

행정업무 자동화 챗봇 개발 및 성능 향상에 관한 연구

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- Chatbot Development
- Performance Improvement
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Introduction

Motivation

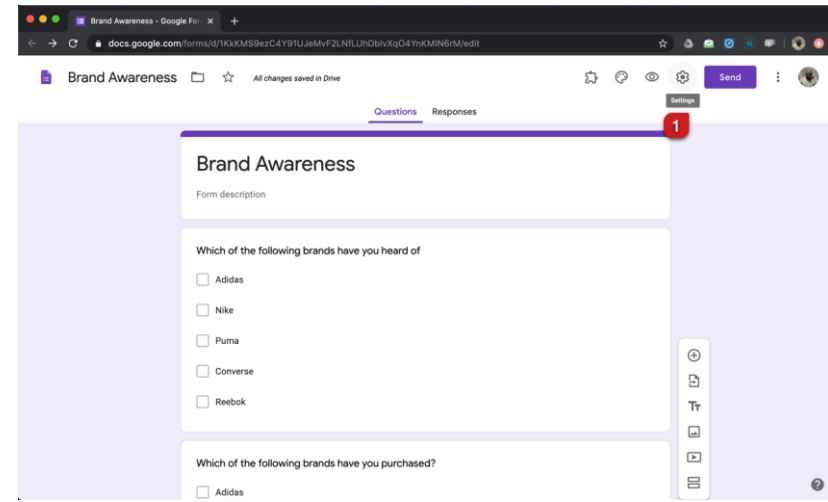
- Many office workers spend a lot of time performing repetitive office tasks
 - They perform the tasks in efficient ways
 - e.g. choosing T-shirt size color, group bus, vote...



	A	B	C	D	E	F
1	이름	사이즈	이니셜	학번		
2	김민지	XS	minji.K	15		
3	배수진	XS	Sujin.B	15		
4	박다연	XS	B.Dayeon	15		XS 85: 3명
5	이미연	S	L.miyeon	15		S 90: 2명
6	김찬수	S	Chansu.K	14		M 95: 1명
7	박보미	M	bomi.B	14		L 100: 2명
8	차민수	L	Minsu.C	15		
9	금만기	L	K.Manki	15		총 8명

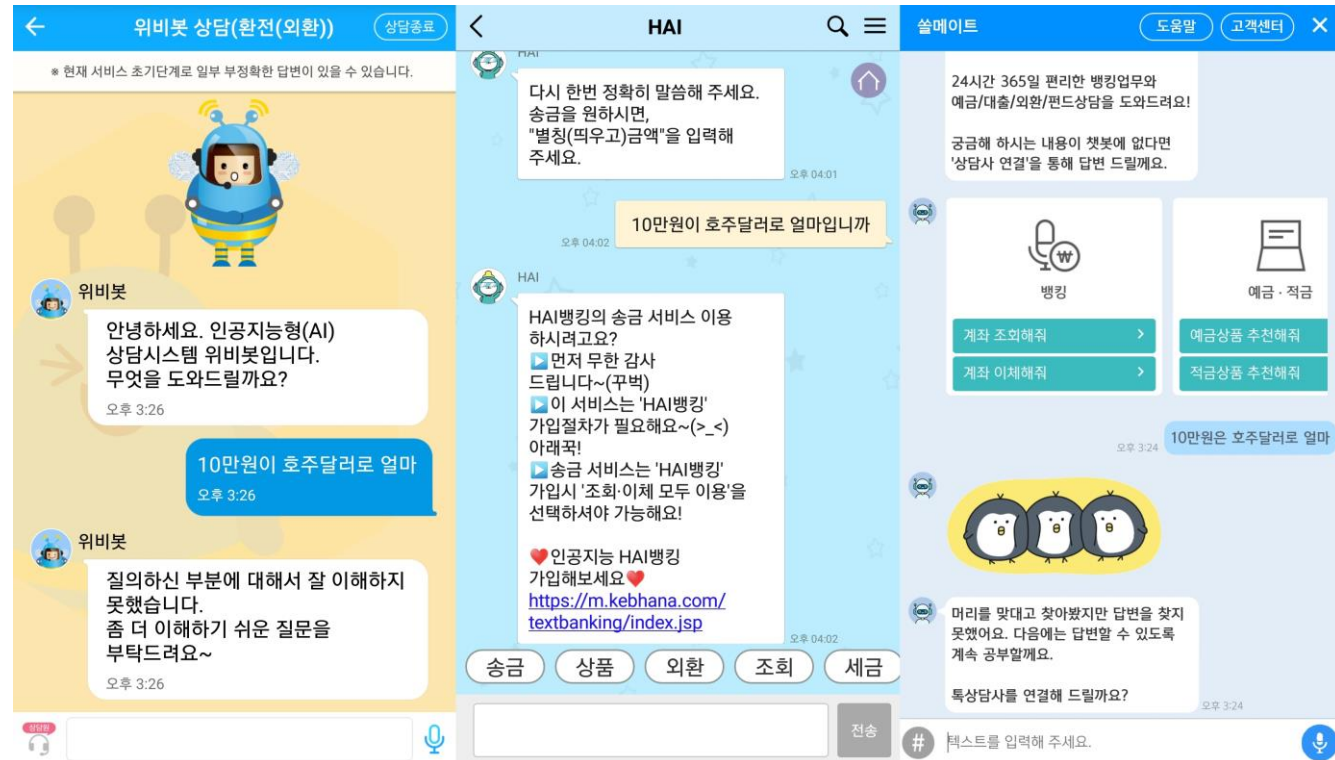
Existing Solutions

- Online bulletin board
 - It cannot guarantee user privacy
- Google form
 - The survey data saved to the external database
- Kakaotalk Survey
 - It cannot guarantee user privacy
 - Anonymous survey has many limits



Chatbot System

- Chatbot simulates human-like conversations with users via text messages



Chatbot System

- We develop user-friendly chatbot system for handling repetitive tasks
 - Kakaotalk
 - Kakao i Open Builder
- We operate the system in the real workplace and improved performance



