

Graduation Project

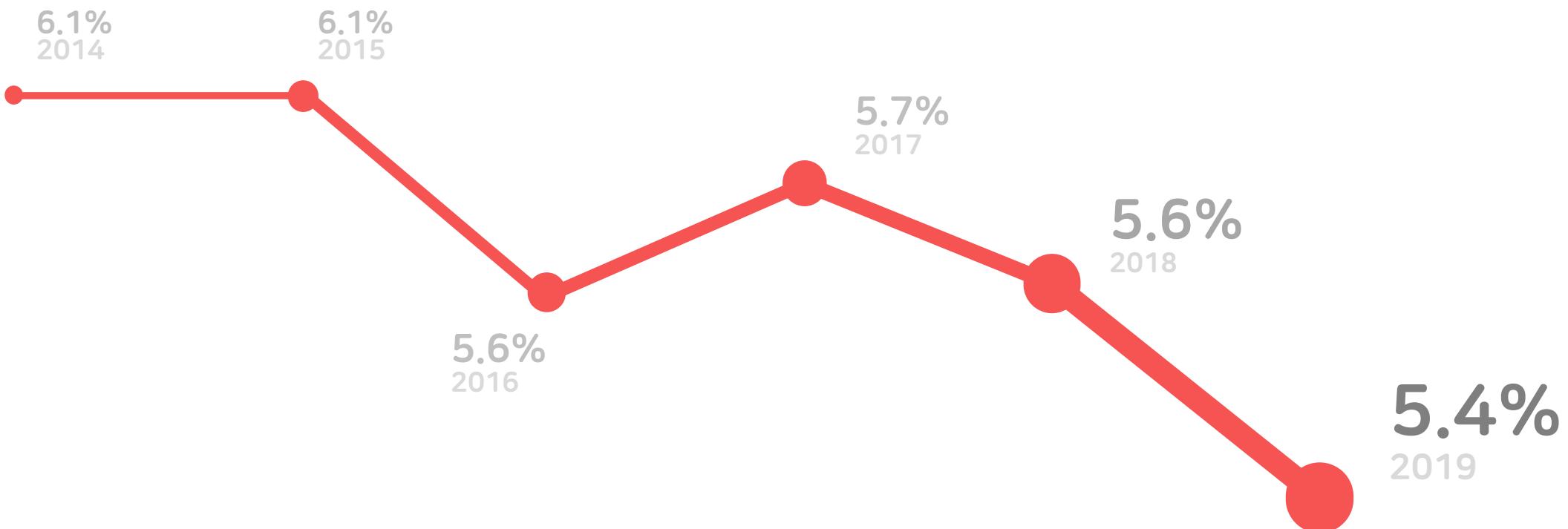
Class 2, Group 5 Final Presentation
2021.12.13

201935006 고효진
201533631 김도균
201935144 최윤찬

I . Motivation

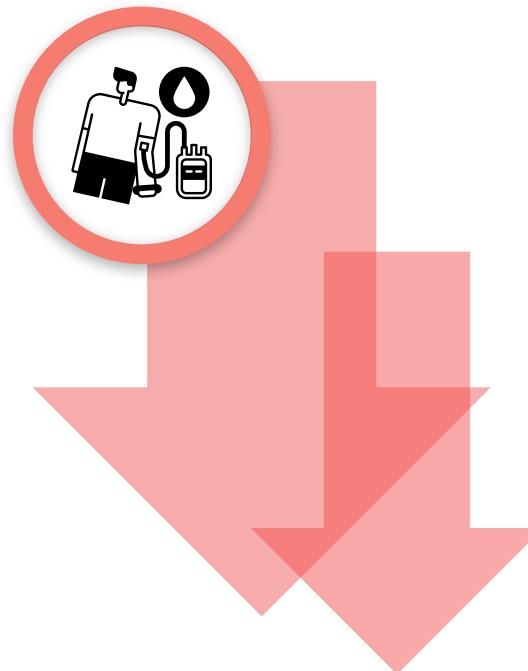
Graph of Annual Blood Donation

According to Korea Red Cross, donating blood rate is decreasing from 2014.



Decreasing Blood Donation

In Q1 2020, the number of people who donate his or her blood decrease over 10% than last year.

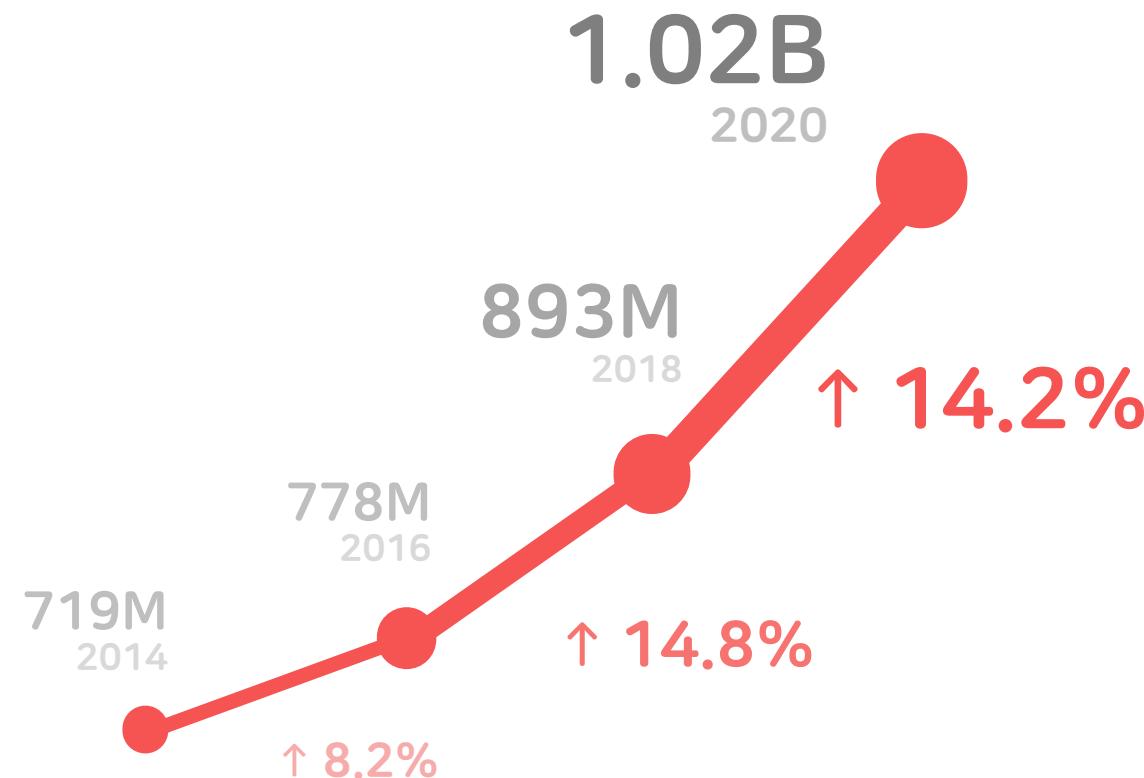


Decrease
12.74%

2019, Q1 ~ 2020, Q1

Humanity Issue

According to NHIS in Korea, the number of people suffering from depression has been increasing from 2014.



Humanity Issue

Mar 19, 2020, 07:48pm EDT | 41,473 views

How To Keep The Humanity In Working From Home

Pat Wadors Brand Contributor
servicenow ServiceNow BRANDVOICE | Paid Program
Innovation

Tips on how employees and their managers can navigate the realities of a COVID-19 quarantine.

I have two big dogs that have gotten used to having me home. Sometimes they even block the exit from my home office! And, from what I've seen on social media over the past week, not only are lots of dogs happy to hang out on video calls, but plenty of cats are more than willing to warm up their humans' keyboards.

But what about the human element? How are we all doing in these times of uncertainty, and how can we be sure to care for ourselves, our families, and our communities? (While practicing all the safe social distancing and other health guidelines, of course.)



Take time for a virtual coffee break with co-workers. SERVICENOW

"I encourage fellow leaders to lead with empathy, solidarity, kindness, and courtesy as we work together through these uncertain times."

Pat Wadors
Forbes

**The solution to
increase the blood donation rate**

Ideation

Recommendation & Community Service for Directed Blood Donation

Objective 1

Recommend the blood donor
not even closest person but
further human connections.

Objective 2

Sort recommendation with
using various features.

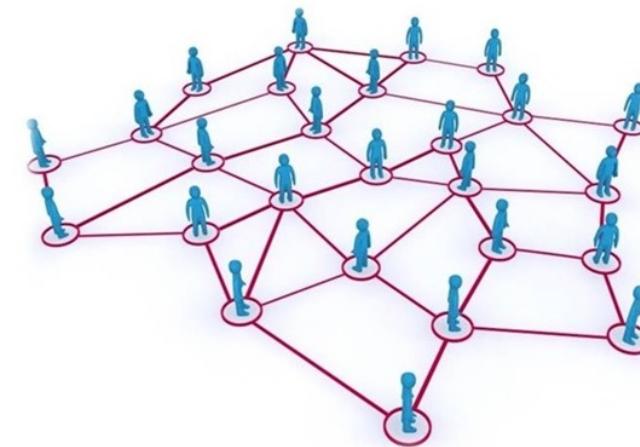
Objective 3

UI and UX design for massive
user and collecting data for ML.

Ideation

Human Network

: Recommend the blood donor not even closest person but further human connections.



