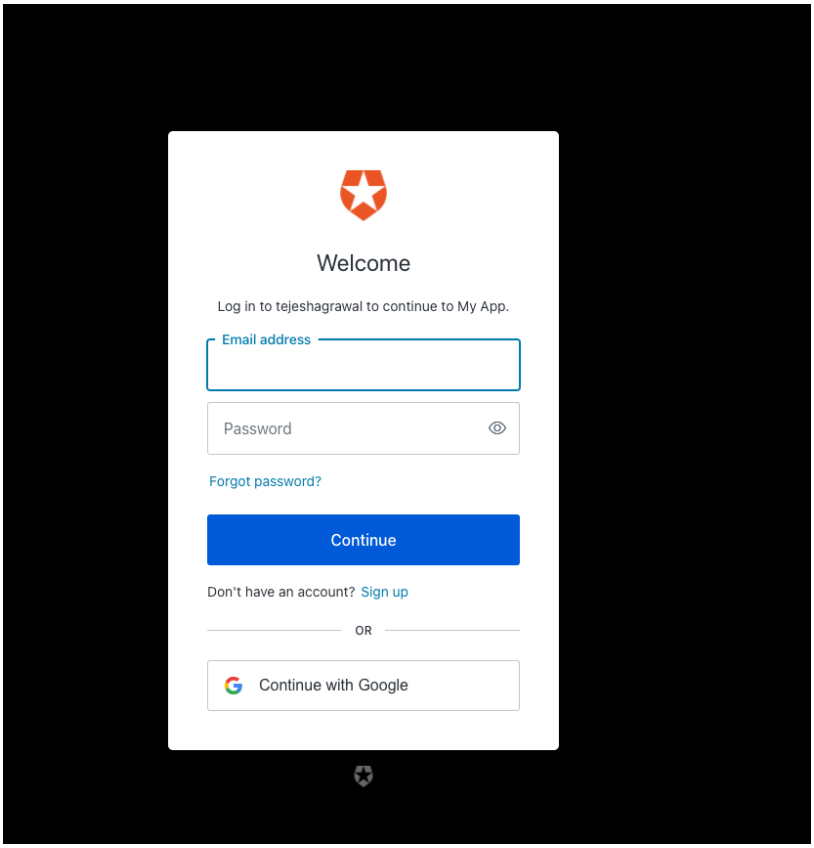
React - Components, Props, Events, Hooks, Router
Axios - library to send ajax request to backend microservices server
Auth0 – To login using user's google credentials