Chatbot Development

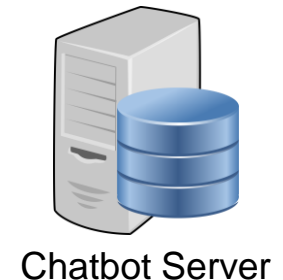
System Design

- Chatbot System Design



Chatbot Development

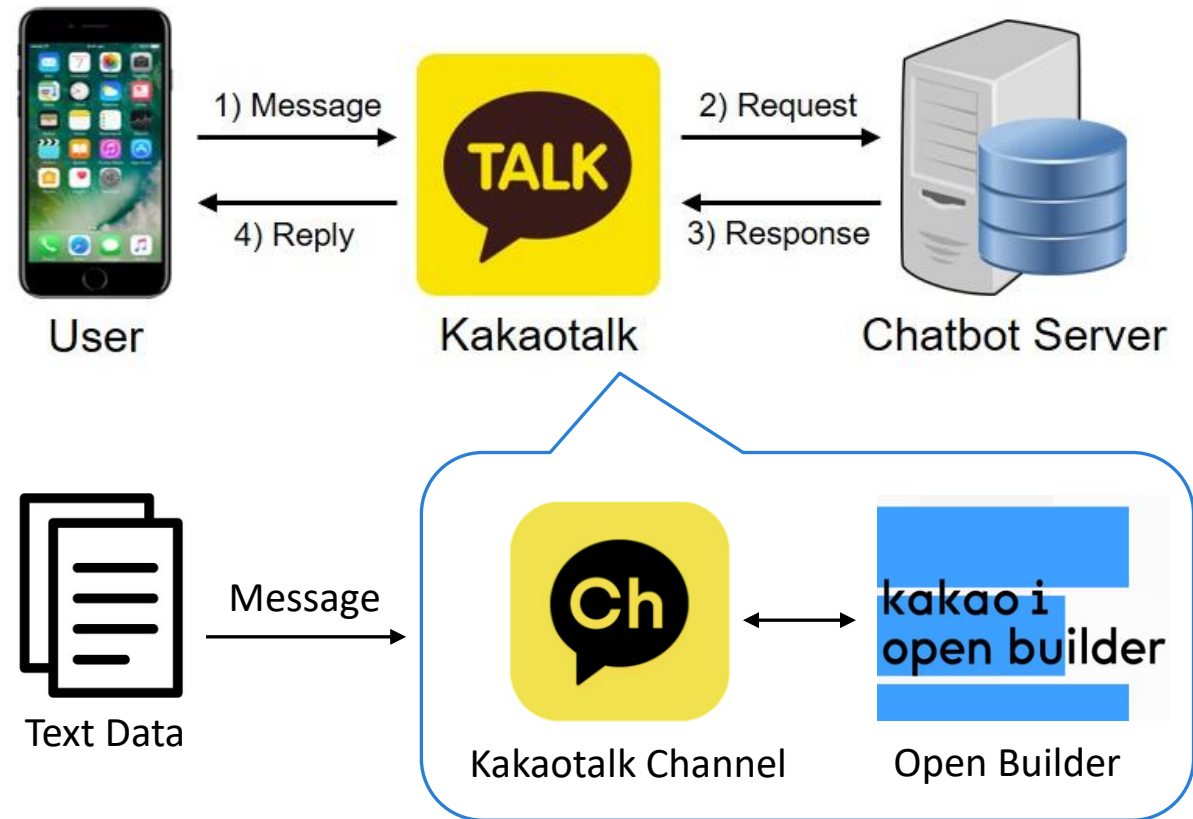
- Kakao i Open Builder provides only chatbot service
 - We make chatbot server for managing data



- We aimed to improve request time and total request per second(TPS) when many users simultaneously use the service
 - if the server does not respond within the time, it is considered no response to the request
- We operate the initial chatbot system in the real workplace
 - About 800 users, 6 months