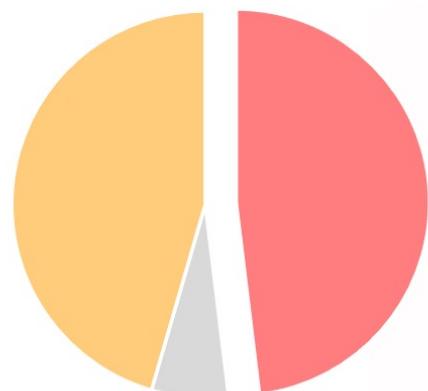
Six Degrees of Kevin Bacon

Ideation

We make survey and get reasonable result for directed blood donation.

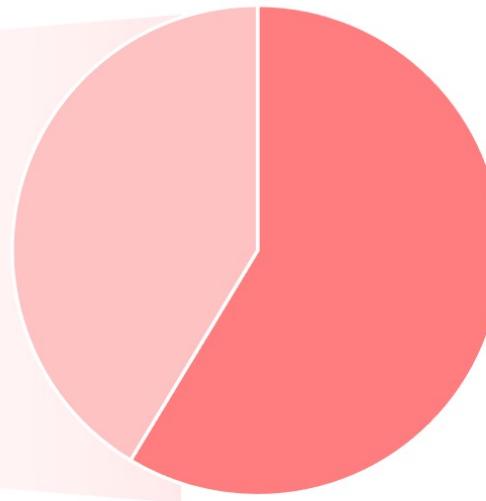
타인에 대한 지정헌혈에 대한 선호도 조사 지정헌혈을 한다면 누구에게 헌혈할 수 있나요?

헌혈 대상 선호도 조사



■ 지인 및 가족 ■ 모르겠음 ■ 제 3자

지인 및 가족 중 Depth별 헌혈 의향도



■ Depth 2 이상 ■ Depth 1

2021년 5월 10일 기준
총 응답자 267명 중
유효 응답 156건을 대상으로 분석

Introducing..

Recommendation & Community Service
for Directed Blood Donation



Double D

Directed Blood Donation

Make new connection through the donation.

Key Features



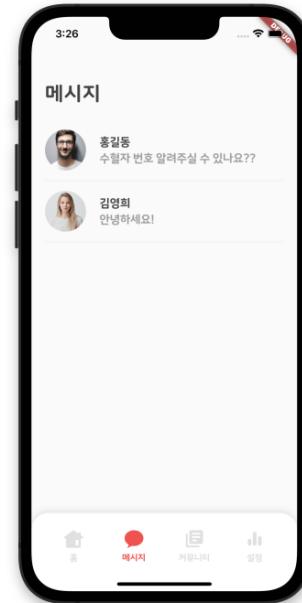
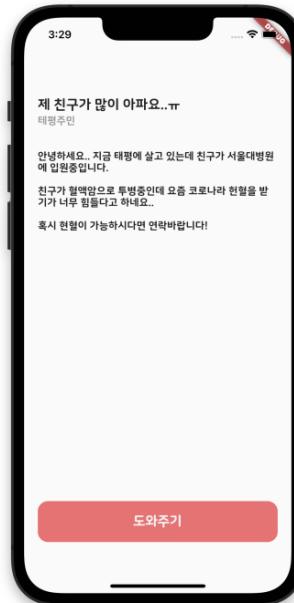
Recommendation

Suggestion ML algorithm find the proper person who match with my condition.



Community

If user cannot find proper person thought the recommendation system, user also find another person in community service.



Messaging

After recommendation, user can communicate with chat service for directed blood donation.



Demo

You can find the YT link to watch our project's final presentation video
and PDF file in our Github repository.

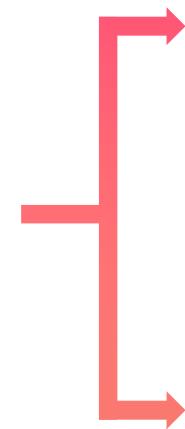
<https://github.com/GC210GP/wiki212>

User Experience

Journey map of users

Find Blood Receiver

Find proper person to user who want to directed blood donation.



Recommendation Service

Our ML algorithm will find the right person who are similar with user.

Community Service

User can find another blood receiver in his or her community.



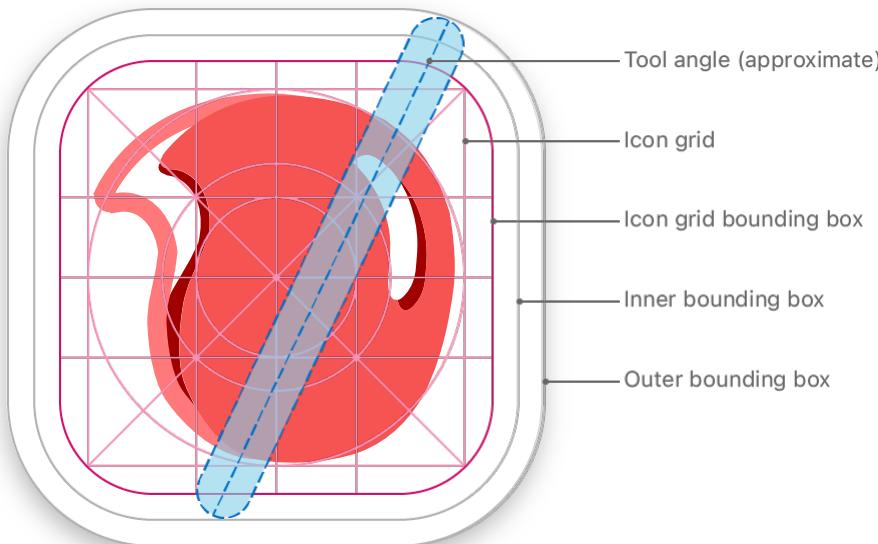
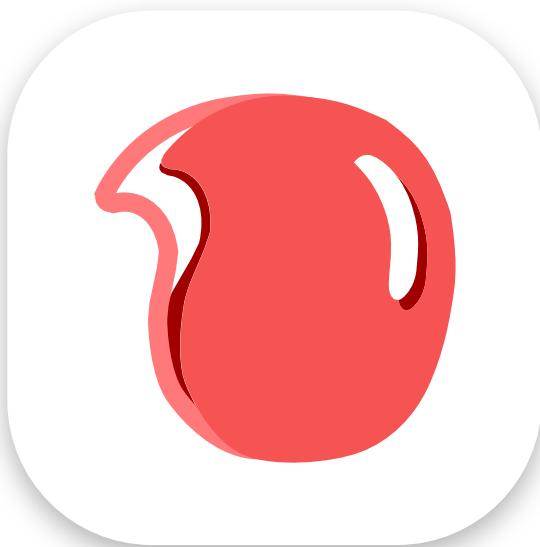
Messaging Service

Share information about blood donation between donor and receiver.



Branding

Make brand identity to set the concept of the service.



#FFFFFF

#F65353

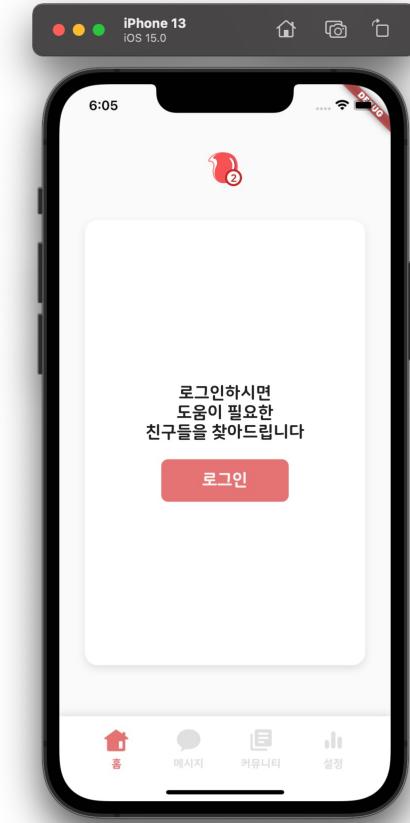
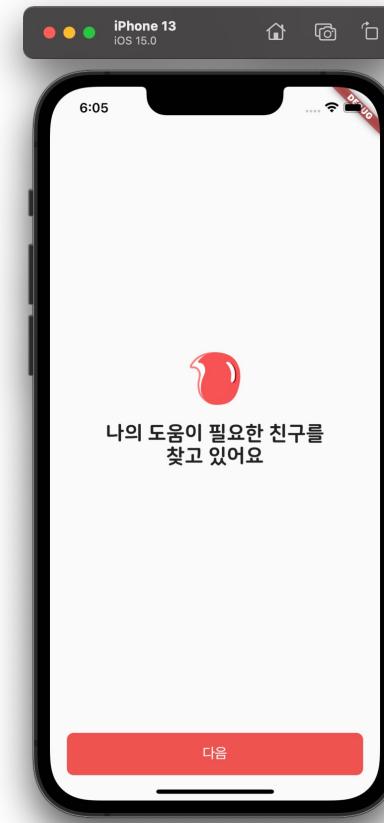
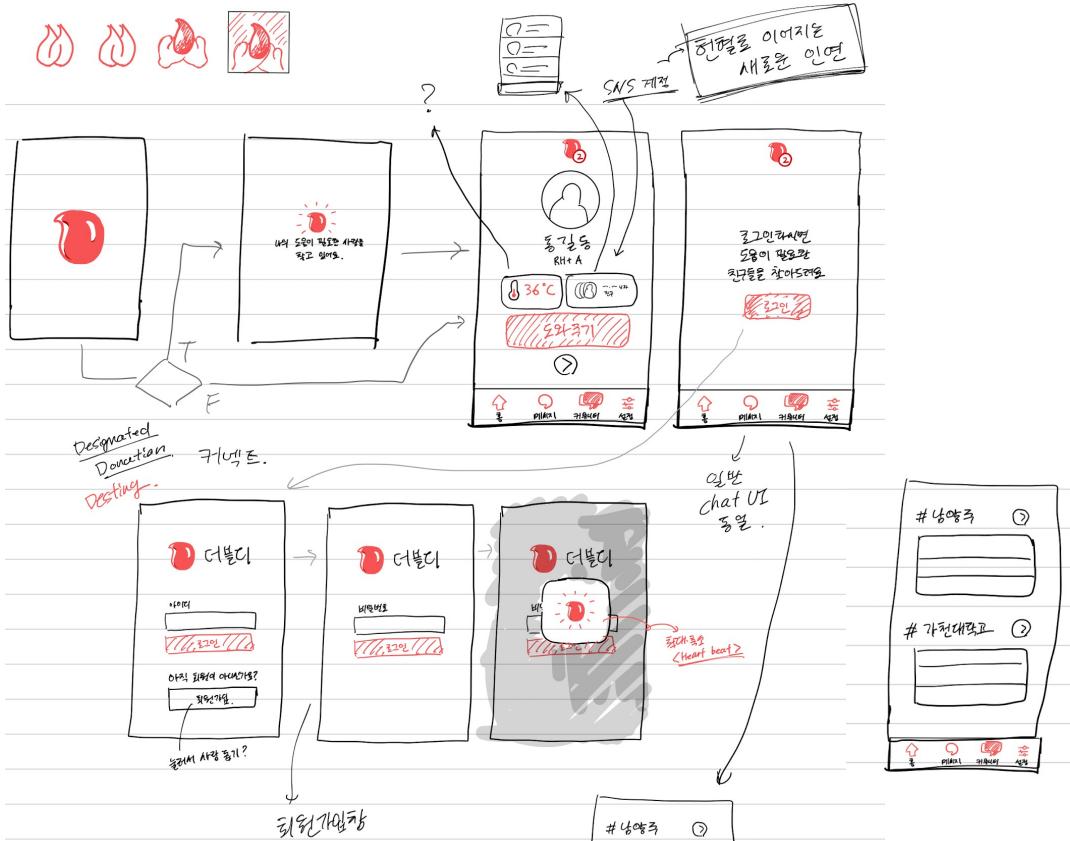
#A10000

