

San Jose State University
CMPE 202
Summer 2018
T3am Project Report

Professor Paul Nguyen
Professor Gopinath Vinodh

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General Information

Team Members

Our team is called t3am and has the following members:

- Sy Le (006088940)
- Hyunwook Shin (012507417)
- Kevin Lai (008498282)
- Lin Cheng (012484459)

Demo URL / Accounts

Front End App

Front End App can be accessed via

- <http://cmpe202-t3am-starbucks-webapp.herokuapp.com>

Demo Account

email: **syle@gmail.com**
password: **password**

Back End / API App

Back end app can be accessed via

- <http://cmpe202-java-rest-api.herokuapp.com>
- <http://ec2-34-192-241-153.compute-1.amazonaws.com:8202>

Code Repository URLs

Back end (back end api / java server)

<https://github.com/nguyensjsu/su18-202-t3am>

<https://github.com/nguyensjsu/su18-202-t3am/tree/master/web-app>

Set up Documentation

Follow this doc to setup the environment locally.

<https://docs.google.com/document/d/1YKTlsn7VnxUjwjOXPiQigHKz-usWgbWOH0NESBkKrKk/edit?usp=sharing>

Jenkins Server (CI/CD)

<https://ec2-18-222-125-85.us-east-2.compute.amazonaws.com/jenkins>

Extra Credit Implementations

Our team chooses to implement the following things for extra credit

Implement a "real" iOS or Android Mobile App calling the REST API

Implement Web "Front-End" Deployed to Heroku for Starbucks Payment Card management

Refer to the heroku link above for front end app and the front end code

Deploy API to AWS as Docker Containers in Amazon Containers

DockerFile

```
FROM java
EXPOSE 8202
COPY . /opt/t3am
CMD nohup java -cp /opt/t3am/starbucks2-service-1.0.jar RestService &
```

More details about the docker file can be found here in our repo

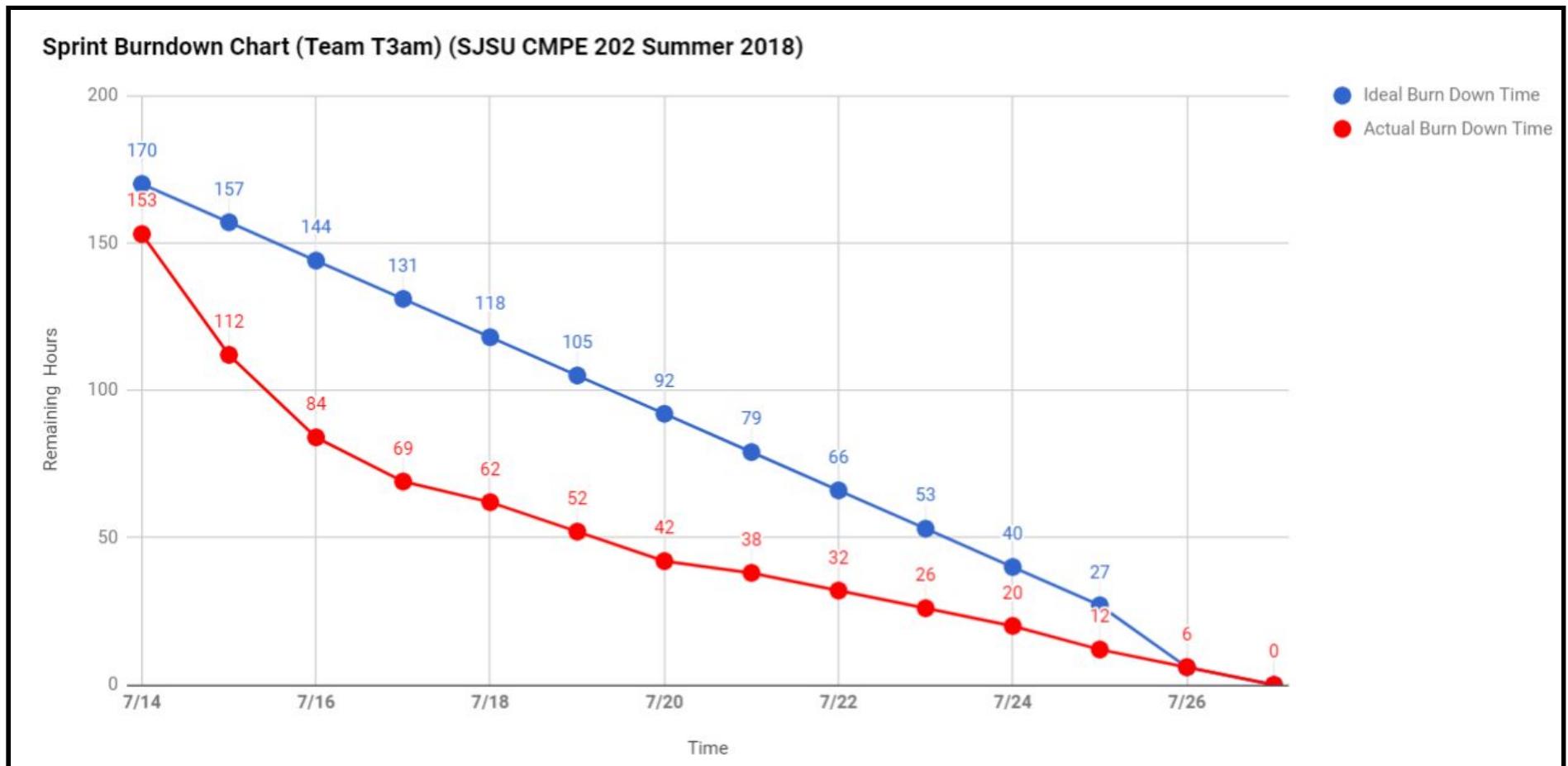
<https://github.com/nguyensjsu/su18-202-t3am/blob/master/Dockerfile>

Sprint Information

Refer to this link for more information about our doc.

https://docs.google.com/spreadsheets/d/1pfwGInHH9siD7P3Q7gQIALwi6-xfxB6CuSd0tBX_e3c/edit?usp=sharing