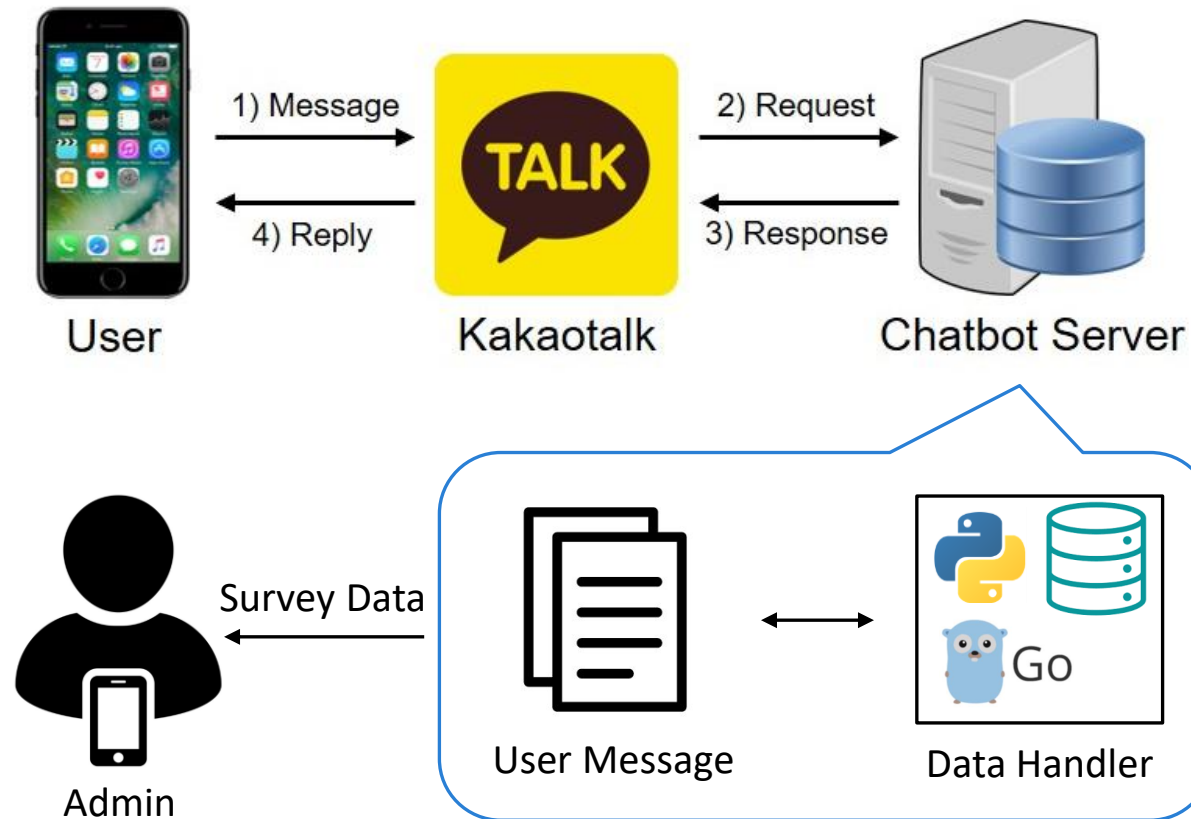
System Design

- Kakaotalk



System Design

- Chatbot Server



Requirement

- Function Requirement

Index	Requirement
1	Chatbot has to identify user's name and authority.
2	Users have to be allowed to participate, check and cancel survey.
3	Administrator has to be allowed to make, check and delete survey.
4	Administrator has to be allowed to download csv file that contains results of survey.

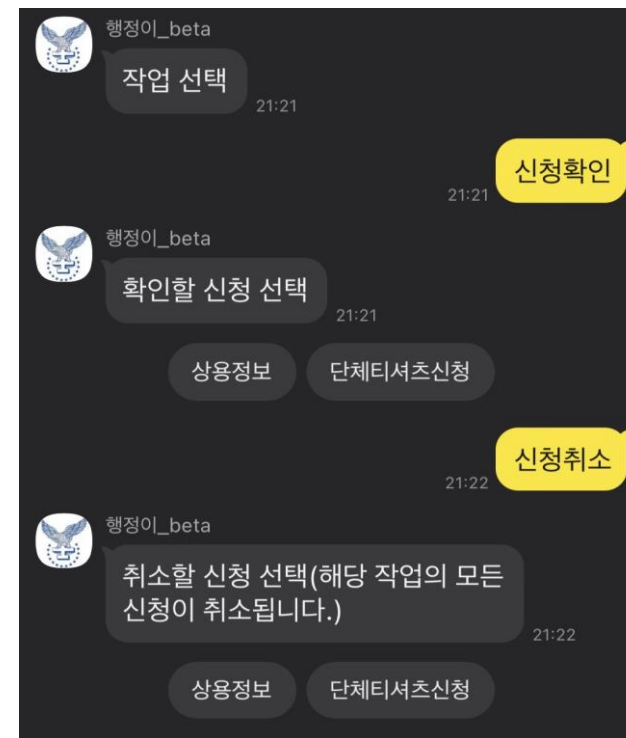
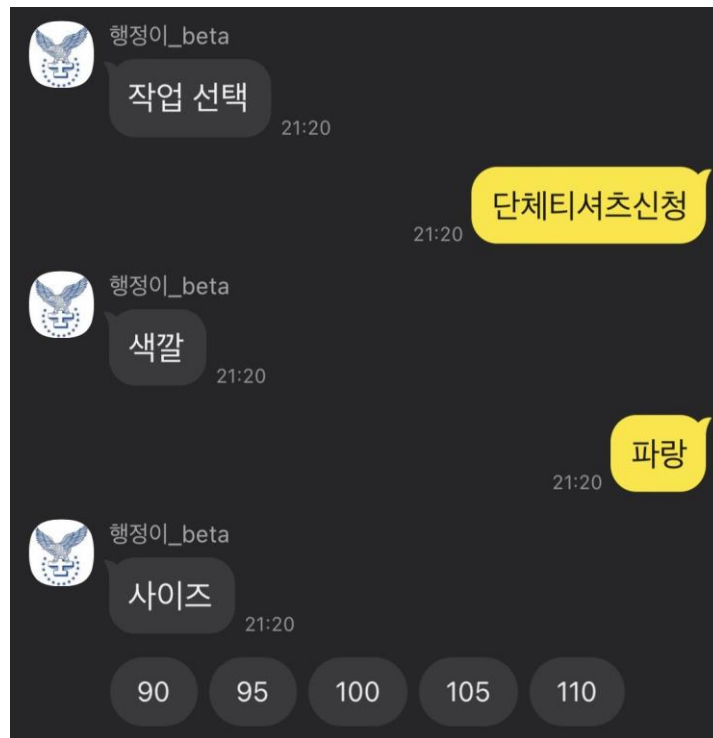
Requirement

- Performance Requirement

Index	Requirement
1	Chatbot has to reply all request at least 100 per second.
2	Chatbot has to reply all request at least in 1 second under situation of 100 concurrent users.