Double D
Directed Blood Donation

더블디
**New connection through
the donation.**

User Interface

Sketch and design for user interaction and visual elements.



Application

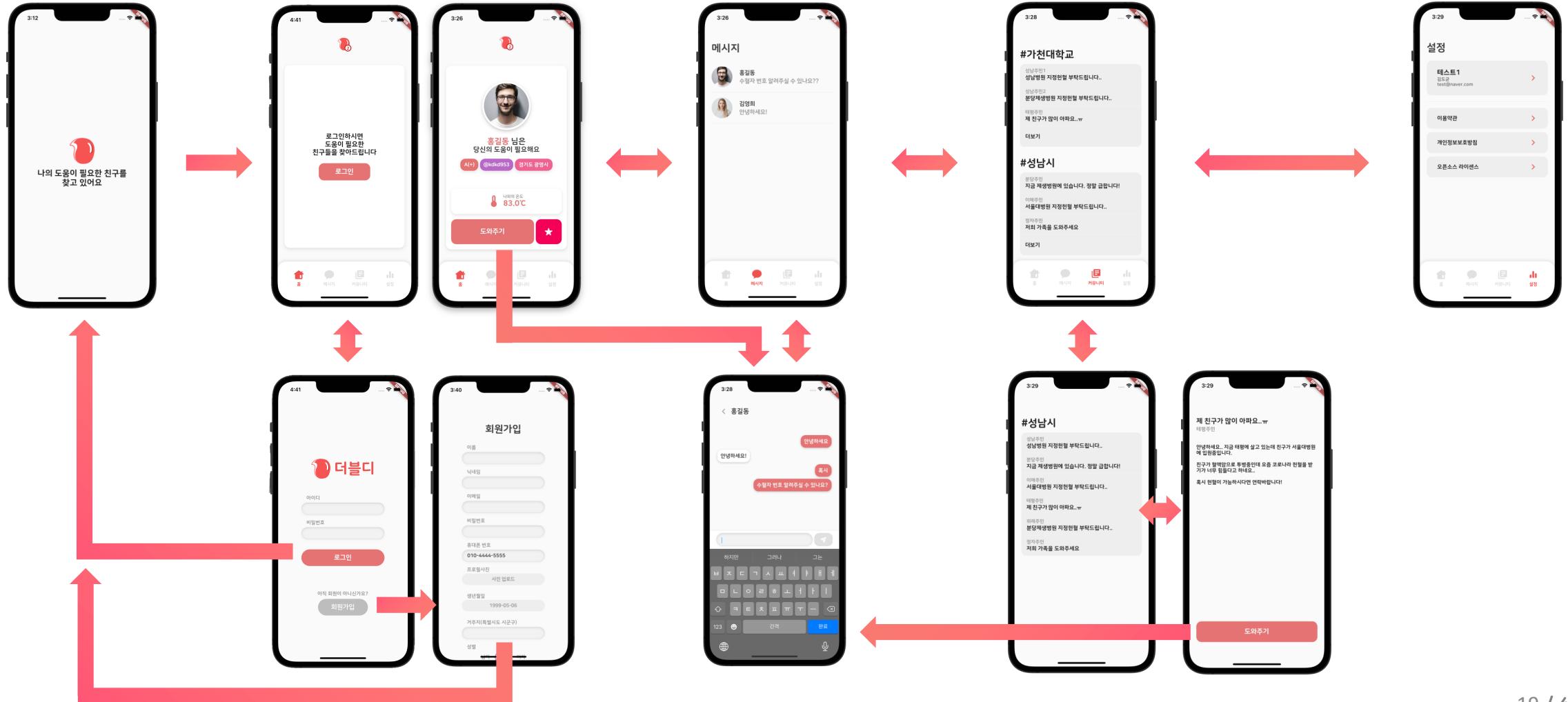


Flutter

Flutter is cross-platform framework
which can make iOS and Android application.

Storyboard

Complete UI design for each page.



II. Technical Features

- Backend -

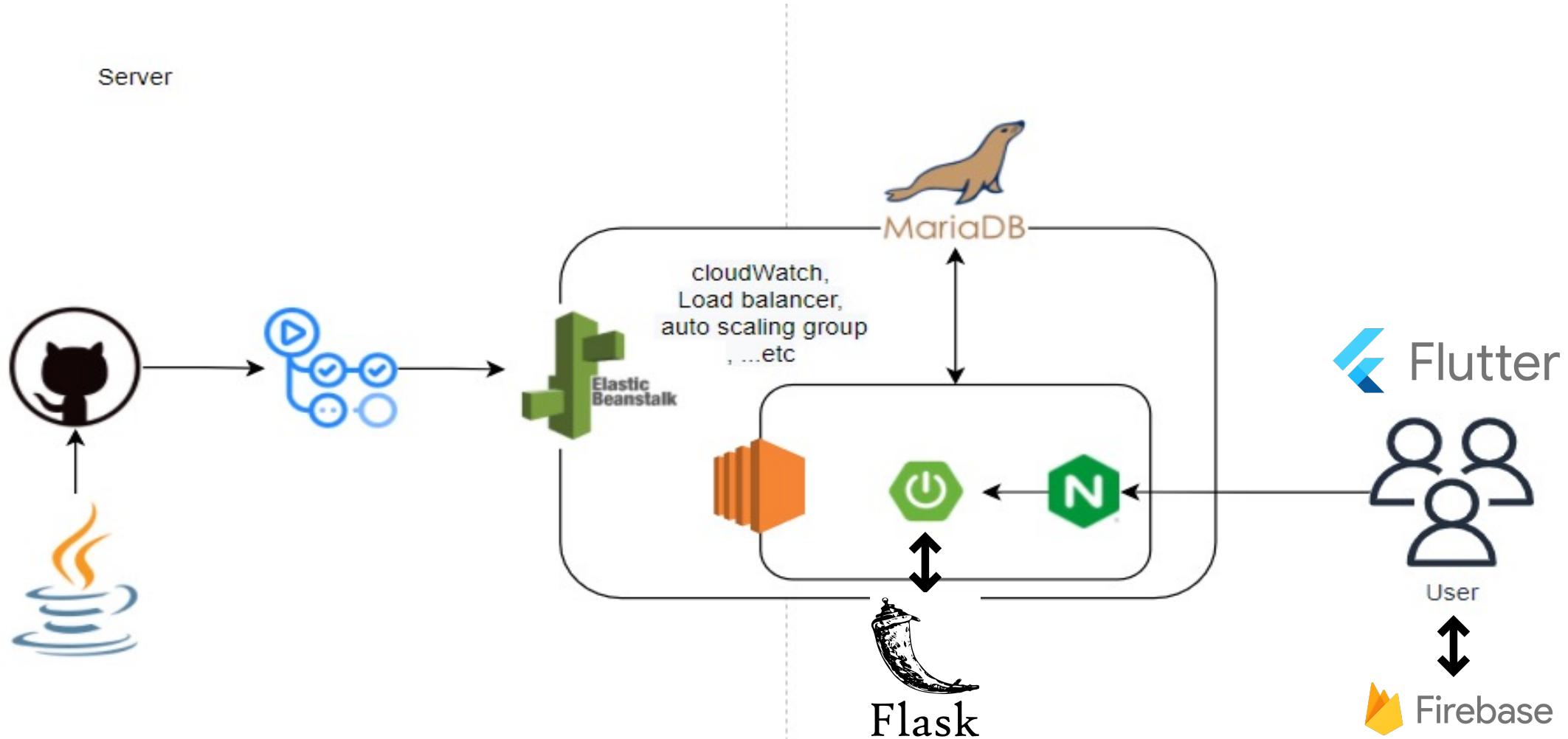
Tech Stack

Backend

- Java11, Spring Boot, Gradle
- JPA(Spring Data, Hibernate), QueryDSL
- JUnit5, AssertJ
- MariaDB, H2
- GitHub Actions
- AWS (Elastic Beanstalk)
- IntelliJ, Postman

