COMP7940 Cloud Computing

2023/24 S2 Lab 4 - Consuming external service (Redis/ChatGPT)

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Intended Learning Outcomes

Throughout this lab you will be able to:

1. Experience in consuming an external database service;
2. Improve your chatbot to respond based on a database;
3. Equip your chatbot with ChatGPT 🤖 ;

1. Redis (Remote Dictionary Server) database

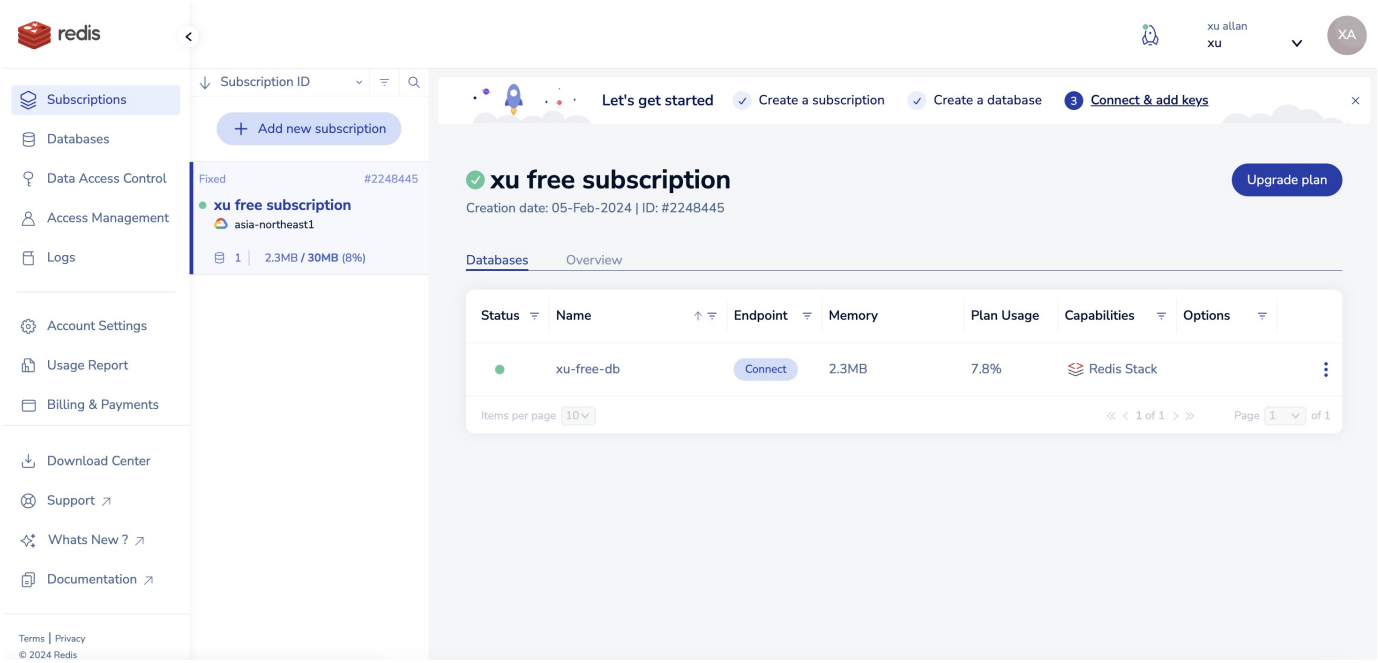
Redis is an open-source in-memory storage, used as a distributed, in-memory **key-value** database, cache and message broker, with optional durability (Ref: wikipedia)