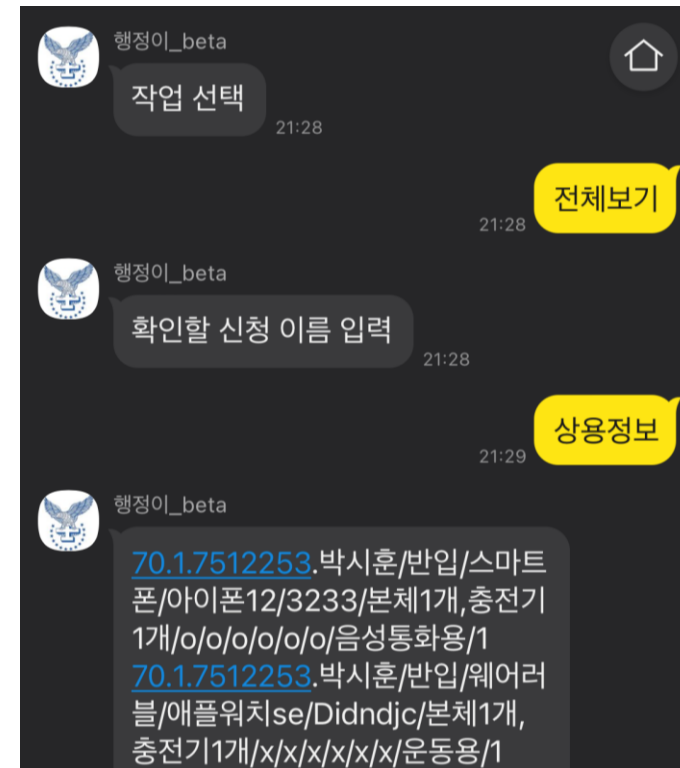
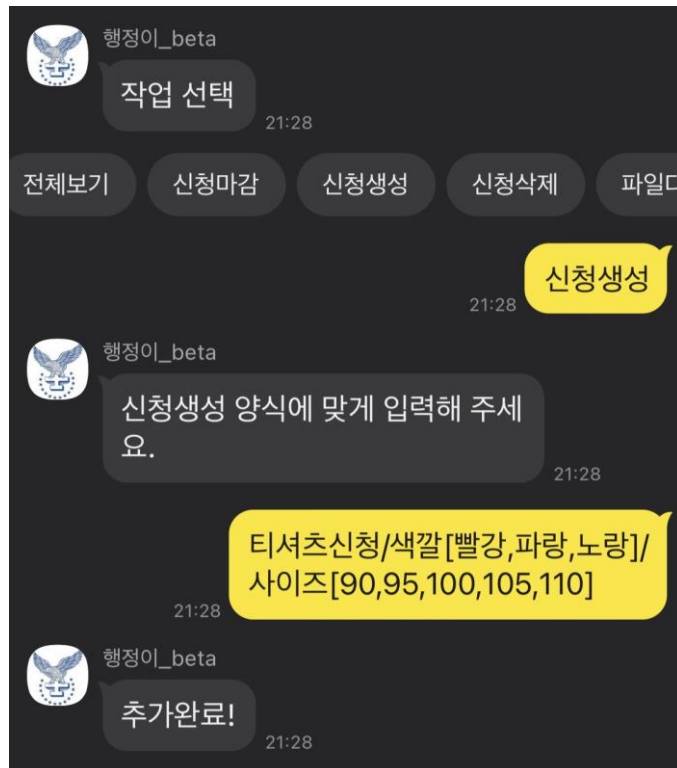
Chatbot Function

- Users can participate, check and cancel survey



Chatbot Function

- Administrator can make, check and delete survey
 - Administrator has to be allowed to download csv file that contains results of survey



Request Message (Json)

```
"userRequest": {
  "block": {
    "id": "<블록 id>",
    "name": "<블록 이름>"
  },
  "user": {
    "id": "<사용자 botUserKey>",
    "type": "botUserKey",
    "properties": {
      "botUserKey": "<사용자 botUserKey>",
    }
  },
  "utterance": "<사용자 발화>",
  "params": {
    "surface": "BuilderBotTest",
    "ignoreMe": "true"
  },
  "lang": "kr",
  "timezone": "Asia/Seoul"
},
"contexts": []
```

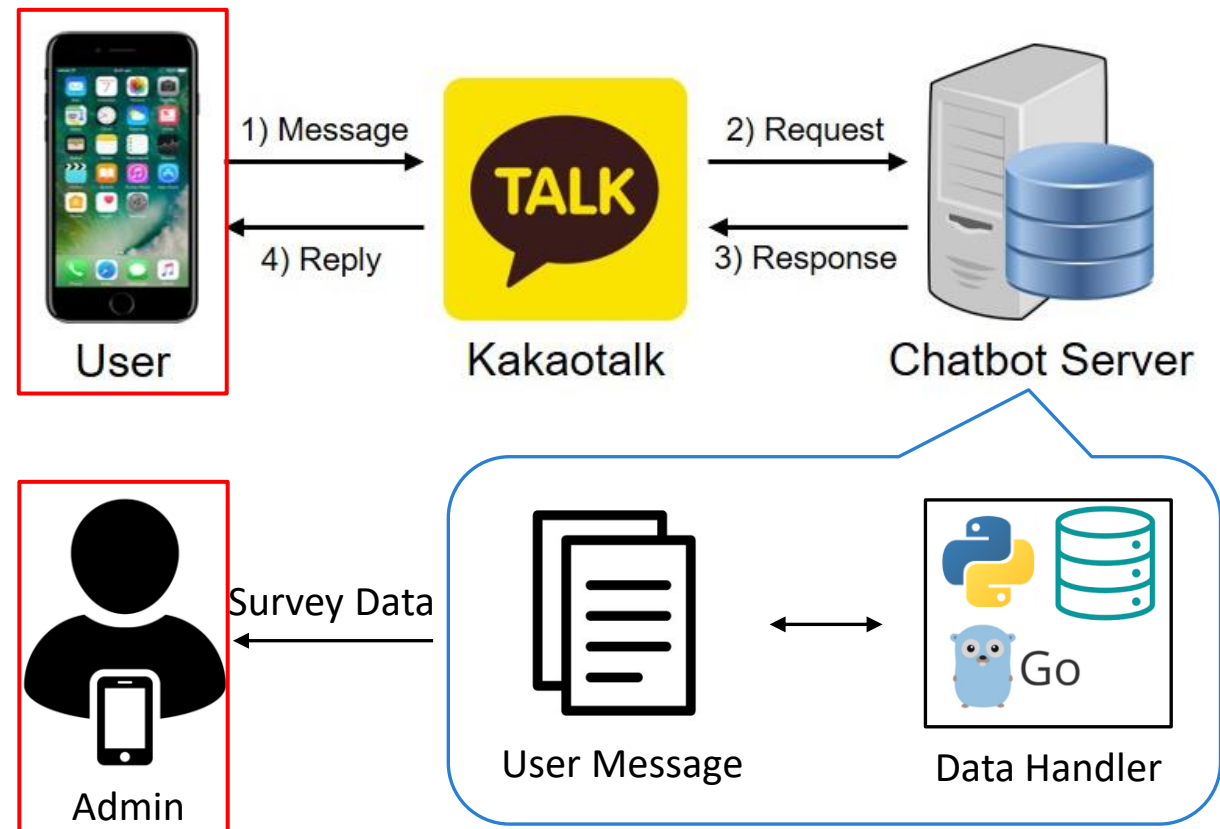
```
{
  "version": "2.0",
  "template": {
    "outputs": [
      {
        "simpleText": {
          "text": "간단한 텍스트 요소입니다."
        }
      }
    ]
  }
}

{
  "version": "2.0",
  "template": {
    "outputs": [
      {
        "simpleImage": {
          "imageUrl": "http://k.kakaocdn.net/dn/
          "altText": "보물상자입니다"
        }
      }
    ]
  }
}
```