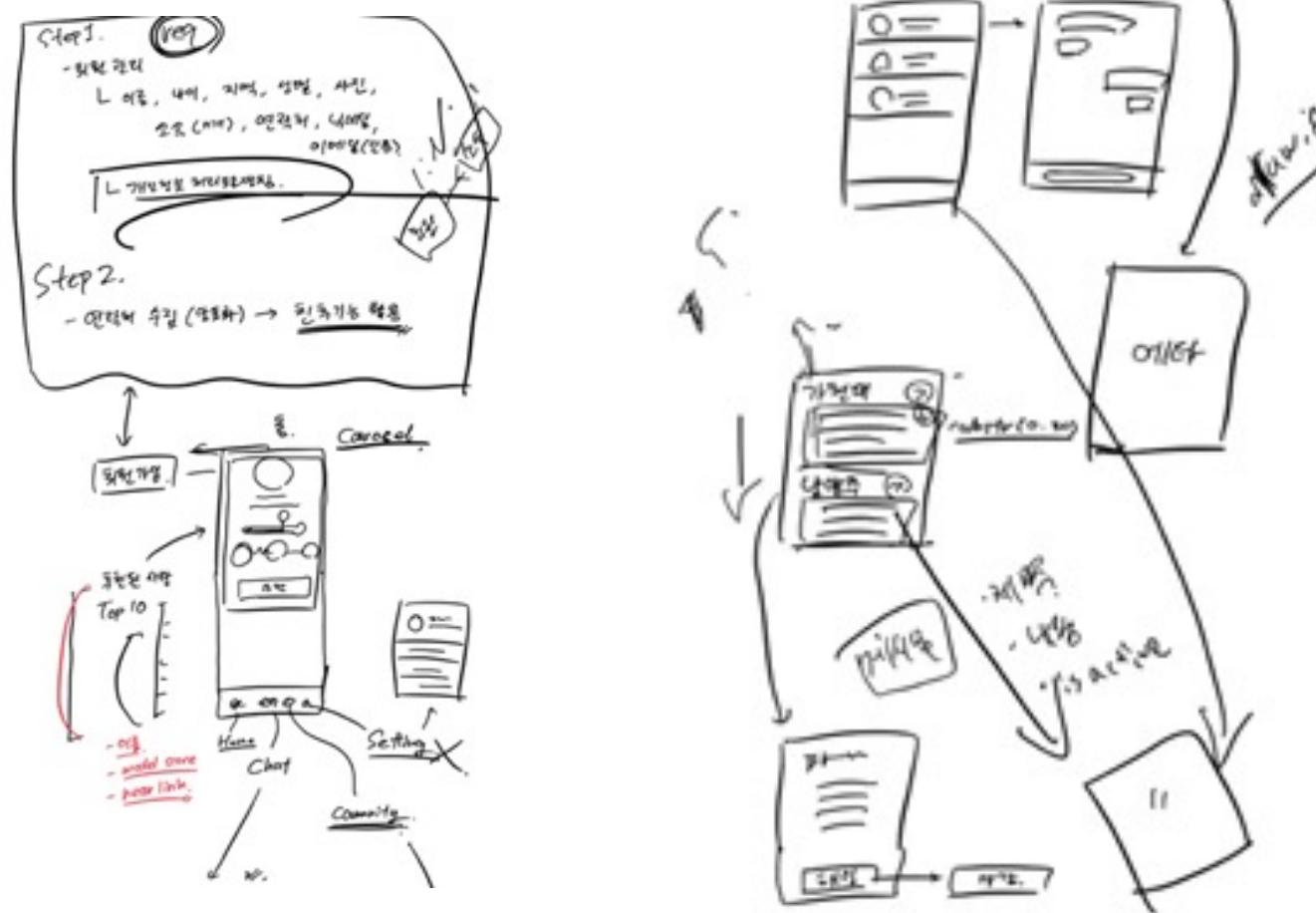
System Architecture

Backend



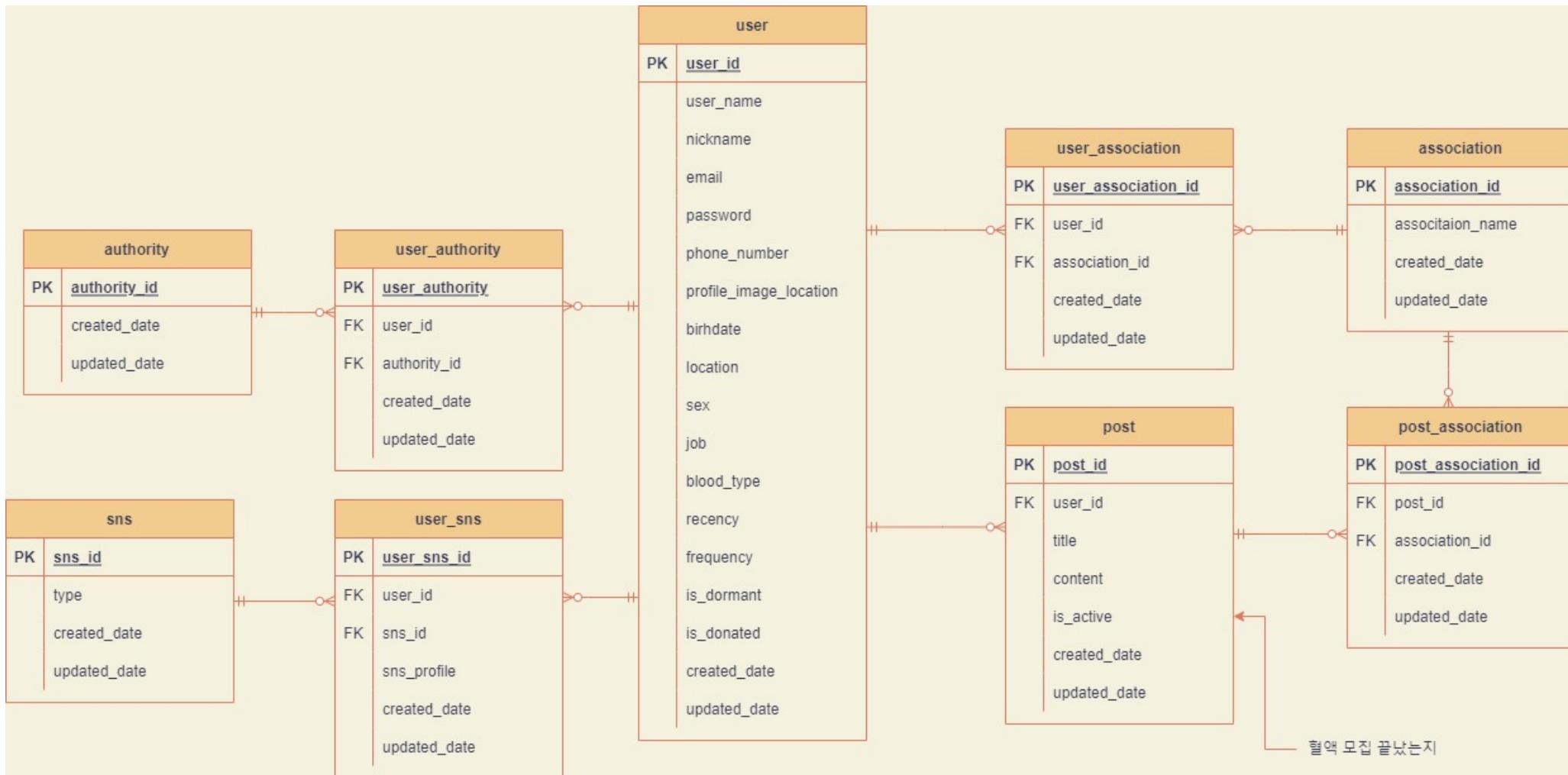
Requirements Elicitation

Backend



ER Diagram

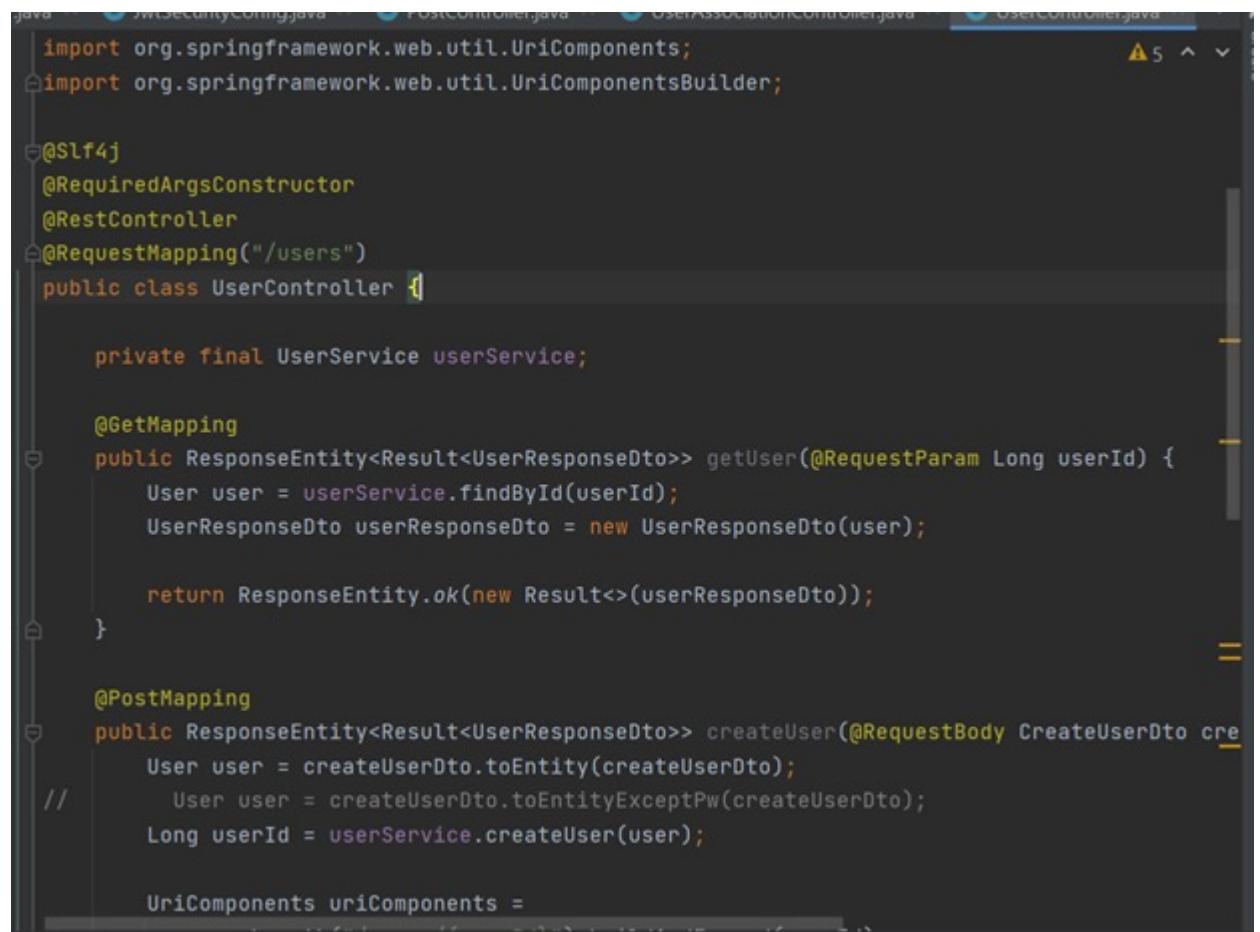
Backend



API

Backend

- Basic CRUD(user, post …etc)
- Authentication(JWT)
- Image upload/download (AWS S3)



A screenshot of a Java IDE showing the code for the UserController.java file. The code implements basic CRUD operations for users using Spring Framework annotations like @RestController, @GetMapping, and @PostMapping. It interacts with a UserService to perform operations like finding a user by ID and creating a new user. The code also uses UriComponents and UriComponentsBuilder for generating URLs.

```
import org.springframework.web.util.UriComponents;
import org.springframework.web.util.UriComponentsBuilder;

@Slf4j
@RequiredArgsConstructor
@RestController
@RequestMapping("/users")
public class UserController {

    private final UserService userService;

    @GetMapping
    public ResponseEntity<Result<UserResponseDto>> getUser(@RequestParam Long userId) {
        User user = userService.findById(userId);
        UserResponseDto userResponseDto = new UserResponseDto(user);

        return ResponseEntity.ok(new Result<>(userResponseDto));
    }

    @PostMapping
    public ResponseEntity<Result<UserResponseDto>> createUser(@RequestBody CreateUserDto createUserDto) {
        User user = createUserDto.toEntity(createUserDto);
        User user = createUserDto.toEntityExceptPw(createUserDto);
        Long userId = userService.createUser(user);

        UriComponents uriComponents = ...
    }
}
```

API Documentation

Backend

blood-donation

Make things easier for your teammates with a complete collection description.

user

Make things easier for your teammates with a complete folder description.

POST createUser

<http://localhost:8080/users>

Make things easier for your teammates with a complete request description.

Body raw (json)

json

Request

cURL

```
curl --location --request GET 'http://localhost:8080/users?userId=11'
```



Response

Body Headers

json

```
{  
  "data": {  
    "id": 11,  
    "name": "name1",  
    "nickname": "nickname1",  