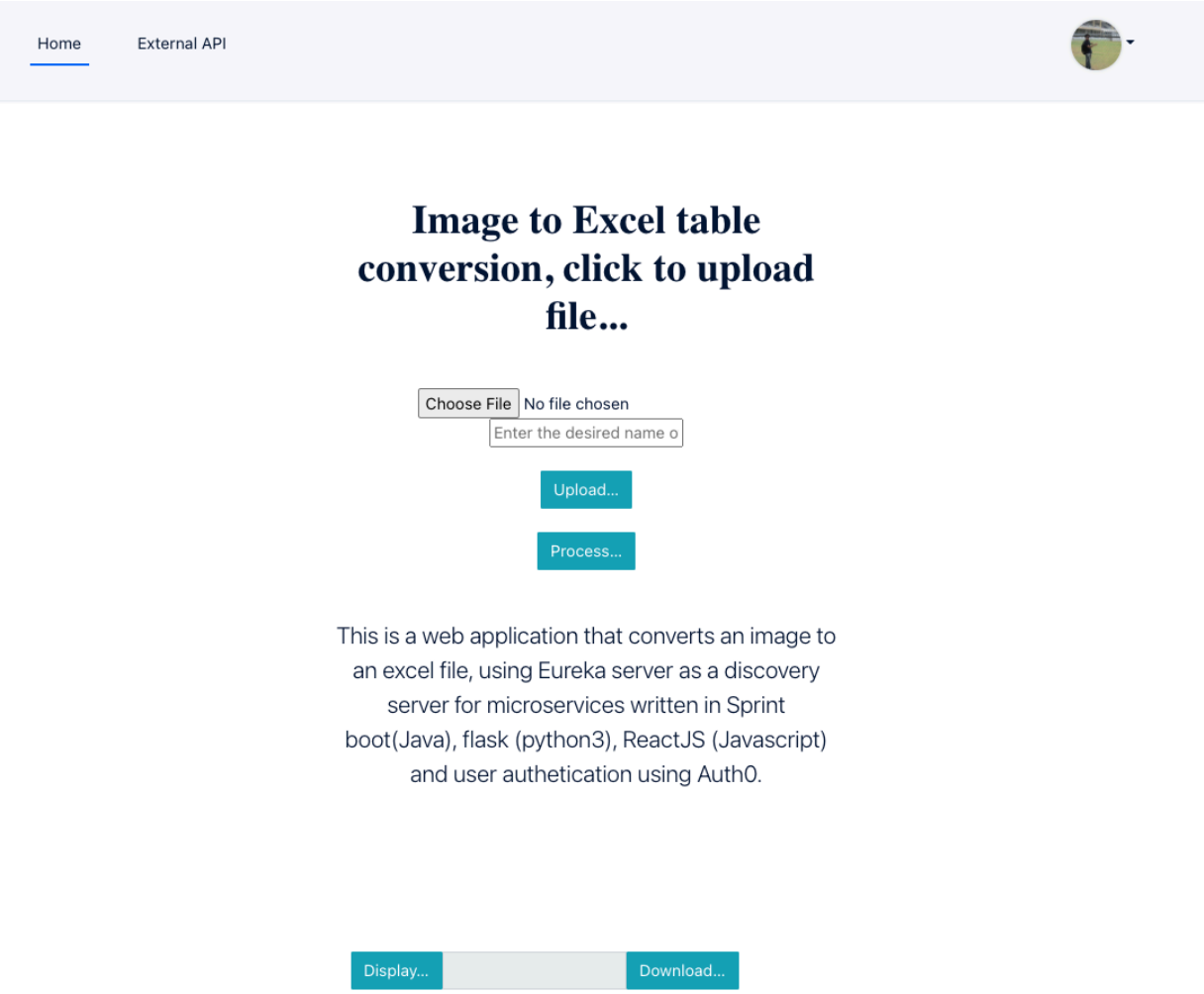
10. SCREENSHOTS OF WEBSITE

Login Page:

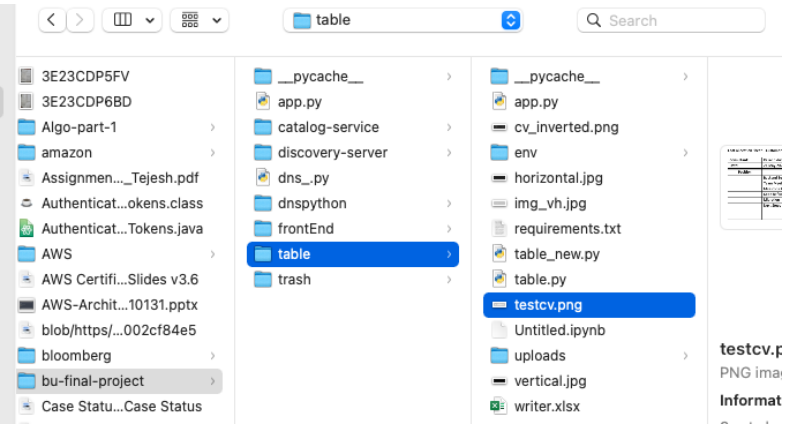




Home Page:



Choosing file from file directory after clicking on Choose File button,



Click on upload button to upload file in server backend folder.

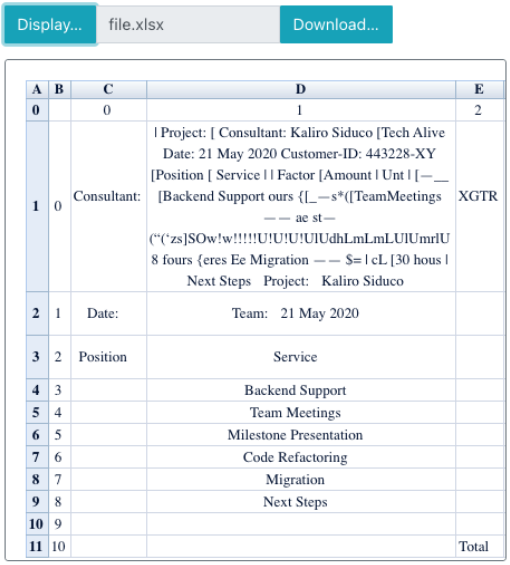
Click on process button:

Below screenshot gives the api 200 call, success call:

```
INFO:HELLO WORLD:welcome to upload
INFO:werkzeug:127.0.0.1 - - [17/May/2021 00:34:19] "POST /upload HTTP/1.1" 200 -
INFO:werkzeug:127.0.0.1 - - [17/May/2021 00:40:18] "GET /process HTTP/1.1" 200 -
```

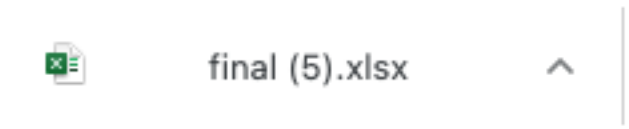
Clicking on display button:

This is a web application that converts an image to an excel file, using Eureka server as a discovery server for microservices written in Sprint boot(Java), flask (python3), ReactJS (Javascript) and user authetication using Auth0.



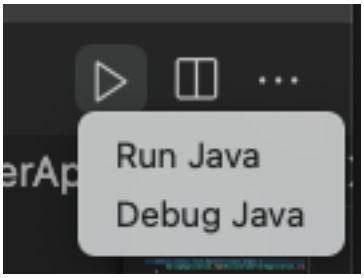
A	B	C	D	E
0		0	1	2
1	0	Consultant:	| Project: [Consultant: Kaliro Siduco [Tech Alive Date: 21 May 2020 Customer-ID: 443228-XY [Position [Service | | Factor [Amount | Unt | [—__ [Backend Support ours {[_—s*([TeamMeetings — — ae st— (“(‘zs]SOw!w!!!!!U!U!U!UlUdhLmLmLUlUmrlU 8 fours {eres Ee Migration — — $= | cL [30 hous | Next Steps Project: Kaliro Siduco	XGTR
2	1	Date:	Team: 21 May 2020	
3	2	Position	Service	
4	3		Backend Support	
5	4		Team Meetings	
6	5		Milestone Presentation	
7	6		Code Refactoring	
8	7		Migration	
9	8		Next Steps	
10	9			
11	10			Total

Click on download button, downloads the file:



11. RUN LOCALLY

Starting the Eureka Service discovery server on port 8761:




```
2021-05-17 01:49:28.920  INFO 42071 --- [      Thread-12] c.n.e.r.PeerAwareInstanceRegistryImpl    : Renew threshold is: 1
2021-05-17 01:49:28.920  INFO 42071 --- [      Thread-12] c.n.e.r.PeerAwareInstanceRegistryImpl    : Changing status to UP
2021-05-17 01:49:28.957  INFO 42071 --- [      Thread-12] e.s.EurekaServerInitializerConfiguration : Started Eureka Server
2021-05-17 01:49:29.126  INFO 42071 --- [          main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port(s): 8761 (http) with context path '
'
2021-05-17 01:49:29.127  INFO 42071 --- [          main] .s.c.n.e.s.EurekaAutoServiceRegistration : Updating port to 8761
2021-05-17 01:49:29.138  INFO 42071 --- [          main] i.j.d.DiscoveryServerApplication         : Started DiscoveryServerApplication in 19.782 seconds (JVM
running for 23.567)
```

Starting flask microservice:

We are using python3 to run our microservice, creating virtual environment:

```
$ python3 -m venv env
```

Activate virtual environment:

```
[Tejeshs-Air:table tejeshagrawal$ . env/bin/activate
 (env) Tejeshs-Air:table tejeshagrawal$
```