Performance Improvement

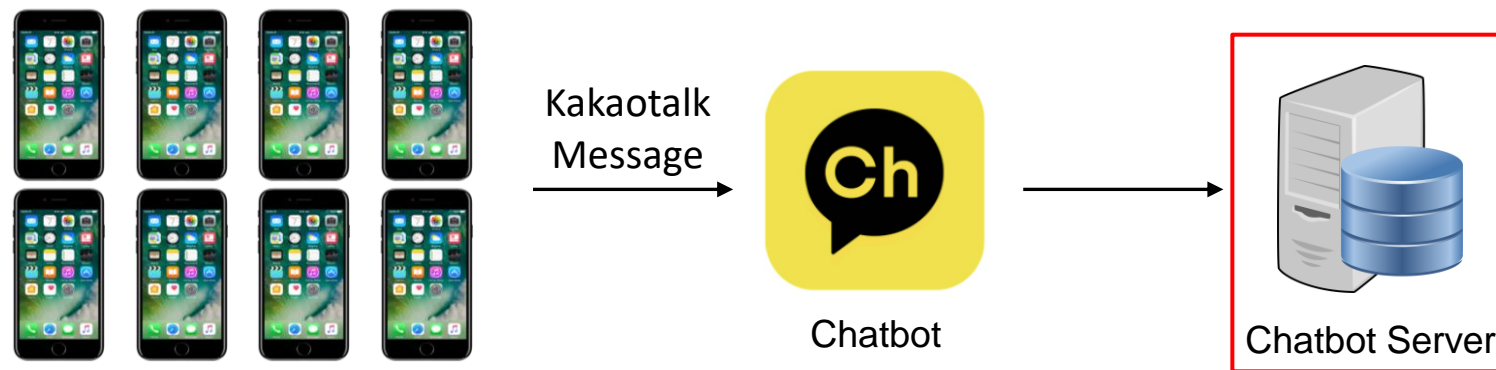
Experiment

- We used the initial chatbot system in the real workplace
 - About 800 users, 6 months
- We monitored potential issue while using the chatbot system
 - User complaint
 - Admin complaint



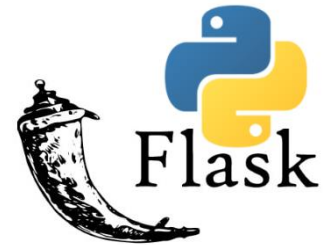
Issues

- Chatbot has error when users input incorrect message(empty text, form error)
 - We solved this problem by adding the function to check the user's response first
- Chatbot Server stop due to overload when concurrent users increased
 - We improve it by analyzing the cause of server performance degradation



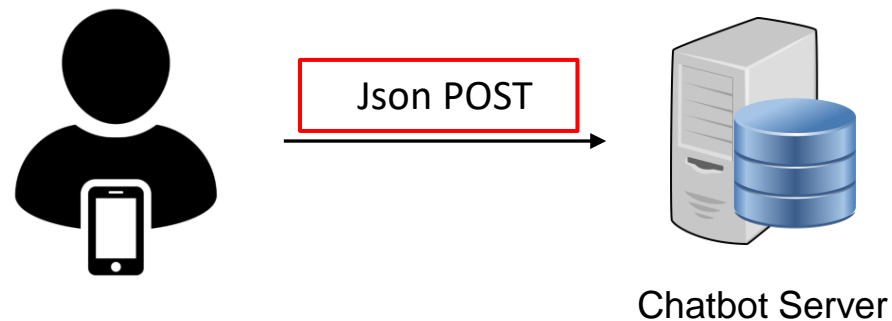
Performance Development

- Code migration
 - Python3 & Flask vs Golang & net/http
- Database design
 - Excel vs SQLite3
- Load Balancing



Performance Analysis

- We measured response time and total request per second(TPS), repeatedly sending Json POSTs in the same form as request format to the backend server
 - We used Python Locust, open source load testing tool