    "email": "email5",  
    "phoneNumber": "pnum1",  
    "profileImageLocation": "img1",  
    "birthdate": "2021-12-02"  
  }  
}
```

[View more](#)

Deploy Server App to AWS

Backend



Elastic Beanstalk

환경
애플리케이션
변경 기록

blood-donation-new
애플리케이션 버전
저장된 구성

Blooddonationnew-env
환경으로 이동
구성
로그
상태
모니터링
경보
관리형 업데이트
이벤트
태그

최근 환경
Blooddonationnew-env

① 이제 AWS Graviton 지원
arm64 기반 프로세서인 AWS Graviton은 동급 x86 프로세서에 비해 최대 40% 뛰어난 가격 성능을 제공할 수 있습니다. arm64 인스턴스 유형으로 업그레이드하려면 '추가 구성'의 '용량' 설정에서 선택하세요.

Elastic Beanstalk > 환경 > Blooddonationnew-env

Blooddonationnew-env
Blooddonationnew-env.eba-zyvef2nw.ap-northeast-2.elasticbeanstalk.com (e-5a66nhiram)
애플리케이션 이름: blood-donation-new

상태
확인
월인

실행 버전
github-action-2021-12-13T13-22-42
업로드 및 배포

플랫폼
Corretto 11 running on 64bit
Amazon Linux 2/3.2.8
변경 사항

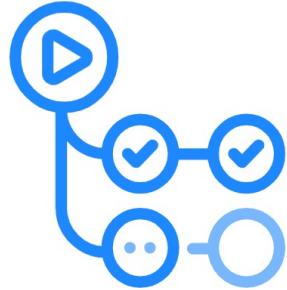
최근 이벤트

시간	유형	세부 정보
2021-12-13 13:40:54 UTC+0900	INFO	Environment health has transitioned from Degraded to Ok.
2021-12-13 13:38:54 UTC+0900	INFO	Removed instance [i-054507b87b83334a7] from your environment.
2021-12-13 13:36:54 UTC+0900	WARN	Environment health has transitioned from Info to Degraded. Incorrect application version found on 1 out of 2 instances. Expected version "github-action-2021-12-13T13-33-09" (deployment 10). Application update completed 10 seconds ago and took 3 minutes. All instances are in same availability zone (ap-northeast-2a).
2021-12-13 13:36:24 UTC+0900	INFO	Environment update completed successfully.

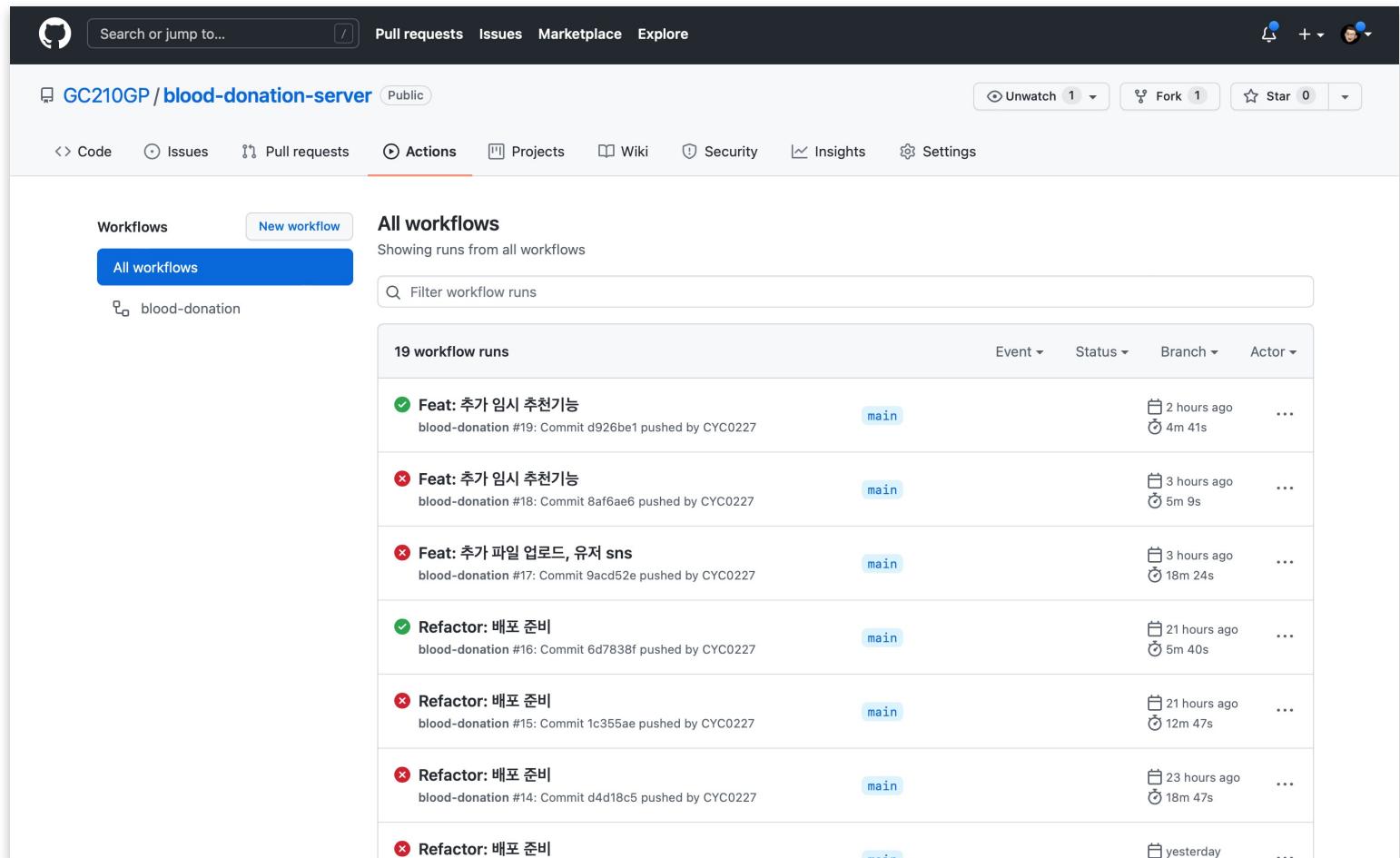
모두 표시 < 1 >

Continuous Integration & Deployment

Backend



GitHub Actions



The screenshot shows the GitHub Actions page for the repository "GC210GP/blood-donation-server". The "Actions" tab is selected. On the left, there's a sidebar for "Workflows" with "All workflows" selected. Below it, a search bar shows "blood-donation". The main area displays "All workflows" with 19 workflow runs listed. Each run includes details like the event (push), status (main branch), time ago, duration, and an ellipsis for more options. The runs are categorized into "Feat" and "Refactor" types, with some being successful (green checkmark) and others failing (red X).