Burndown Chart



Team Schedule / Task Allocation

Task	Owner	ETA in Hour
Initial Planning work	Team	2

Set up RDS and DB tables	Lin Cheng	8
Set up the pipeline for webapp (AWS Beanstalk) includes the domain and basic hello world api.	Lin Cheng	2
Set up CI/CD pipeline for the above webapp/noSQL in the github repo...	Hyunwook	2
Initial code plumbing for the API server	Lin Cheng	12
Set up Response Header Content Type - Application/JSON	Sy Le	1
GET /api/v1/signin	Hyunwook	8
GET /api/v1/signout	Hyunwook	4
GET /api/v1/signup	Sy Le	10
GET /api/v1/user_profile return the information related to the user by user_id	Sy Le	4
GET /api/v1/transactions list all the transactions (card reloads vs purchase history) by user_id	Hyunwook & Kevin	8
POST /api/v1/reload add a new card to the list	Lin Cheng	6
POST /api/v1/purchase add a new purchase transaction to the list	Kevin Lai	8
Add Unit Tests	Hyunwook	4
Extra Credit Module 1 - Web Front End client side code development	Sy Le	15
Extra Credit Module 1 - Web Front End deployment on Heroku	Sy Le	10
MISC - Deploy BE code to Heroku	Sy Le	16
Docker image and deploy to AWS ECS	Lin Cheng	10
Do Project Report	TEAM	40
		170

Sprint Standup Journal

07/21/2018 to 07/27/2018

- Team mainly works on project report

07/20/2018

- Done Front End and Deployed Front End App and API to Heroku
 - api : <http://cmpe202-java-rest-api.herokuapp.com>
 - webapp : <http://cmpe202-t3am-starbucks-webapp.herokuapp.com>
- Started and work on report

07/19/2018

- Complete last set of flow front end integration
- Start work on the deployment of front end heroku deployment
- Added Validation to API
- Wrap server response in ServerResponse
- Start work on project report
- Successfully run on AWS ECS Fargate

07/17/2018 to 07/18/2018

- Continue working on integrating Web FE in Add Purchase Flow
- Refactored and clean up code to make the Add Purchase API flow to work
- Clean up sql_backup file
- Docker container for the API later
- WIP - Continued Add mode unit tests

07/16/2018

- Completed API to sign in using email and password
- Deployed our API Back End to heroku: <http://cmpe202-java-rest-api.herokuapp.com>
- Continued BE and FE (webapp)integration work: authentication (signin / signup) flow
- Parameterized Database Connection Strings, App Host, App Port into environment for deployment.
- Fixed UserProfile Fetch API to return real data instead of mocks

- WIP - CI/CD pipeline with jenkins
- WIP - Plumbing up unit tests

07/15/2018

- Initial Code complete, Server is now Up and Running
- Created 2 AWS EC instances for prod and dev
 - PROD: ec2-18-209-62-254.compute-1.amazonaws.com
 - DEV: ec2-34-192-241-153.compute-1.amazonaws.com
- Created AWS RDS for data store
- Functional getCards API
- Functional signUp API
- Basic plumbing works for POJO Objects such as Purchase, UserProfile, Card
- Created SQL Backup file for new deployment sql_backup

07/14/2018

- Team meetup, draft out dependencies, task breakdown and initial work

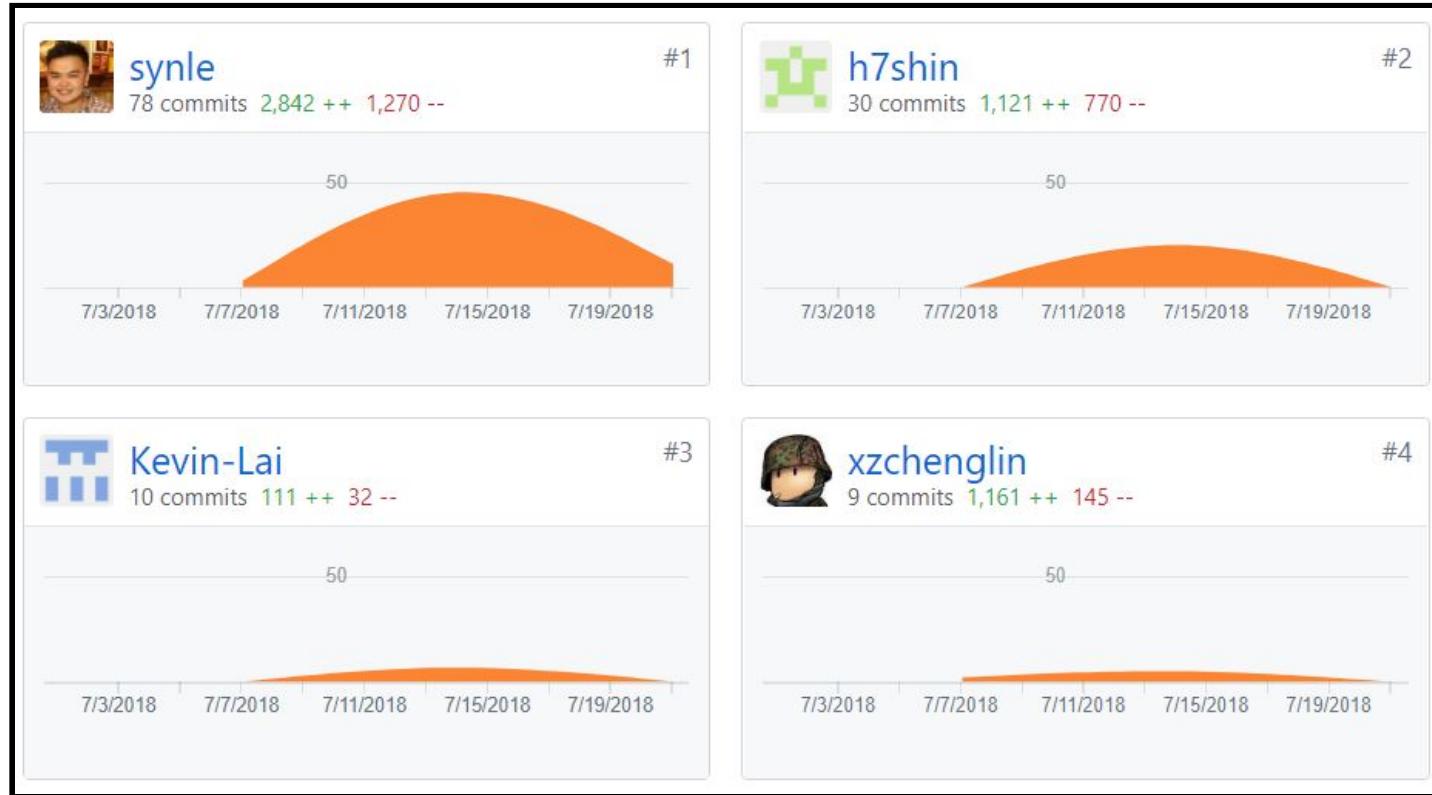
Github Push Contributors Graph

<https://github.com/nguyensjsu/su18-202-t3am/graphs/contributors>

Team Contributions



Individual Contributions



Technologies

Back End

Apache Camel

The back end is built using Apache Camel which is used to serve up REST API endpoints.

Maven

The back end project is bundled using maven.