1.1 Register a Redis account

Redis website

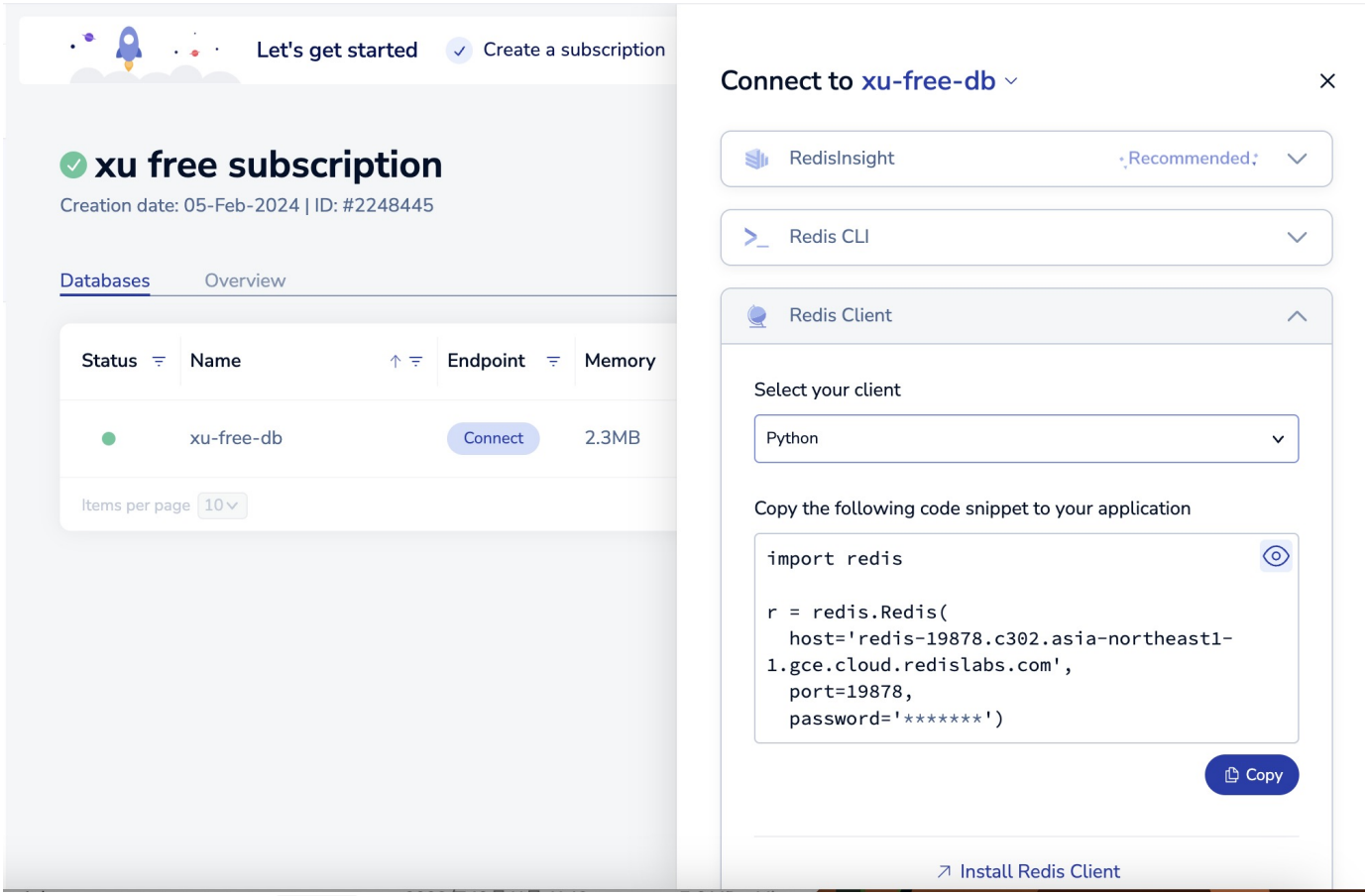
1.2 Add a new cloud database (free subsription)

- After you add a new subscription, you could see the webpage like the follows:



1.3 Access your cloud database using Python

- Click the botton of `Connect` and select the client type as `Python`; Then you could see the webpage like the follows:



- Click the botton of `Copy` and paste in your python environment using terminals to connect your Redis cloud database:

```
(lab3) xuyu@xuyudeMacBook-Air ~ % python
Python 3.12.1 | packaged by Anaconda, Inc. | (main, Jan 19 2024, 09:45:58) [Clang 14.0
Type "help", "copyright", "credits" or "license" for more information.
>>> import redis
>>>
>>> r = redis.Redis(
...   host='redis-19878.c302.asia-northeast1-1.gce.cloud.redislabs.com',
...   port=19878,
...   password='KLB4jPzIEB5kmXwKLwwUTAyeSX5qKVoi')
>>>
```

- Check whether you successfully connected the Redis cloud database:

```
>>> r.ping()
True
```

- Add new **key-value** pairs into your cloud database using the method of `set(key, value)`:

```
>>> r.set("my_name","xuyu")
True
```

- Get the value of the given key from your cloud database using the method of `get(key)`:

```
>>> r.get("my_name")
b'xuyu'
```

- Check whether a particular key existing in the database or not using the method of `exists(key)`:

```
>>> r.exists("my_name")
1
>>> r.exists("random123")
0
```

- Delete a key in the database using the method of `delete(key)`

```
>>> r.delete("my_name")
1
>>> r.exists("my_name")
0
```

> The document of redis-py can be accessed in https://redis-py.readthedocs.io/en/stable/

2. Employing your chatbot integrating Redis cloud services

2.1 Update your configuration file created in Lab3

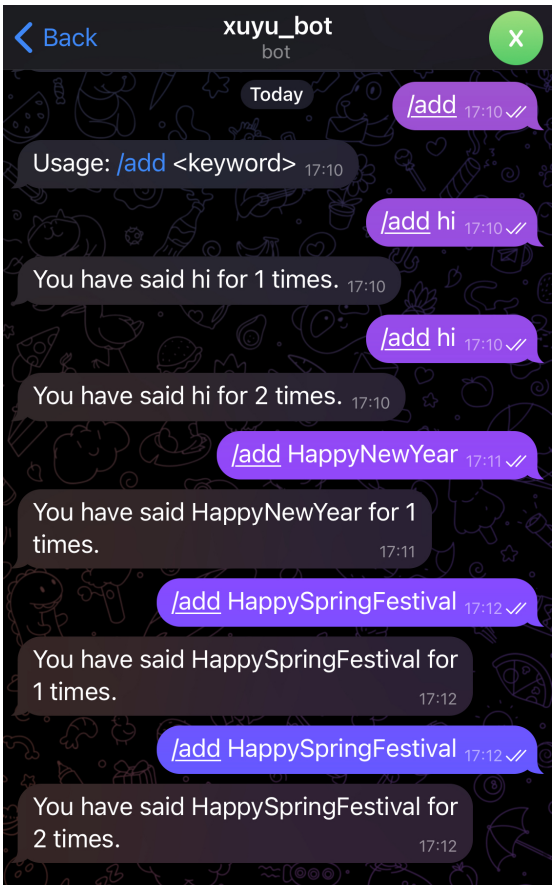
```
[TELEGRAM]
ACCESS_TOKEN = 6735106346:AAFHGTtRYDzw7YMxq7dJOwwS-i8Ids4SKGM
[REDIS]
HOST = edis-19878.c302.asia-northeast1-1.gce.cloud.redislabs.com
PASSWORD = KLB4jPzIEB5kmXwKLwwUTAyeSX5qKVoi
REDISPORT = 19878
```