Event	Status	Branch	Actor
blood-donation #19: Commit d926be1 pushed by CYC0227	main	2 hours ago	...
blood-donation #18: Commit 8af6ae6 pushed by CYC0227	main	3 hours ago	5m 9s
blood-donation #17: Commit 9acd52e pushed by CYC0227	main	3 hours ago	18m 24s
blood-donation #16: Commit 6d7838f pushed by CYC0227	main	21 hours ago	5m 40s
blood-donation #15: Commit 1c355ae pushed by CYC0227	main	21 hours ago	12m 47s
blood-donation #14: Commit d4d18c5 pushed by CYC0227	main	23 hours ago	18m 47s
blood-donation #13: Commit 3a2a23a pushed by CYC0227	main	yesterday	...

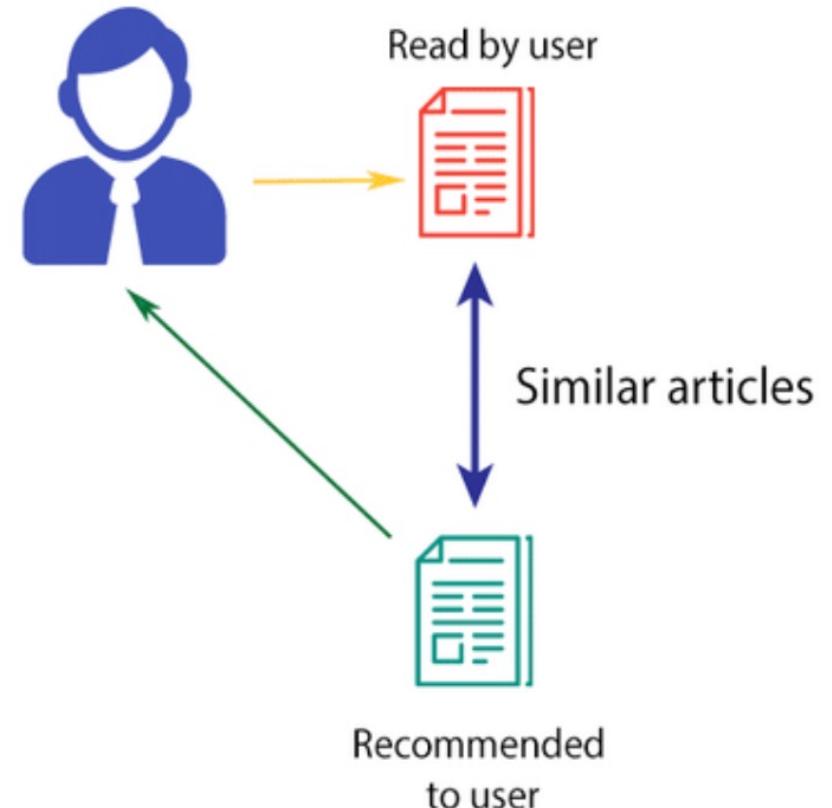
II. Technical Features

- Recommendation System -

Recommendation System

Content-based filtering

1. Initial recommendation are made based on similarity.
2. The user evaluates the intimacy with a few recommended people
3. Based on the ratings, update the distance between two users.
4. It recommends people with similar tendencies to those with high intimacy



Data Extraction

Recommendation System

Personal Information

: Blood Type, Age, Location, Job, Name, …etc

→ Randomly generated based on statistical indicators

Relationship

: Intimacy in social relationship

→ After the service is deployed, data will be obtained from real users

Data Inspection

Recommendation System

Recency	name	Sex	blood_type	age	location	job	uuid
2	송종대	Male	B	30-39	서울	회사원	419465cb-aa69-431c-bba0-b409cf53bce3
0	이기근	Female	O	30-39	강원	군인	f784715b-1d47-427d-82b3-6baf29f7394f
1	김신재	Male	A	16-19	대구	회사원	07d64fb5-eacf-4ace-a1e5-1413c26872f8
2	김기태	Male	O	16-19	부산	대학생	62204e12-2c36-4345-a83e-6d8a16d1992
1	여재민	Female	B	20-29	인천	대학생	5b483563-5525-4dd1-b986-65d05d35c9
4	김삼태	Female	A	40-49	충북	회사원	a5525ece-07b3-4260-954c-187091cf0236
2	송영민	Male	B	30-39	경기	기타	d2e75130-b704-448b-918c-d0a147fc5da
1	하태우	Male	A	30-39	서울	대학생	4d6f58e4-764e-49bb-9bdd-05733c30343
2	박영준	Female	O	16-19	서울	대학생	bde621b0-c948-469f-bf69-b7ec2922f64a
5	이민철	Female	B	40-49	서울	회사원	0057de1d-dfdb-4915-bc43-263c8dbabb1
4	박재민	Male	O	30-39	부산	공무원	deea8066-8bee-42c9-8793-47d01526f0e6
0	정가준	Female	B	20-29	경기	가사	983c77af-de1c-40bb-ad72-79454c88dfb5
2	오석훈	Female	O	20-29	서울	회사원	e8b2340e-d566-482b-806d-31c322e6273
1	오종진	Male	AB	16-19	경기	대학생	c83da45b-86ef-4653-b835-2ef5dd9f3cc4
2	강재필	Male	A	60세 이상	경기	회사원	f5c504d2-82b2-4554-9e2c-fc2f15d3d40e
2	김대희	Male	A	20-29	경남	고등학생	55312507-ad50-48e0-8b0b-b21ab660ac8
2	강홍섭	Male	B	20-29	서울	대학생	1436eb68-bb70-465f-bfc8-3e92d67e5c2d
2	한재훈	Female	O	40-49	경기	회사원	1b852b09-7b91-4e7b-aff5-b788732523dk
2	김영오	Male	A	40-49	강원	대학생	2a3c178d-5eee-4458-bf58-a73c61a61ee5
2	김창주	Male	O	50-59	경기	회사원	57dac1d8-f979-499a-9365-f095a762b7ab
2	박정규	Female	A	40-49	경기	고등학생	b161cb1d-cde3-44af-baea-deabce040cc9
4	박수민	Female	A	20-29	경기	회사원	fbf80c6f-ccb5-4ad5-a1f6-eef9090398bc
2	김정민	Male	O	20-29	전북	고등학생	763764e6-bcc1-443f-81ef-dd3491519e6h

Data creation based on real blood donation data combined by KOSTAT

Recency: The number of blood donation.

name: Generated name.

Sex: Generated gender.

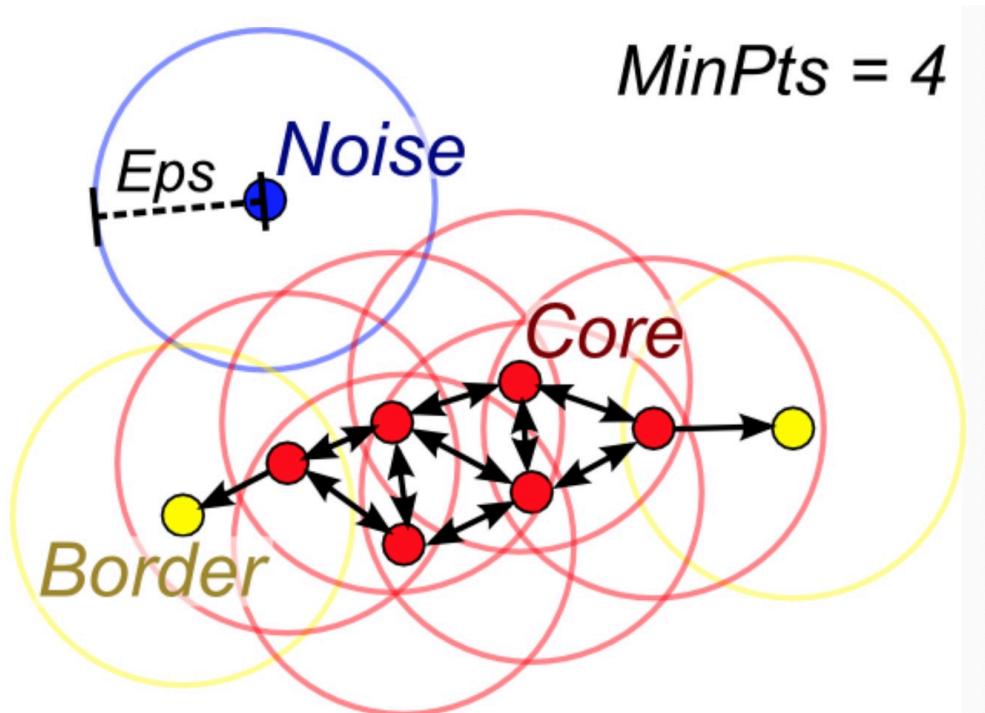
blood_type: A, B, O, AB, RH+, RH-

age, location, job, uuid: Generated data.