Google Guice

We used Guice to handle dependencies injection, namely @Inject

iBATIS Data Mapping Framework

Internally we used iBATIS to map java code to SQL queries

Front End (webapp)

The front end application in this project is a thin layer that handles integration with the back end API described above to handle basic flows of payments, purchases, reloads for drink ordering.

jQuery, jQuery UI, bootstrap and moment.js

The front end is built using Bootstrap, jQuery, jQuery UI to construct the major piece of the UI and moment.js to handle date formatting

Deployment

As for deployment, we used Heroku to deploy. You can find more information below.

Testing and CI/CD

JUnit/Python Unit Test

Junit library is used to run component-level unit tests in tools and models packages.

Python unittest library stress the end-to-end API testing on a local mock server.

Jenkins

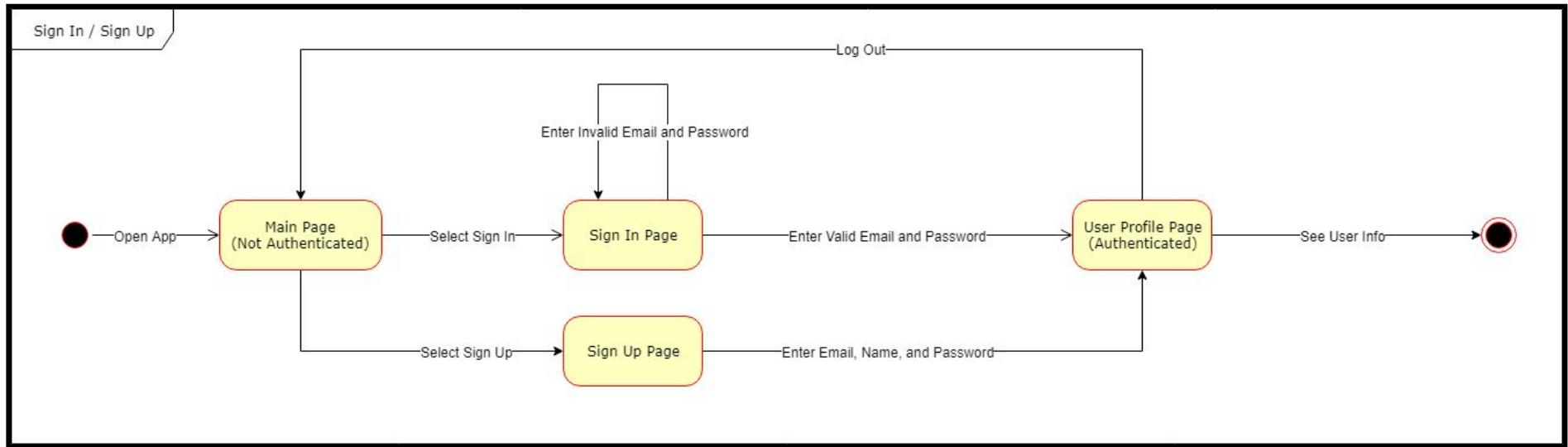
Jenkins job starts a test backend server locally by compiling the source code from GitHub using “make run”. As the Jenkins node does not have access to the git repository, we instead have created a recent copy of the source code (instead of git clone). After starting a service that listens to port 8082, Jenkins runs “make test” to run a series of API testing against the local server. This is ensure that there is no regressions or unexpected failures in our APIs. Once both JUnit and Python (end-to-end API) tests pass, the job will be marked as SUCCESS.

The screenshot shows the Jenkins interface for a build. At the top, there's a navigation bar with the Jenkins logo, a search bar, and user information (Admin 202). Below the bar, the URL shows 'Jenkins > API Testing > #122'. A red box highlights the number '2' in the top right corner, indicating two concurrent builds. The main content area displays 'Build #122 (Jul 20, 2018 11:34:15 PM)'. To the left is a sidebar with links: Back to Project, Status, Changes, Console Output, Edit Build Information, Delete Build, and Previous Build. In the center, there's a note 'No changes.' with a pencil icon. To the right, it says 'Started 10 min ago' and 'Took 2 min 4 sec'. There's also a link to 'add description' with a pencil icon. At the bottom, a footer bar includes 'Page generated: Jul 20, 2018 11:44:25 PM UTC', 'REST API', and 'Jenkins ver. 2.121.1'.

Ngnix

Nginx is used to route requests to Jenkins HTTPS server <https://ec2-18-222-125-85.us-east-2.compute.amazonaws.com:8081/login>

App Flow



Sign up flow

New users used this to sign up for new account

Login flow

Existing users log in with their existing account

CMPE202 T3AM Starbucks Store

Sign In Sign Up

Email address

syle@gmail.com

Password

.....

Sign In

Dashboard

This is where users check their remaining balance as well as some information about their account

CMPE202 T3AM Starbucks Store

User	Reloads History	Purchases History
New Card	New Purchase	Log Out
User ID 958bbc20-cda2-4f57-9fe6-e1ecb6e6e913		
Email address syle@gmail.com		
Full Name Sy Le		
Current Balance \$36.00		

Cards List

This is where user look for their previous reloaded gift cards

CMPE202 T3AM Starbucks Store

User

Reloads History

Purchases History

New Card

Refresh

Number	Code	Balance	Date Added
1111111111	111	\$10.00	July 18th 2018, 3:20:57 pm
2222222222	222	\$20.00	July 18th 2018, 3:21:13 pm
3333333333	333	\$30.00	July 19th 2018, 2:41:04 pm

Add New Card

This is where user add a new gift card

Add New Card

User ID
958bbc20-cda2-4f57-9fe6-e1ecb6e6e913

Email address
style@gmail.com

Card ID
4444444444

Card Code
444

Card Balance
40

Save **Cancel**

Purchases List

This is where users can view their previous purchases

CMPE202 T3AM Starbucks Store

User	Reloads History	Purchases History
New Purchase	Refresh	
Balance	Note	Date Added
\$3.00	Iced Coffee	July 18th 2018, 3:26:33 pm
\$3.00	Iced Coffee	July 18th 2018, 3:26:34 pm
\$3.00	Iced Coffee	July 18th 2018, 3:26:38 pm
\$4.00	Frap	July 18th 2018, 3:29:54 pm
\$5.00	Chai	July 18th 2018, 3:49:18 pm
\$6.00	Thai Tea	July 19th 2018, 2:41:31 pm