Running pip3.7 to install dependencies:

```
[(env) Tejeshs-Air:table tejeshagrawal$ ls
Untitled.ipynb          app.py                  env                     img_vh.jpg              table.py                testcv.png              vertical.jpg
__pycache__             cv_inverted.png         horizontal.jpg          requirements.txt        table_new.py            uploads                 writer.xlsx
[(env) Tejeshs-Air:table tejeshagrawal$ pip3.7 install -r requirement.txt
ERROR: Could not open requirements file: [Errno 2] No such file or directory: 'requirement.txt'
WARNING: You are using pip version 20.1.1; however, version 21.1.1 is available.
You should consider upgrading via the '/Users/tejeshagrawal/Desktop/bu-final-project/table/env/bin/python3 -m pip install --upgrade pip' command.
[(env) Tejeshs-Air:table tejeshagrawal$ pip3.7 install -r requirements.txt
Requirement already satisfied: editdistance==0.5.2 in ./env/lib/python3.7/site-packages (from -r requirements.txt (line 1)) (0.5.2)
Requirement already satisfied: openpyxl in ./env/lib/python3.7/site-packages (from -r requirements.txt (line 2)) (3.0.7)
Requirement already satisfied: jinja2 in ./env/lib/python3.7/site-packages (from -r requirements.txt (line 3)) (2.11.3)
Requirement already satisfied: pandas in ./env/lib/python3.7/site-packages (from -r requirements.txt (line 4)) (1.2.4)
Requirement already satisfied: Image in ./env/lib/python3.7/site-packages (from -r requirements.txt (line 5)) (1.5.33)
Requirement already satisfied: pytesseract in ./env/lib/python3.7/site-packages (from -r requirements.txt (line 6)) (0.3.7)
Requirement already satisfied: lmdb==1.0.0 in ./env/lib/python3.7/site-packages (from -r requirements.txt (line 7)) (1.0.0)
Requirement already satisfied: matplotlib==3.2.1 in ./env/lib/python3.7/site-packages (from -r requirements.txt (line 8)) (3.2.1)
Requirement already satisfied: numpy==1.19.5 in ./env/lib/python3.7/site-packages (from -r requirements.txt (line 9)) (1.19.5)
```

```
(env) Tejeshs-Air:table tejeshagrawal$ cat requirements.txt
editdistance==0.5.2
openpyxl
jinja2
pandas
Image
pytesseract
lmdb==1.0.0
matplotlib==3.2.1
numpy==1.19.5
opencv-python==4.4.0.46
path==15.0.0
tensorflow
XlsxWriter
flask_cors
flask_eureka
Flask
py_eureka_client
```

Running the flask microservice:

```
(env) Tejeshs-Air:table tejeshagrawal$ python3 app.py
 * Serving Flask app "app" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
INFO:werkzeug: * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

It registers on Eureka service discovery server:

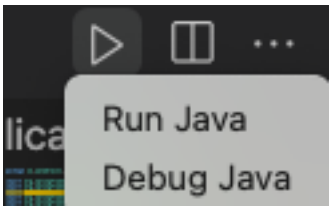
```
2021-05-17 02:05:56.207  INFO 42767 --- [a-EvictionTimer] c.n.e.registry.AbstractInstanceRegistry  : Running the evict task with compensationTime 0ms
2021-05-17 02:06:56.212  INFO 42767 --- [a-EvictionTimer] c.n.e.registry.AbstractInstanceRegistry  : Running the evict task with compensationTime 4ms
2021-05-17 02:07:10.268  INFO 42767 --- [nio-8761-exec-1] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring DispatcherServlet 'dispatcherServlet'
2021-05-17 02:07:10.268  INFO 42767 --- [nio-8761-exec-1] o.s.web.servlet.DispatcherServlet        : Initializing Servlet 'dispatcherServlet'
2021-05-17 02:07:10.294  INFO 42767 --- [nio-8761-exec-1] o.s.web.servlet.DispatcherServlet        : Completed initialization in 26 ms
2021-05-17 02:07:10.495  INFO 42767 --- [nio-8761-exec-1] c.n.e.registry.AbstractInstanceRegistry  : Registered instance PYTHON-MODULE-1/127.0.0.1:python-modul
e-1:5000 with status UP (replication=false)
2021-05-17 02:07:56.215  INFO 42767 --- [a-EvictionTimer] c.n.e.registry.AbstractInstanceRegistry  : Running the evict task with compensationTime 1ms
```

DS Replicas

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
PYTHON-MODULE-1	n/a (1)	(1)	UP (1) - 127.0.0.1:python-module-1:5000

Starting Spring boot microservice:




```
2021-05-17 02:11:39.232  INFO 43057 --- [nfoReplicator-0] com.netflix.discovery.DiscoveryClient    : DiscoveryClient_CATALOG-SERVICE/tejeshs-air:catalog-servic
e:8085: registering service...
2021-05-17 02:11:39.302  INFO 43057 --- [nfoReplicator-0] com.netflix.discovery.DiscoveryClient    : DiscoveryClient_CATALOG-SERVICE/tejeshs-air:catalog-servic
e:8085 - registration status: 204
2021-05-17 02:11:39.375  INFO 43057 --- [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port(s): 8085 (http) with context path '
'
2021-05-17 02:11:39.376  INFO 43057 --- [           main] .s.c.n.e.s.EurekaAutoServiceRegistration : Updating port to 8085
2021-05-17 02:11:39.380  INFO 43057 --- [           main] i.j.m.CatalogServiceApplication          : Started CatalogServiceApplication in 14.349 seconds (JVM r
unning for 16.647)
```

Now we have both applications running and registered on Eureka server:

DS Replicas

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
CATALOG-SERVICE	n/a (1)	(1)	UP (1) - tejeshs-air:catalog-service:8085
PYTHON-MODULE-1	n/a (1)	(1)	UP (1) - 127.0.0.1:python-module-1:5000

General Info

```
2021-05-17 02:07:56.215  INFO 42767 --- [a-EvictionTimer] c.n.e.registry.AbstractInstanceRegistry  : Running the evict task with compensationTime 1ms
2021-05-17 02:08:56.217  INFO 42767 --- [a-EvictionTimer] c.n.e.registry.AbstractInstanceRegistry  : Running the evict task with compensationTime 0ms
2021-05-17 02:09:56.219  INFO 42767 --- [a-EvictionTimer] c.n.e.registry.AbstractInstanceRegistry  : Running the evict task with compensationTime 1ms
2021-05-17 02:10:56.266  INFO 42767 --- [a-EvictionTimer] c.n.e.registry.AbstractInstanceRegistry  : Running the evict task with compensationTime 2ms
2021-05-17 02:11:39.300  INFO 42767 --- [nio-8761-exec-4] c.n.e.registry.AbstractInstanceRegistry  : Registered instance CATALOG-SERVICE/tejeshs-air:catalog-se
rvice:8085 with status UP (replication=false)
2021-05-17 02:11:56.282  INFO 42767 --- [a-EvictionTimer] c.n.e.registry.AbstractInstanceRegistry  : Running the evict task with compensationTime 7ms
2021-05-17 02:12:56.287  INFO 42767 --- [a-EvictionTimer] c.n.e.registry.AbstractInstanceRegistry  : Running the evict task with compensationTime 2ms
```

Starting front end:

Installing dependencies:

```
Tejeshs-Air:frontEnd tejeshagrawal$ npm install

up to date, audited 1932 packages in 12s

1 package is looking for funding
  run `npm fund` for details

100 vulnerabilities (4 low, 83 moderate, 13 high)

To address issues that do not require attention, run:
  npm audit fix

To address all issues possible (including breaking changes), run:
  npm audit fix --force

Some issues need review, and may require choosing
a different dependency.

Run `npm audit` for details.
Tejeshs-Air:frontEnd tejeshagrawal$
```

Starting the frontend server:

```
Tejeshs-Air:frontEnd tejeshagrawal$ npm start

> auth0-react-sample@0.1.0 start
> npm-run-all --parallel spa api-server


> auth0-react-sample@0.1.0 api-server
> node api-server.js


> auth0-react-sample@0.1.0 spa
> react-scripts start

Exiting: Please make sure that auth_config.json is in place and populated with valid domain and audience values
```

Server is now started:

```
Compiled successfully!

You can now view image-excel-converter in the browser.

  Local:            http://localhost:3000
  On Your Network:  http://192.168.1.239:3000

Note that the development build is not optimized.
To create a production build, use yarn build.
```

12. FUTURE SCOPE

- Use Apache Kafka as messaging server for handling multiple users.
- Use Cache service to process request faster.
- Implement it on AWS, on AWS use S3 for folder structure, Autoscaling and load balancers for more availability and efficiency.
- Right now, it is as a web application. Need to make a mobile web application having camera access feature, so user can take real time photos.
- Need to implement handwriting recognition, so users can convert even handwriting tabular data to an excel sheet.
- Enable proxy gateway server for more security in transition.

13. URLs

- GitHub ::: https://github.com/TEJESH/bu-final-tejesh

14. REFERENCES

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Eureka server, spring boot tutorial:

https://youtu.be/y8IQb4ofjDo

Auth0:

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Python Eureka client:

https://github.com/keijack/python-eureka-client

Creating virtual environment for python:

https://medium.com/@tejeshagrawal/why-using-virtual-environment-for-python-project-is-good-for-system-and-project-4196476213d6

Flask with Machine learning model:

https://towardsdatascience.com/how-to-easily-deploy-machine-learning-models-using-flask-b95af8fe34d4