75549 x 7 data was created.

Algorithm

Recommendation System



<https://p829911.github.io/2019/01/11/DBSCAN/>

DBSCAN Clustering

: After clustering using DBSCAN, similarity between users is measured based on data belonging to the same cluster

→ Distance between two users becomes **the weight of the link**

Clustering

Recommendation System

```
class AutoML:
    def setCombination(self):
        # Scaler List
        standard = StandardScaler()
        minMax = MinMaxScaler()
        robust = RobustScaler()
        maxAbs = MaxAbsScaler()
        scalers = {"standard scaler": standard, "minMax scaler": minMax, "robust scaler": robust,
                   "maxAbs scaler": maxAbs}

        # Encoder List
        label = LabelEncoder()
        oneHot = OneHotEncoder()
        encoders = {"label encoder": label, "one-hot encoder": oneHot}

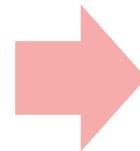
    best_combi_A, best_X_A, best_label_A = autoML.get_result(df_A)
    df_A['cluster_label'] = best_label_A

    best_label_B = autoML.get_result(df_B)
    df_B['cluster_label'] = best_label_B

    best_label_AB = autoML.get_result(df_AB)
    df_AB['cluster_label'] = best_label_AB

    best_label_0 = autoML.get_result(df_0)
    df_0['cluster_label'] = best_label_0

clustered_df = pd.concat([df_A, df_B, df_AB, df_0], axis=0, ignore_index=True)
clustered_df.to_csv('auto_clustered.csv', index=False, encoding='utf-8-sig')
```



uuid	name	Recency	Sex	blood_type	age	location	job	Cluster_labels
07d64fb5-ea9	김신재	1	Male	A	16-19	대구	회사원	0
a5525ece-07	김삼태	4	Female	A	40-49	충북	회사원	1
4d6f58e4-76	하태욱	1	Male	A	30-39	서울	대학생	2
f5c504d2-82	강재필	2	Male	A	60세 이상	경기	회사원	3
55312507-ac	김대희	2	Male	A	20-29	경남	고등학생	4
2a3c178d-5e	김영오	2	Male	A	40-49	강원	대학생	5
b161cb1d-cd	박정규	2	Female	A	40-49	경기	고등학생	6
fbf80c6f-ccb	박수민	4	Female	A	20-29	경기	회사원	7
b704567b-8k	안종한	9	Female	A	16-19	경북	회사원	8
2282bc75-6c	이경우	4	Female	A	20-29	경남	대학생	9
6b6b79e7-19	장덕수	4	Female	A	40-49	경남	기타	10
d4c4a04f-ef1	손미애	4	Male	A	16-19	서울	공무원	11
1c501548-81	김기철	2	Male	A	40-49	충남	대학생	12
e146117d-6a	손연현	2	Male	A	20-29	인천	대학생	13
a1993a9d-ff2	정정수	4	Male	A	20-29	경기	회사원	7
f3bd3bf3-95	손현호	4	Male	A	20-29	서울	대학생	14
48fb6c26-65	김환진	2	Male	A	20-29	서울	회사원	15
8db8984f-67	김경준	2	Male	A	50-59	서울	회사원	16
992979df-9c	남성달	4	Male	A	30-39	경기	고등학생	17
589a16be-c6	차승익	2	Female	A	20-29	부산	군인	18
97dd9e5f-c9	김천수	4	Male	A	20-29	전남	군인	19

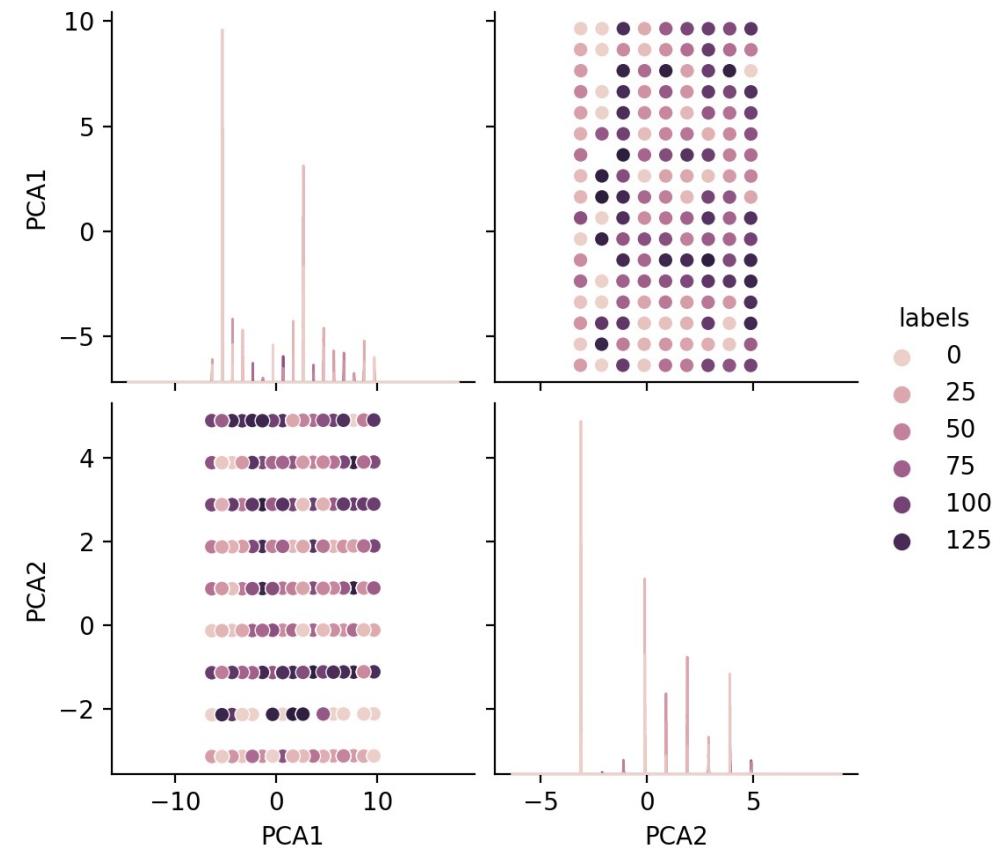
Clustering Result

Recommendation System

- Number of clusters over 1230
- Silhouette score: **0.994**

→ Pretty accurate clustering

silhouette score: 0.9946725508378522



Recommendation System

```
from flask import Flask, escape, request, Response
import pandas as pd
import numpy as np
app = Flask(__name__)

@app.route('/connect', methods = ('GET','POST'))
def information():
    if request.method == 'GET':
        uuid = request.args.get("uuid")
        #uuid = '4d23021e-1b66-4daa-9d68-17673153d4f3'
        df = pd.read_csv('clustered.csv')
        userData = df.loc[df['uuid'] == uuid]
        user_label = userData['Cluster_labels'].reset_index(drop=True)
        print(user_label)
        cluseter_members = df.loc[df['Cluster_labels'].isin(user_label)]
        cluseter_members = cluseter_members['uuid']
        print(cluseter_members)
```

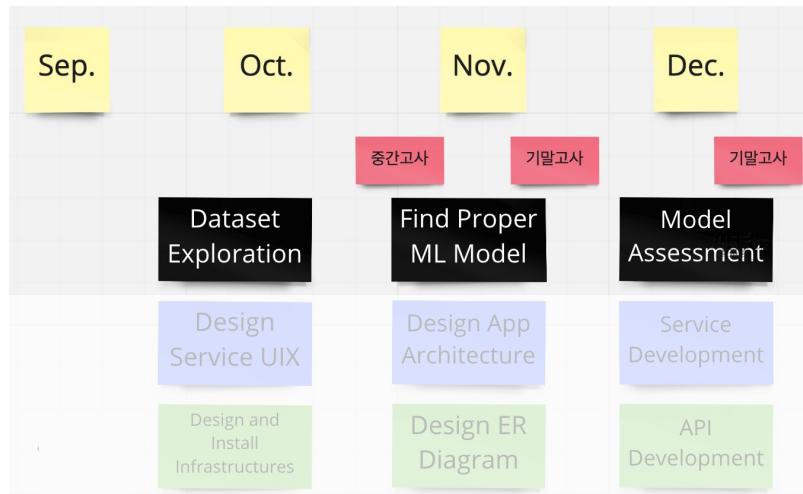
**Connecting with server using
'Flask' for implement micro
service architecture.**

* This was specifically explained
in server section

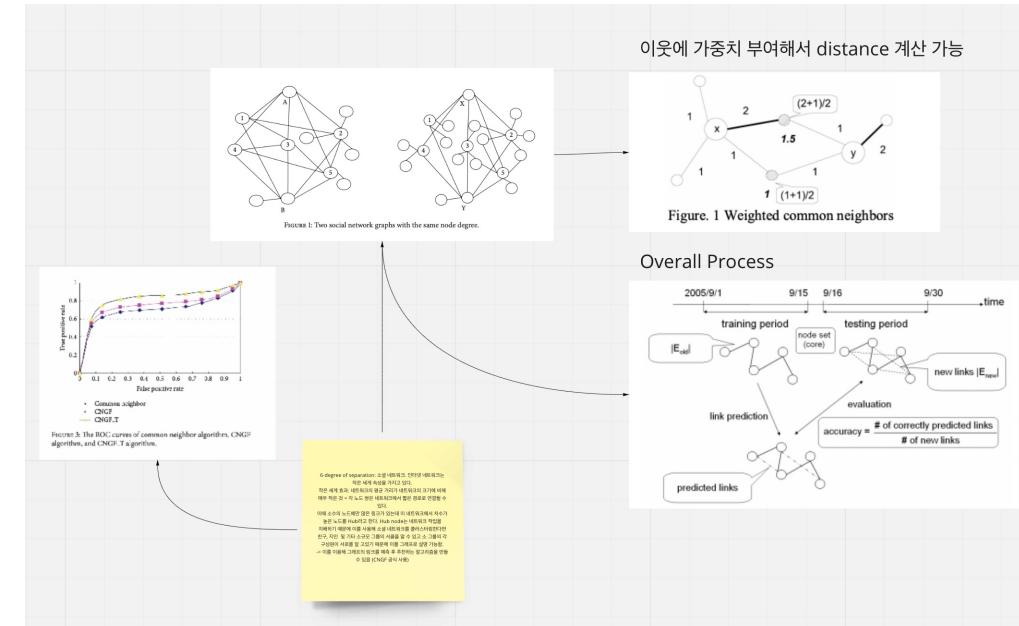
III. Information about Team

Roles of each member

고효진



Calculate distance through weights each nodes and predict proper patient.