Add New Purchase

This is where the user add a new purchase

Add New Purchase

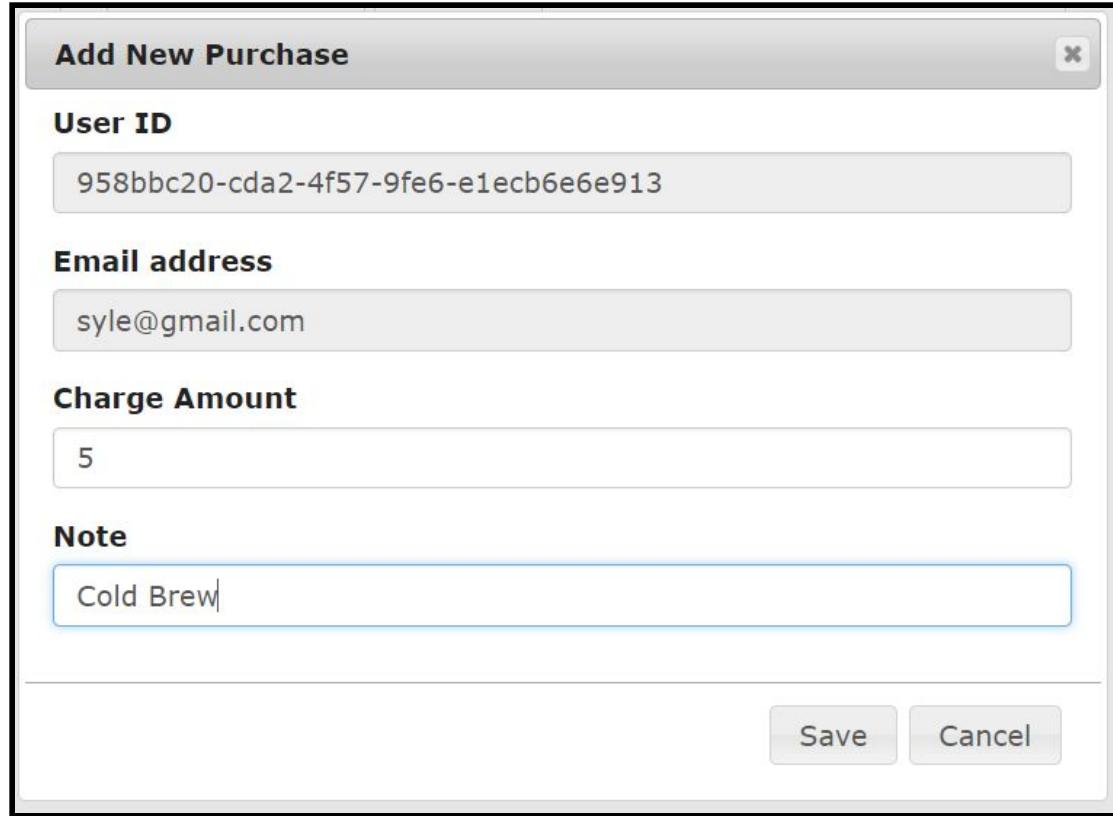
User ID
958bbc20-cda2-4f57-9fe6-e1ecb6e6e913

Email address
syle@gmail.com

Charge Amount
5

Note
Cold Brew

Save **Cancel**



Cloud Infrastructure

Back End Deployment

Docker on AWS ECS

Build Docker image

- Check out code
- Go to source root(su18-202-t3am) and do a “mvn install”

- Run “java -cp starbucks2-service/target/starbucks2-service-1.0.jar RestService”
- Copy starbucks2-service/target/starbucks2-service-1.0.jar and starbucks2-service/target/lib/ to EC2 server’s /opt/t3am
- From /opt/t3am, “docker build -t t3am .”

Push to ECS repository

- Login to AWS ECR: “aws ecr get-login --no-include-email”
- Create repository: “aws ecr create-repository --repository-name t3am”
- Tag image: “docker tag t3am 914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am”
- Push: “docker push 914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am”

```
[root@ip-172-31-3-105 t3am]# docker tag t3am 914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am
[root@ip-172-31-3-105 t3am]# docker push 914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am
The push refers to a repository [914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am]
a76d79f03ef5: Pushed
35c20f26d188: Layer already exists
c3fe59dd9556: Layer already exists
6ed1a81ba5b6: Layer already exists
a3483ce177ce: Layer already exists
ce6c8756685b: Layer already exists
30339f20ced0: Layer already exists
0eb22fb707d: Layer already exists
a2ae92ffcd29: Layer already exists
latest: digest: sha256:81628895be83bf80de4d9cb02703024897909d8a1e944ad65cb65c8b3160969 size: 2212
```

Run from EC2

- Login to AWS ECR: “aws ecr get-login --no-include-email”
- Pull: “docker pull 914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am”

```
[root@ip-172-31-1-174 ~]# docker pull 914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am
Using default tag: latest
latest: Pulling from t3am
e12c678537ae: Already exists
8d9ed335b7db: Already exists
3318dd58ae60: Already exists
624ba6156166: Already exists
c7a02d193df7: Already exists
813b62320378: Already exists
81cf5426393a: Already exists
0a2b7222259b: Already exists
fffff8146f091: Pull complete
Digest: sha256:816288955be83bf80de4d9cb02703024897909d8a1e944ad65cb65c8b3160969
Status: Downloaded newer image for 914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am:latest
```

- Tag image: "docker tag 914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am t3am"
- Run: "docker run -p 8202:8202 t3am"

```
[root@ip-172-31-1-174 ~]# docker run -p 8202:8202 t3am
log4j:WARN No appenders could be found for logger (org.apache.ibatis.logging.LogFactory).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/faq.html#noconfig for more info.
INFO [main] - Loaded 222 type converters
INFO [main] - Apache Camel 2.19.3 (CamelContext: camel-1) is starting
INFO [main] - JMX is enabled
INFO [main] - Runtime endpoint registry is in extended mode gathering usage statistics of all incoming and outgoing endpoints
INFO [main] - StreamCaching is not in use. If using streams then its recommended to enable stream caching. See more details at
INFO [main] - Route: route4 started and consuming from: direct://bizoption
INFO [main] - Route: route5 started and consuming from: direct://bizget
INFO [main] - Route: route6 started and consuming from: direct://bizpost
Jul 17, 2018 6:21:27 AM org.restlet.engine.connector.NetServerHelper start
INFO: Starting the internal [HTTP/1.1] server on port 8202
INFO [main] - Route: routel started and consuming from: http://localhost:8202/api/v1/(path)?restletMethods=OPTIONS
INFO [main] - Route: route2 started and consuming from: http://localhost:8202/api/v1/(path)?restletMethods=GET
INFO [main] - Route: route3 started and consuming from: http://localhost:8202/api/v1/(path)?restletMethods=POST
INFO [main] - Total 6 routes, of which 6 are started.
INFO [main] - Apache Camel 2.19.3 (CamelContext: camel-1) started in 0.925 seconds
```

Run from ECS Fargate

- Define a Fargate Task using the docker image

Container Name	Image		
t3am-c	914381644891.dkr.ecr.us-east-1.amazonaws.com/t3am		
Details			
Port Mappings			
Host Port	Container Port	Protocol	
8202	8202	tcp	
Healthcheck			
Command ping localhost			
Interval	Timeout	Start period	Retries
100	3	100	3

- Create a cluster and run the task

Cluster : t3am

Get a detailed view of the resources on your cluster.