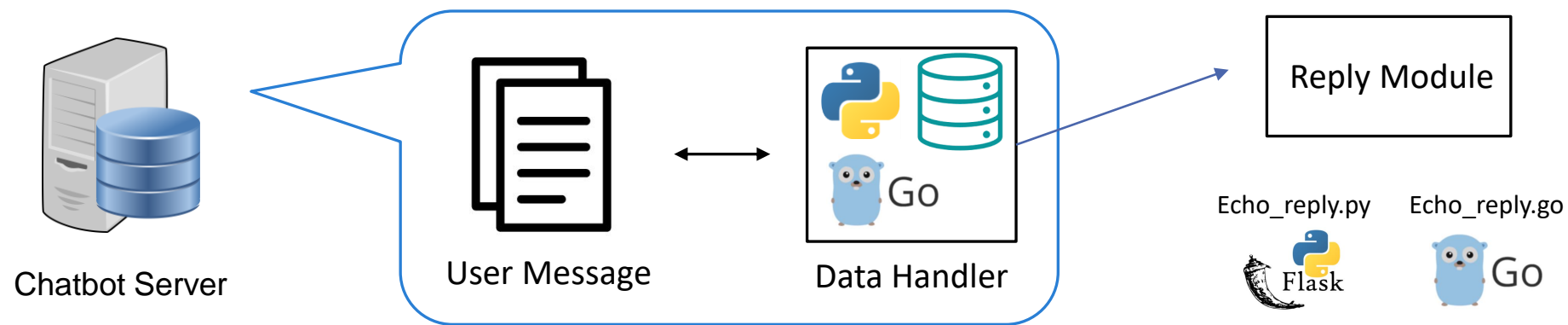


Python Locust

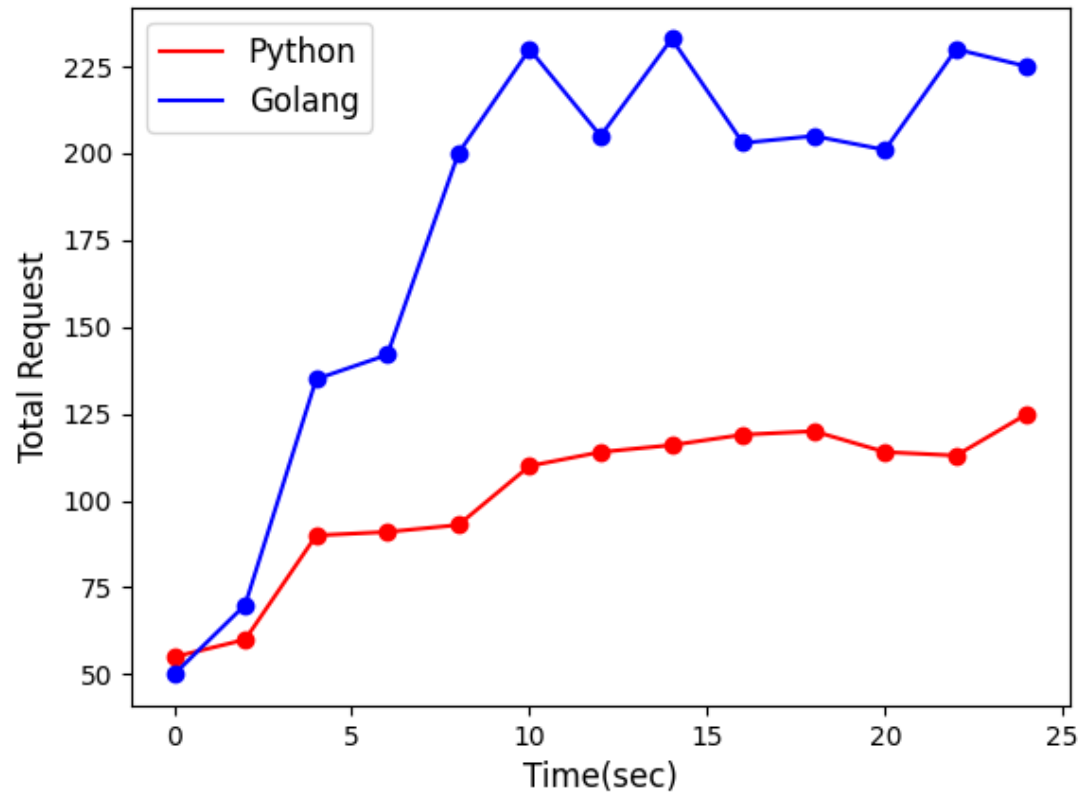


Result: Code Migration

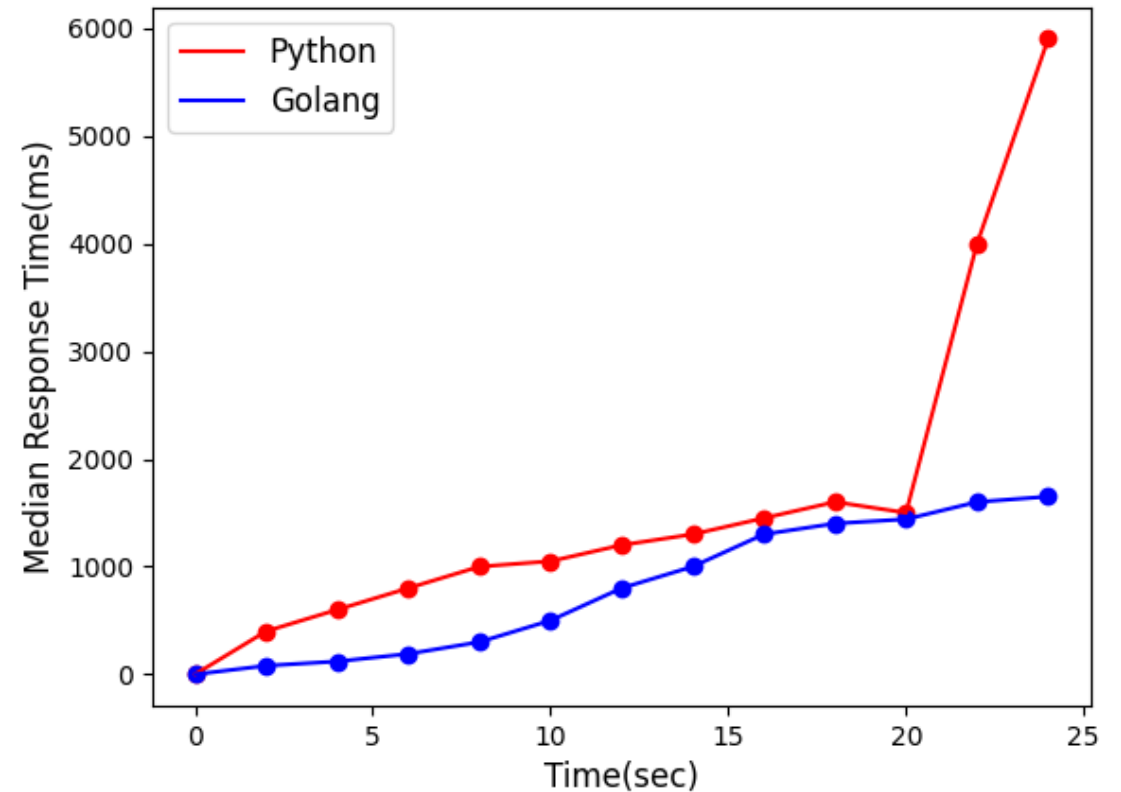
- Python3 & Flask vs Golang & net/http



Result: Code Migration



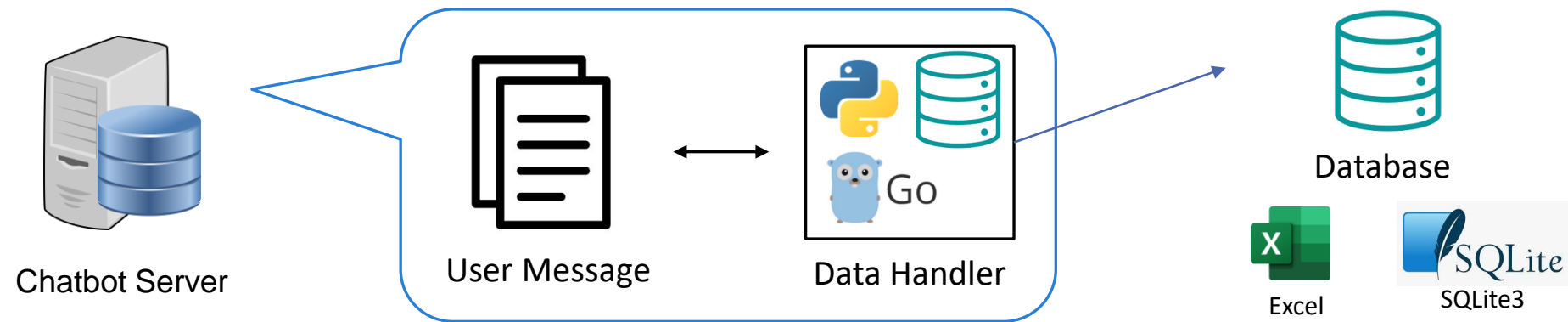
(a) Total Request per Second



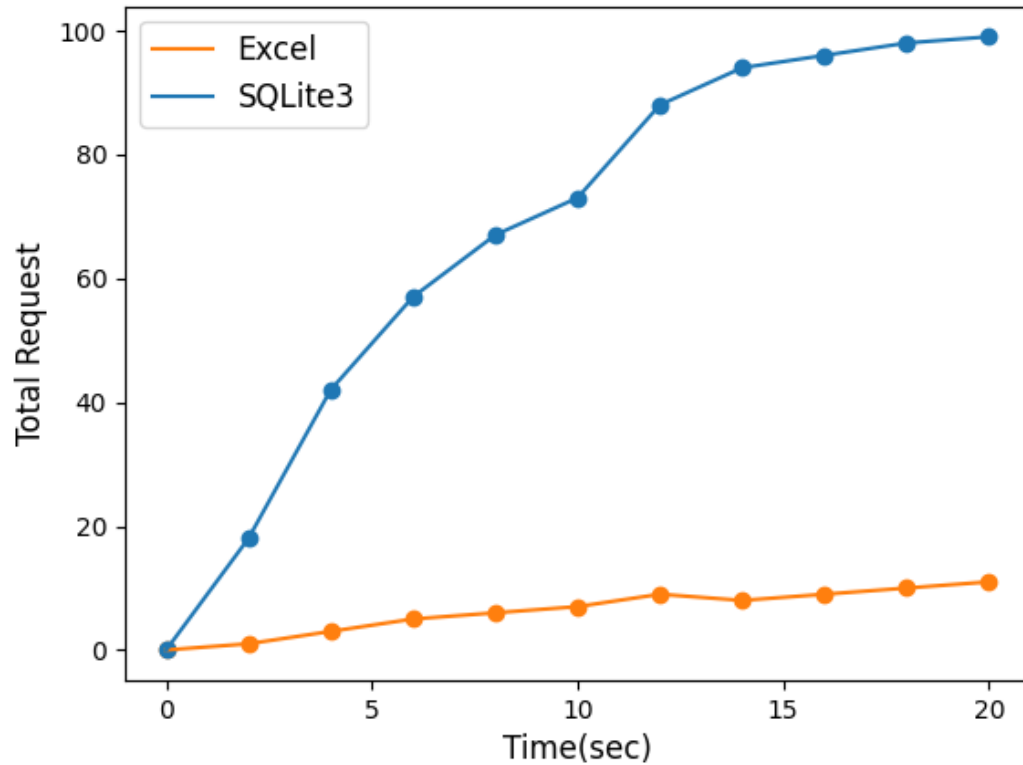
(b) Response Times

Result: Database Design

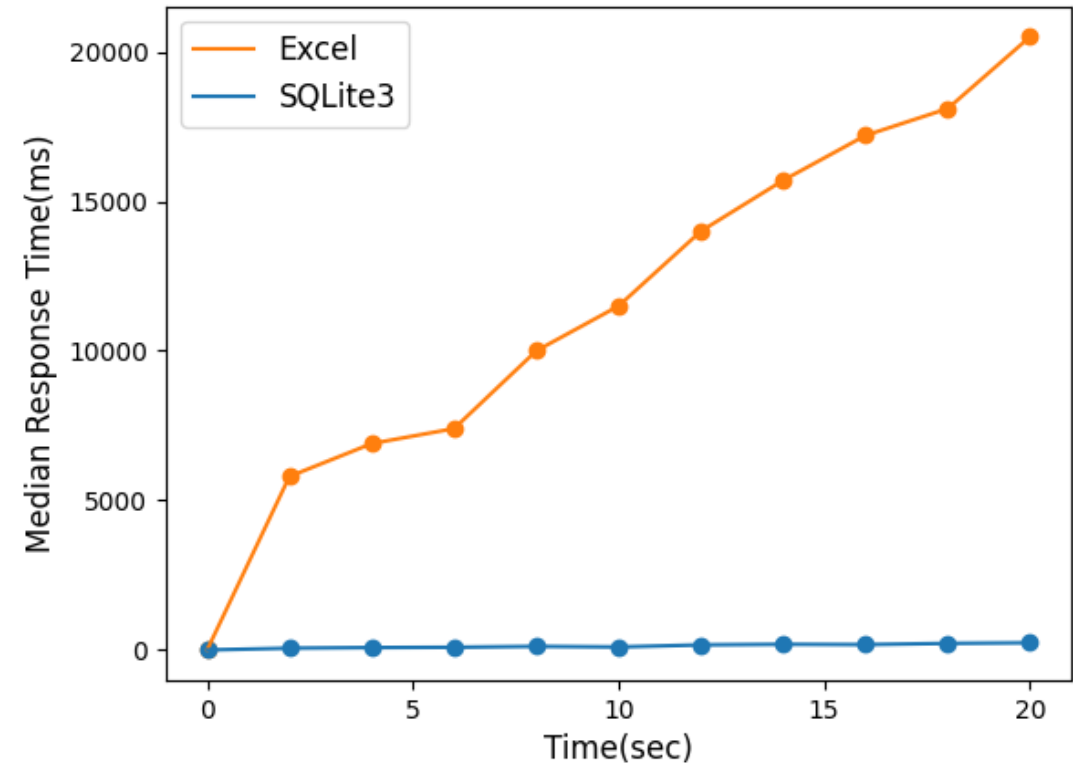
- Excel vs SQLite3



Result: Database Design

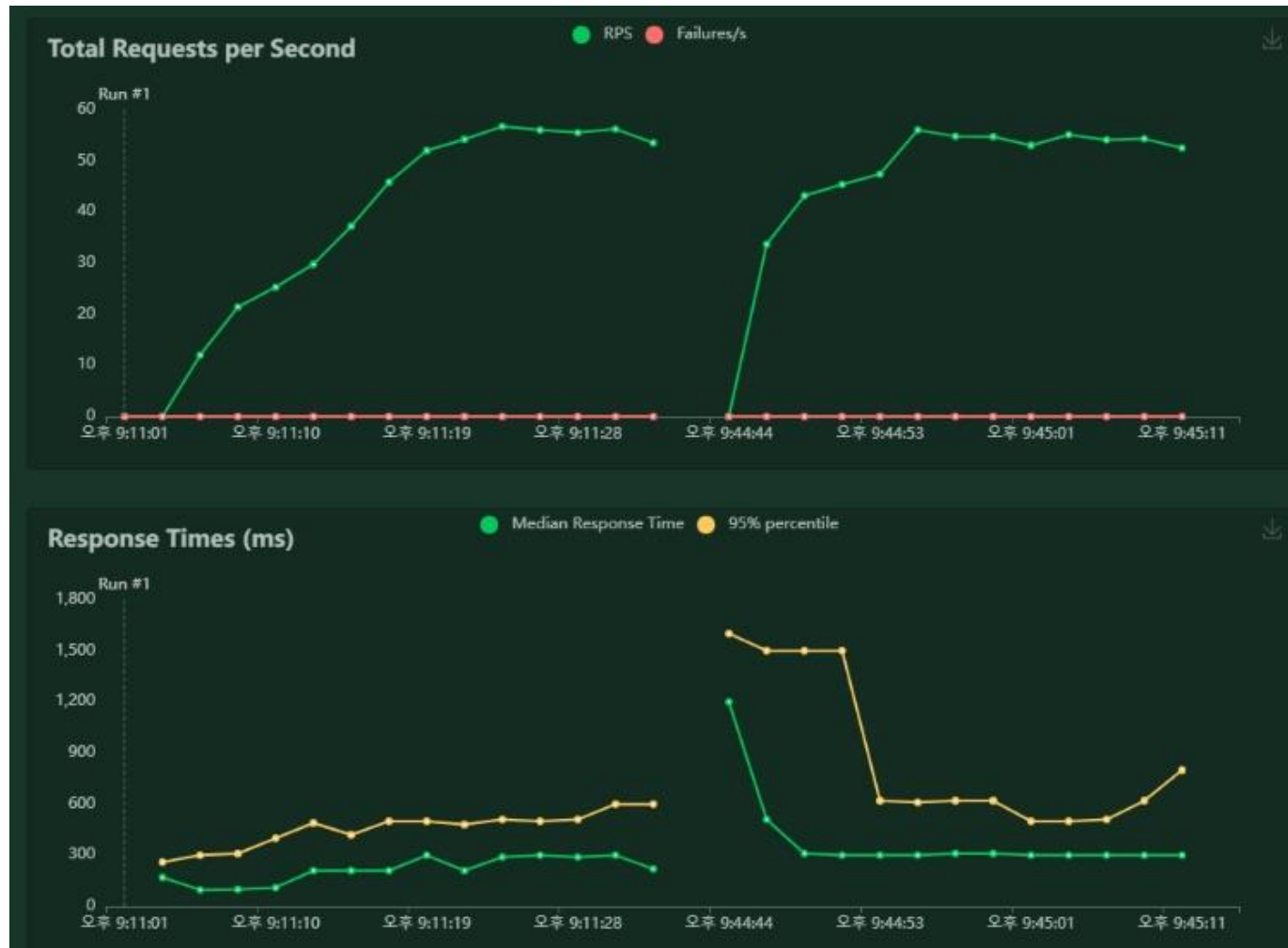


(a) Total Request per Second



(b) Response Times

Result: Load Balancing



Conclusion

Conclusion

- The chatbot system meets all the function and performance requirement

Index	Function Requirement
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Index	Performance Requirement
1	Chatbot has to reply all request at least 100 per second.
2	Chatbot has to reply all request at least in 1 second under situation of 100 concurrent users.

Conclusion

- We developed user-friendly chatbot system and used in real workplace
 - We improved chatbot performance by code migration and database design
- This system can be easily used in small groups or clubs
 - Administrator can build chatbot system if the chatbot server is prepared



Thanks

Q&A

Appendix : Simple

```
{
  "version": "2.0",
  "template": {
    "outputs": [
      {
        "simpleText": {
          "text": "간단한 텍스트 요소입니다."
        }
      }
    ]
  }
}
```

```
{
  "version": "2.0",
  "template": {
    "outputs": [
      {
        "simpleImage": {
          "imageUrl": "http://k.kakaocdn.net/dn/",
          "altText": "보물상자입니다"
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