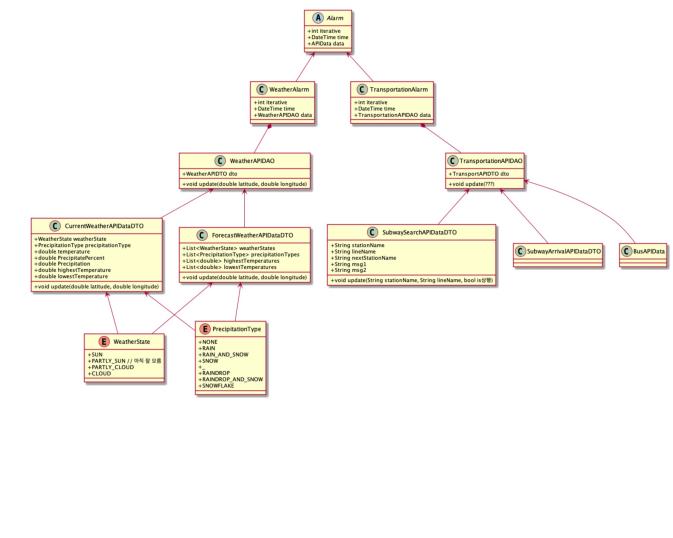
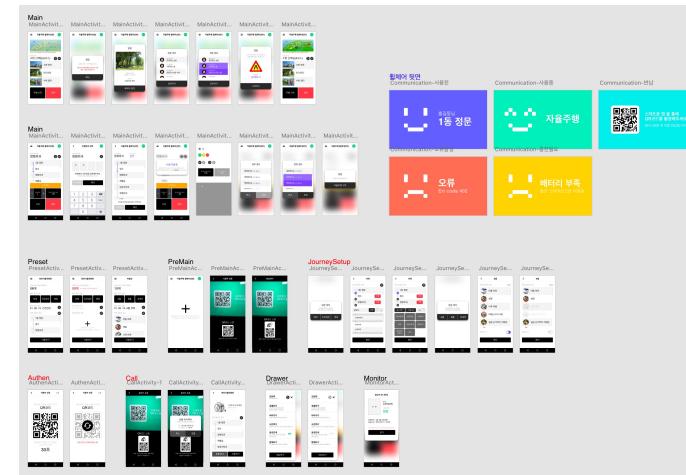
References (Research)

- "The Algorithm of Link Prediction on Social Network"
- "Link Prediction of Social Network Based on Weighted Proximity Measures"

Roles of each member

김도균

Sep.	Oct.	Nov.	Dec.
		중간고사	기말고사
	Dataset Exploration	Find Proper ML Model	Model Assessment
	Design Service UIX	Design App Architecture	Service Development
	Design and Install Infrastructures	Design ER Diagram	API Development



Implement application service with using Flutter cross-platform framework.

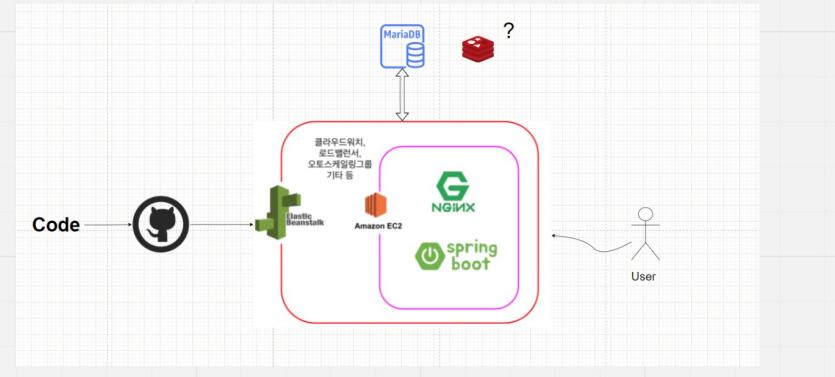


Roles of each member

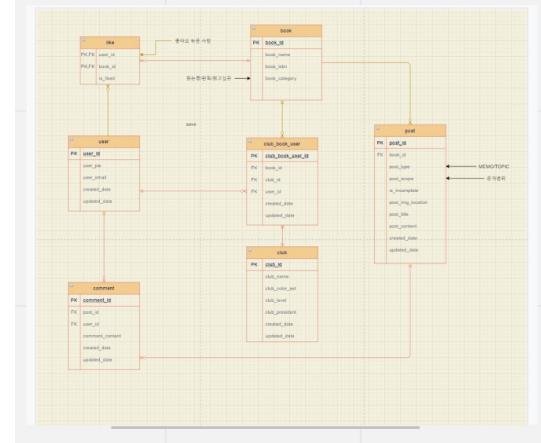
최윤찬

Sep.	Oct.	Nov.	Dec.
Dataset Exploration	Find Proper ML Model	Model Assessment	기말고사
Design Service UIX	Design App Architecture	Service Development	중간고사
Design and Install Infrastructures	Design ER Diagram	API Development	기말고사

Implement CI/CD pipeline with using beanstalk(PaaS) in AWS.
Use NoSQL (in case)



API and Database design from ER-Diagram



Implement back-end service with using Spring Framework.



Team Collaboration Tools



miro

Idea sketch
Brain storming
Meeting notes



POSTMAN

API Documentation
API Test

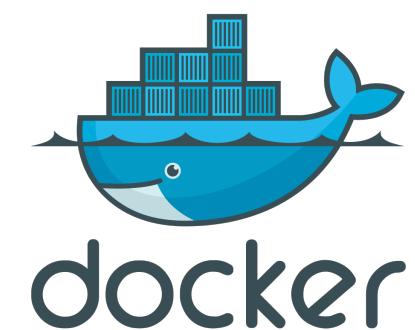
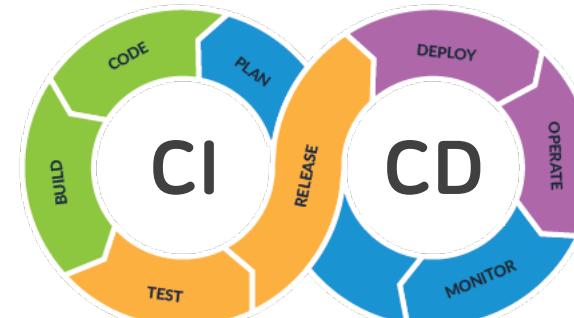


GitHub

Configuration
Management

Plan

- Deploy to Apple AppStore and Google PlayStore.
- Intimacy updating progress; Intimacy that based on real user evaluates, update the distance and recommend more closer user.
- Improve CI/CD pipeline to ease and manage deploy version and write test code.
- Implement back-end software in docker container.



Rewind

Mar 19, 2020, 07:48pm EDT | 41,473 views

How To Keep The Humanity In Working From Home

Pat Wadors Brand Contributor
servicenow ServiceNow BRANDVOICE | Paid Program
Innovation

Tips on how employees and their managers can navigate the realities of a COVID-19 quarantine.

I have two big dogs that have gotten used to having me home. Sometimes they even block the exit from my home office! And, from what I've seen on social media over the past week, not only are lots of dogs happy to hang out on video calls, but plenty of cats are more than willing to warm up their humans' keyboards.

But what about the human element? How are we all doing in these times of uncertainty, and how can we be sure to care for ourselves, our families, and our communities? (While practicing all the safe social distancing and other health guidelines, of course.)



Take time for a virtual coffee break with co-workers. SERVICENOW

"I encourage fellow leaders to lead with empathy, solidarity, kindness, and courtesy as we work together through these uncertain times."

Pat Wadors
Forbes

Graduation Project

Class 2, Group 5 Final Presentation
2021.12.13

Font

- Nanum Square Round

References

- 잡아바, 코로나19로 혈액 수급 '주의'단계까지? 헌혈하기 고민된다면?
<https://www.jobaba.net/thema/exprcDtl.do?seq=2425&cntntsSeCd=03>
- 동아닷컴, 100만 넘은 우울증 환자... 20대 가장 많아
<https://www.donga.com/news/Society/article/all/20210406/106260124/1>
- 동아닷컴, 생산가능인구 내년부터 연 33만명씩 급감... '인구절벽' 가속
<https://www.donga.com/news/Economy/article/all/20190328/94781800/1>
- Forbes, How To Keep The Humanity In Working From Home
<https://www.forbes.com/sites/servicenow/2020/03/19/how-to-keep-the-humanity-in-working-from-home/?sh=34f3e8e51f8c>

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