Status ACTIVE

Registered container instances 0

Pending tasks count 0 Fargate, 0 EC2

Running tasks count 1 Fargate, 0 EC2

Active service count 1 Fargate, 0 EC2

Draining service count 0 Fargate, 0 EC2

Services **Tasks** **ECS Instances** **Metrics** **Scheduled Tasks**

Create **Update** **Delete**

Filter in this page Launch type ALL Service type ALL

<input type="checkbox"/>	Service Name	Status	Service ty...	Task Defin...
<input type="checkbox"/>	t3am-s	ACTIVE	REPLICA	t3am-t:1

- Get the created instance IP and try visiting

Network interface	Subnet ID	VPC ID	Zone	Security groups	Description	Instance ID	Status	IPv4 Public IP
eni-05e60662	subnet-1ebe6a...	vpc-541c5533	us-east-1d	t3am-s-1585	arn:aws:ecs:us...	● in-use		34.224.74.171

GET ▾ http://34.224.74.171:8202/api/v1/cards

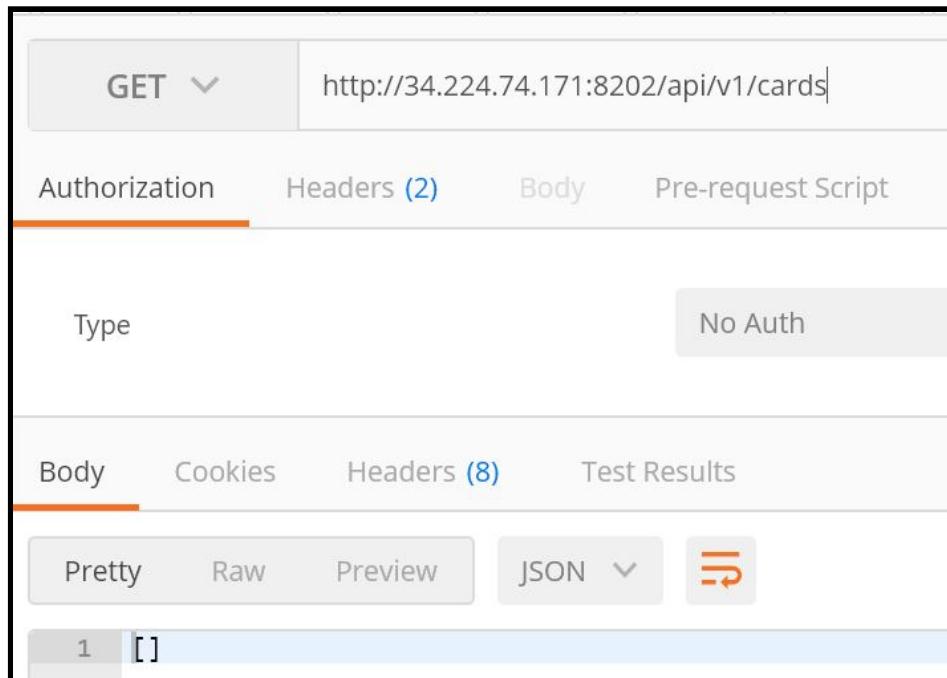
Authorization Headers (2) Body Pre-request Script

Type No Auth

Body Cookies Headers (8) Test Results

Pretty Raw Preview JSON ▾

1 []



Front End Heroku deployment

App Setup

The screenshot shows the Heroku application dashboard for the app `cmpe202-t3am-starbucks-webapp`. The top navigation bar includes the Heroku logo, a search bar, and user account icons. Below the header, the app's name is displayed along with its GitHub integration information: `syngle/cmpe202-t3am-starbucks-webapp` with the `master` branch. A navigation menu at the top provides links to Overview, Resources, Deploy, Metrics, Activity, Access, and Settings. The `Overview` tab is currently selected. In the main content area, there is a section for "Free Dynos" with a button to "Upgrade to Hobby...". A promotional message about "Web Dyno Autoscaling" is visible, with "Hide" and "Learn More" buttons. At the bottom, a configuration section for the `web` dyno shows the command `node index.js`, a toggle switch, a price of `$0.00`, and an edit icon.

 HEROKU Jump to Favorites, Apps, Pipelines, Spaces...

Info	Region	 United States
	Stack	heroku-16
	Framework	 Node.js
	Slug Size	17.3 MiB of 500 MiB
	GitHub Repo	 synle/cmpe202-t3am-starbucks-webapp
	Heroku Git URL	https://git.heroku.com/cmpe202-t3am-starbucks-webapp.git

Config Vars

API_HOST is set in the config file which the front end app is used to communicate with the back end API

Config Vars Config Vars Hide Config Vars

Config vars change the way your app behaves. In addition to creating your own, some add-ons come with their own.

<input type="text" value="API_HOST"/>	<input type="text" value="https://cmpe202-jav..."/>	 
<input type="text" value="KEY"/>	<input type="text" value="VALUE"/>	Add

Database Schema

sb_user

This is where we stores users' information

Schema

▼	public	sb_user
Columns		
□	user_id	CHARACTER VARYING
□	email	CHARACTER VARYING
□	full_name	CHARACTER VARYING
□	password	CHARACTER VARYING
□	balance	NUMERIC
□	date_added	BIGINT

Results

Rows 3						CSV	JSON	CSV	JSON
user_id	email	full_name	password	balance	date_added				
958bbc20-cda2-4...	syle@gmail.com	Sy Le	password	0	1531952274019				
feab2bad-d5dd-4..	syle1@gmail.com	Sy Le	password	0	1531959952188				
e4c226eb-2168-4...	syle2@gmail.com	Sy Le2	password	0	1532036670245				

sb_card

This is where we stores previous reloaded card. This has a user_id foreign key that relates records to users

Schema

public.sb_card	
Columns	
card_id	BIGINT
uid	CHARACTER VARYING
number	CHARACTER VARYING
code	CHARACTER VARYING
balance	NUMERIC
date_added	BIGINT

Results

Rows 5						CSV	JSON	Rows 5	CSV	JSON
card_id	uid	number	code	balance	date_added					
4	958bbc20-cda2-...	111111111	111	10	1531952457886					
5	958bbc20-cda2-...	222222222	222	20	1531952473593					
6	feab2bad-d5dd-4...	123456789	123	100	0					
7	958bbc20-cda2-...	333333333	333	30	1532036464962					
8	958bbc20-cda2-...	444444444	444	40	1532049960445					

sb_purchase

This is where we stores previous purchases. This has a user_id foreign key that relates records to users

Schema

▼	public.sb_purchase
▼ Columns	
□	purchase_id BIGINT
□	uid CHARACTER VARYING
□	balance NUMERIC
□	date_added BIGINT
□	note CHARACTER VARYING

Results

Rows 7					 CSV	 JSON	 CSV	 JSON
purchase_id	uid	balance	date_added	note				
1	958bbc20-cda2...	3	1531952793526	Iced Coffee				
2	958bbc20-cda2...	3	1531952794984	Iced Coffee				
3	958bbc20-cda2...	3	1531952798744	Iced Coffee				
4	958bbc20-cda2...	4	1531952994579	Frap				
5	958bbc20-cda2...	5	1531954158600	Chai				
6	958bbc20-cda2...	6	1532036491432	Thai Tea				
7	feab2bad-d5dd-4...	30	1532037687755	Meal Combo #1				

API Spec

Sign up (Create User)

This API is used for NEW users to sign up for new account.

Curl Sample

```
curl -X POST \
  http://localhost:8202/api/v1/signup \
  -H 'accept: application/json' \
  -d '{
    "email": "style1@gmail.com",
    "full_name": "Sy Le",
    "password": "password"
}'
```

Response

<https://github.com/nguyensjsu/su18-202-t3am/blob/master/starbucks2-domain/src/main/java/model/UserProfile.java>

Sign in (Log in)

This API is used for EXISTING users to sign in with their old account.

Curl Sample

```
curl -X POST \
  http://localhost:8202/api/v1/signin \
  -H 'accept: application/json' \
  -d '{'
```

```
"email": "style1@gmail.com",
"password": "password"
}'
```

Response

<https://github.com/nguyensjsu/su18-202-t3am/blob/master/starbucks2-domain/src/main/java/model/UserProfile.java>

Get Cards Reload by UserId

This API is used to get a list of cards reloaded by userId

Curl Sample

```
curl -X GET \
'http://localhost:8202/api/v1/cards?uid=2c60158e-d432-4b78-a300-360cc6fa7260'
```

Response

<https://github.com/nguyensjsu/su18-202-t3am/blob/master/starbucks2-domain/src/main/java/model/Card.java>

Reload Card by UserId

This API is used to add/reload a card for a user by UserId

Curl Sample

```
curl 'http://localhost:8080/api/v1/reload' \8081/no-referrer' \
-H 'Connection: keep-alive' \
-H 'DNT: 1' --data-binary
'{"uid":"958bbc20-cda2-4f57-9fe6-e1ecb6e6e913","number":"1111111111","code":"111","balance":"10"}'
```

Response

<https://github.com/nguyensjsu/su18-202-t3am/blob/master/starbucks2-domain/src/main/java/model/Card.java>

Get Purchases by UserId

This API is used to get a list of previous purchases by UserID

Curl Sample

```
curl -X GET \
'http://localhost:8202/api/v1/purchases?uid=2c60158e-d432-4b78-a300-360cc6fa7260'
```

Response

<https://github.com/nguyensjsu/su18-202-t3am/blob/master/starbucks2-domain/src/main/java/model/Purchase.java>

Add Purchase by UserId

This API is used to add a purchase by UserID

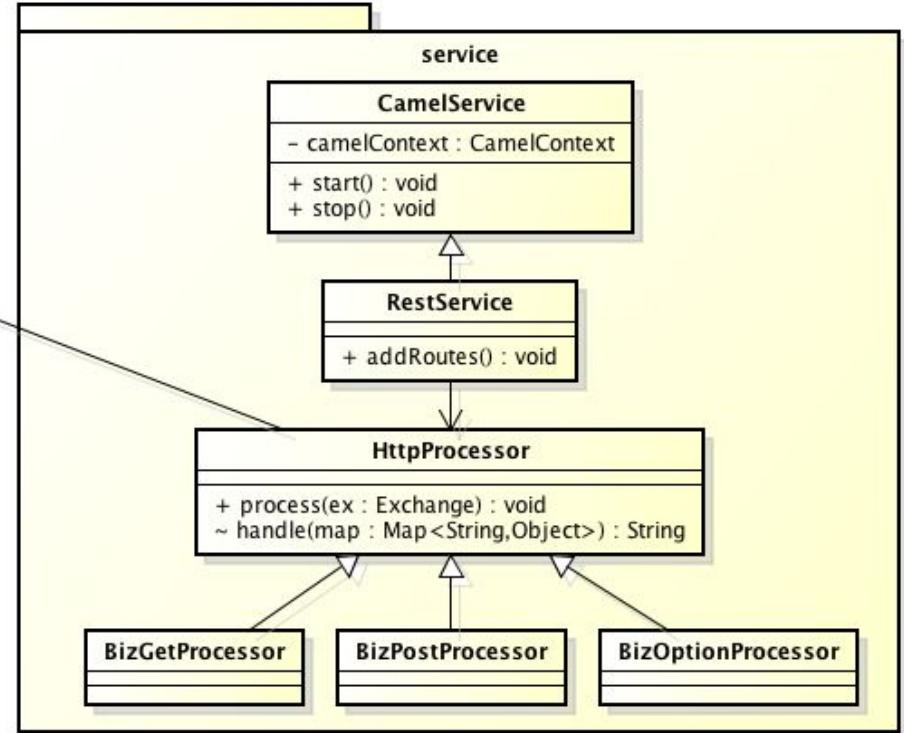
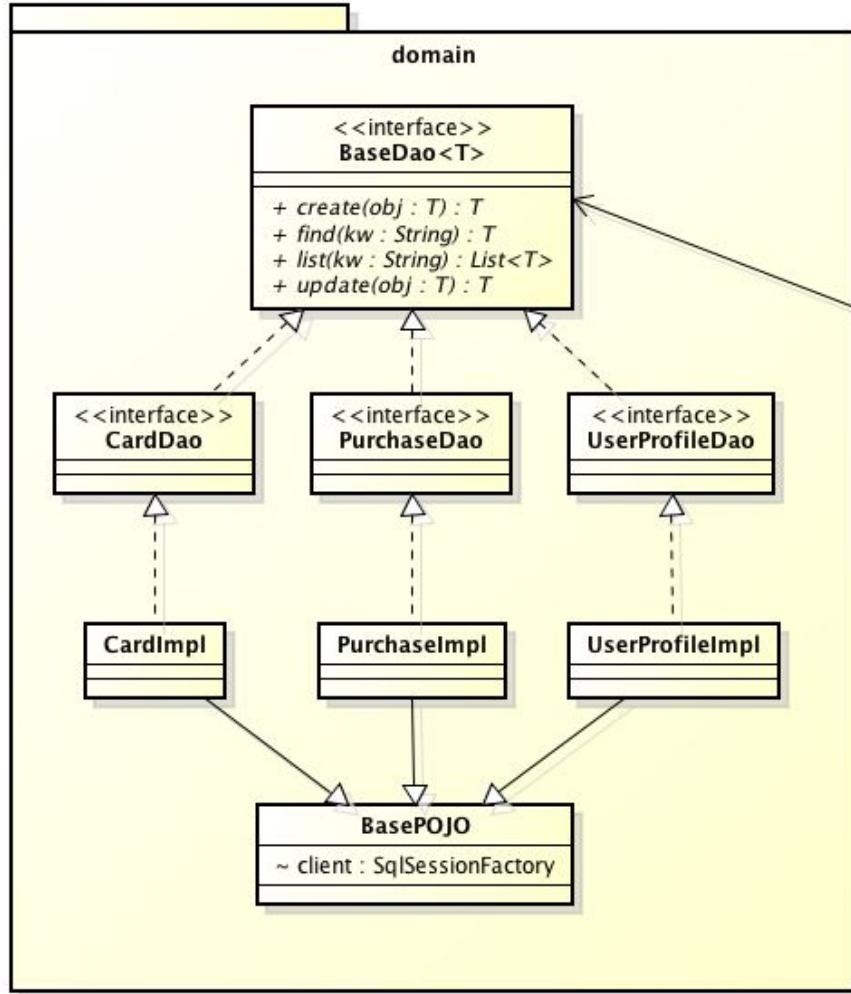
Curl Sample

```
curl 'http://localhost:8080/api/v1/purchase' \
-H 'Content-Type: application/json; charset=utf-8' \
-H 'DNT: 1' --data-binary '{"uid":"958bbc20-cda2-4f57-9fe6-e1ecb6e6e913", "balance": "3", "note": "Iced Coffee"}'
```

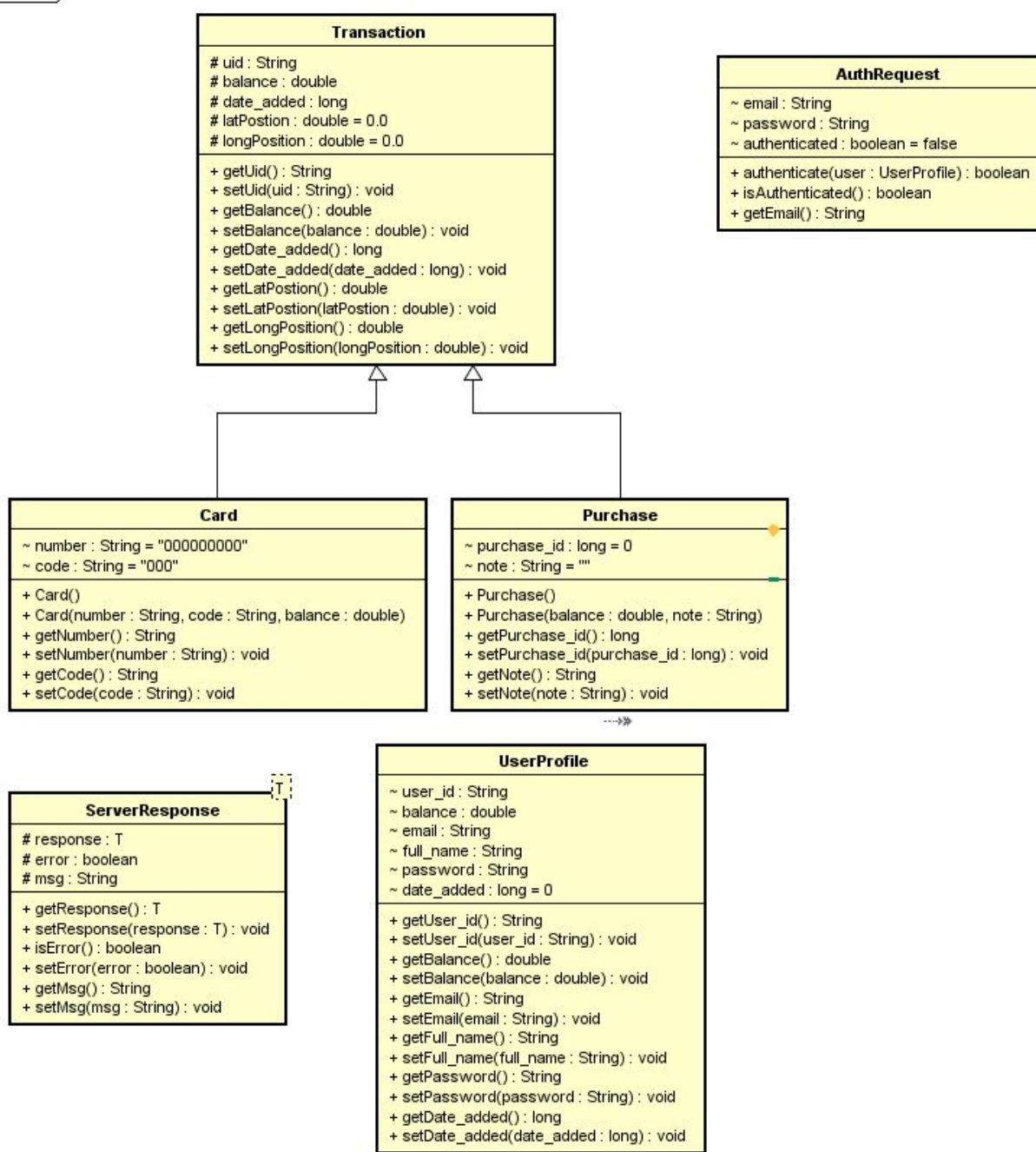
Response

<https://github.com/nguyensjsu/su18-202-t3am/blob/master/starbucks2-domain/src/main/java/model/Purchase.java>

Class Design UML Diagrams

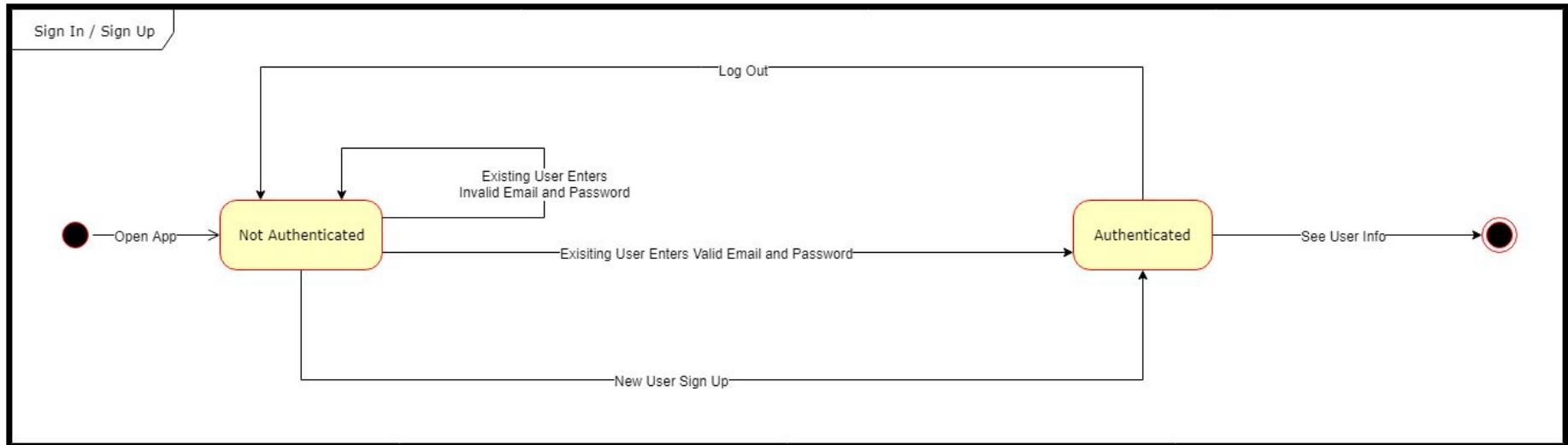


pkgmodel

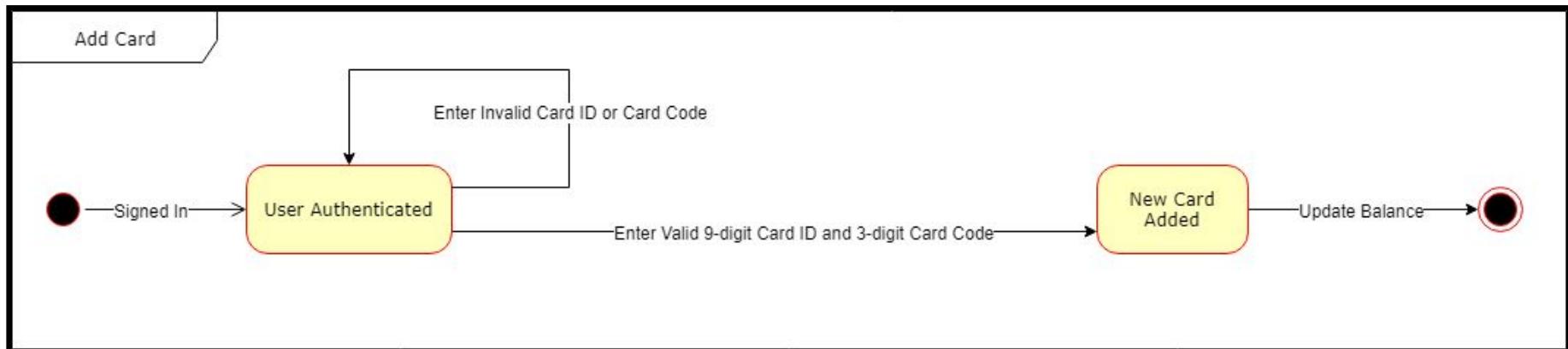


State Diagrams

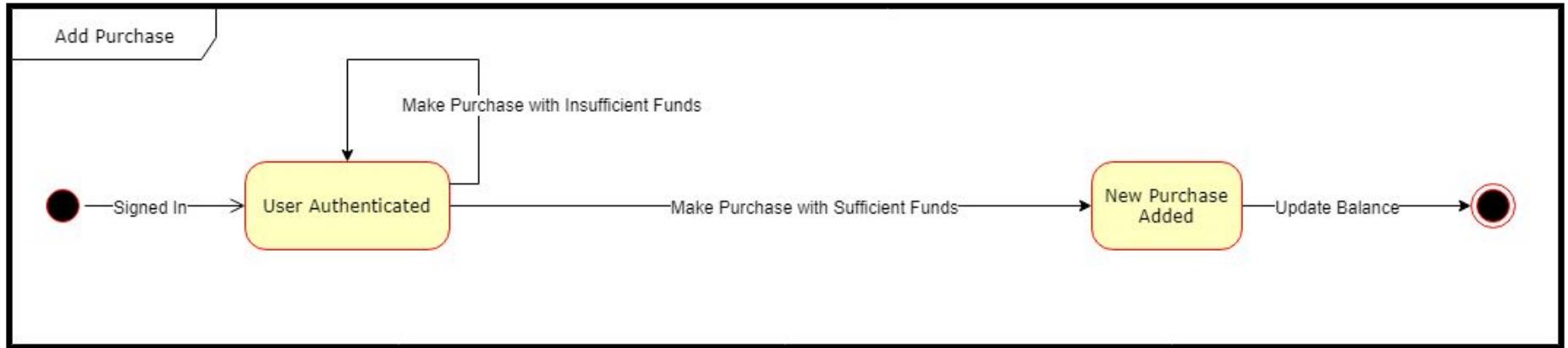
Sign In / Sign Up



Add Card



Add Purchase



Unit Testings

Java Unit Tests

Helper package JUnit

```
-----  
T E S T S  
-----  
Running helper.JSONHelperTest  
Tests run: 3, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.246 sec  
Results :  
Tests run: 3, Failures: 0, Errors: 0, Skipped: 0  
[INFO]
```

Model Package JUnit

```
-----  
T E S T S  
-----  
Results :  
Tests run: 0, Failures: 0, Errors: 0, Skipped: 0
```

Python End-To-End Tests

Workflow:

1. Run “mvn build” to build the JAR
2. Run the JAR, and start the backend server listening to localhost:8202
3. Run python test “api_tests” which send REST API requests to the localhost server
4. Verify that responses and fields match the expected results

```
python -m unittest api_tests  
...  
-----  
Ran 3 tests in 0.249s  
  
OK  
dock2 ~/wses/su18-202-t3am/jenkins/tests$ █
```

Each Jenkins Job runs the python end-to-end tests. A screenshot of a successful run is shown below:

```
python-requests/2.6.0 CPython/2.7.5 Linux/3.10.0-862.3.2.el7.x86_64 -  
.  
-----  
Ran 3 tests in 0.635s  
  
OK  
make[2]: Leaving directory `/var/lib/jenkins/workspace/API Testing/su18-202-  
t3am/jenkins/tests'  
make[1]: Leaving directory `/var/lib/jenkins/workspace/API Testing/su18-202-t3am/jenkins'  
+ set +x  
sed -i "s/value=\"_your_db_password\"/value=\"*****\"/g" starbucks2-  
domain/src/main/java/sql-maps-config.xml  
++ ps -ef  
++ grep 'java.*jar'  
++ grep -v grep  
++ grep Rest  
++ awk '{print $2}'  
+ kill -9 3706  
make: *** [run] Killed  
Finished: SUCCESS
```