2.2 Update `chatbot.py` of the echo chatbot to integrate Redis

```
from telegram import Update
from telegram.ext import (Updater, CommandHandler, MessageHandler, Filters,
                          CallbackContext)
import configparser
import logging
import redis

global redis1
def main():
    # Load your token and create an Updater for your Bot
    config = configparser.ConfigParser()
    config.read('config.ini')
    updater = Updater(token=(config['TELEGRAM']['ACCESS_TOKEN']), use_context=True)
    dispatcher = updater.dispatcher
    global redis1
    redis1 = redis.Redis(host=(config['REDIS']['HOST']),
                password=(config['REDIS']['PASSWORD']),
                port=(config['REDIS']['REDISPORT']))

    # You can set this logging module, so you will know when
    # and why things do not work as expected Meanwhile, update your config.ini as:
    logging.basicConfig(format='%(asctime)s - %(name)s - %(levelname)s - %(message)s',
                        level=logging.INFO)

    # register a dispatcher to handle message: here we register an echo dispatcher
    echo_handler = MessageHandler(Filters.text & (~Filters.command), echo)
    dispatcher.add_handler(echo_handler)


    # on different commands - answer in Telegram
    dispatcher.add_handler(CommandHandler("add", add))
    dispatcher.add_handler(CommandHandler("help", help_command))

    # To start the bot:
    updater.start_polling()
    updater.idle()



def echo(update, context):
    reply_message = update.message.text.upper()
    logging.info("Update: " + str(update))
    logging.info("context: " + str(context))
    context.bot.send_message(chat_id=update.effective_chat.id, text= reply_message)
```

```
# Define a few command handlers. These usually take the two arguments update and
# context. Error handlers also receive the raised TelegramError object in error.
def help_command(update: Update, context: CallbackContext) -> None:
    """Send a message when the command /help is issued."""
    update.message.reply_text('Helping you helping you.')


def add(update: Update, context: CallbackContext) -> None:
    """Send a message when the command /add is issued."""
    try:
        global redis1
        logging.info(context.args[0])
        msg = context.args[0]   # /add keyword <-- this should store the keyword
        redis1.incr(msg)

        update.message.reply_text('You have said ' + msg +  ' for ' +
                        redis1.get(msg).decode('UTF-8') + ' times.')

    except (IndexError, ValueError):
        update.message.reply_text('Usage: /add <keyword>')


if __name__ == '__main__':
    main()
```

- We add two commands to the echo chatbot (created in the Lab3): `/help` and `/add`. The command of `/help` could be designed to provide information for users to use your chatbot. We implemented the command of `/add` as a simple example which counts the frequency of specific input words.



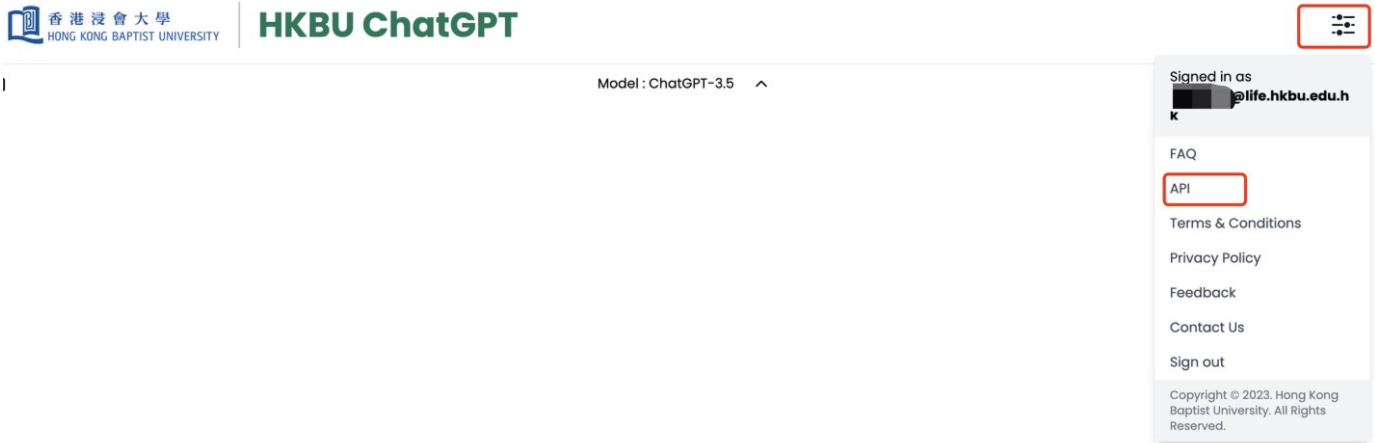
> (Optional) Try to use `set()`, `get()`, or `delete()` into the `chatbot.py` to enable your bot replying certain answers given particular messages.

3. ChatGPT: integrating large language models (LLM) into your chatbot

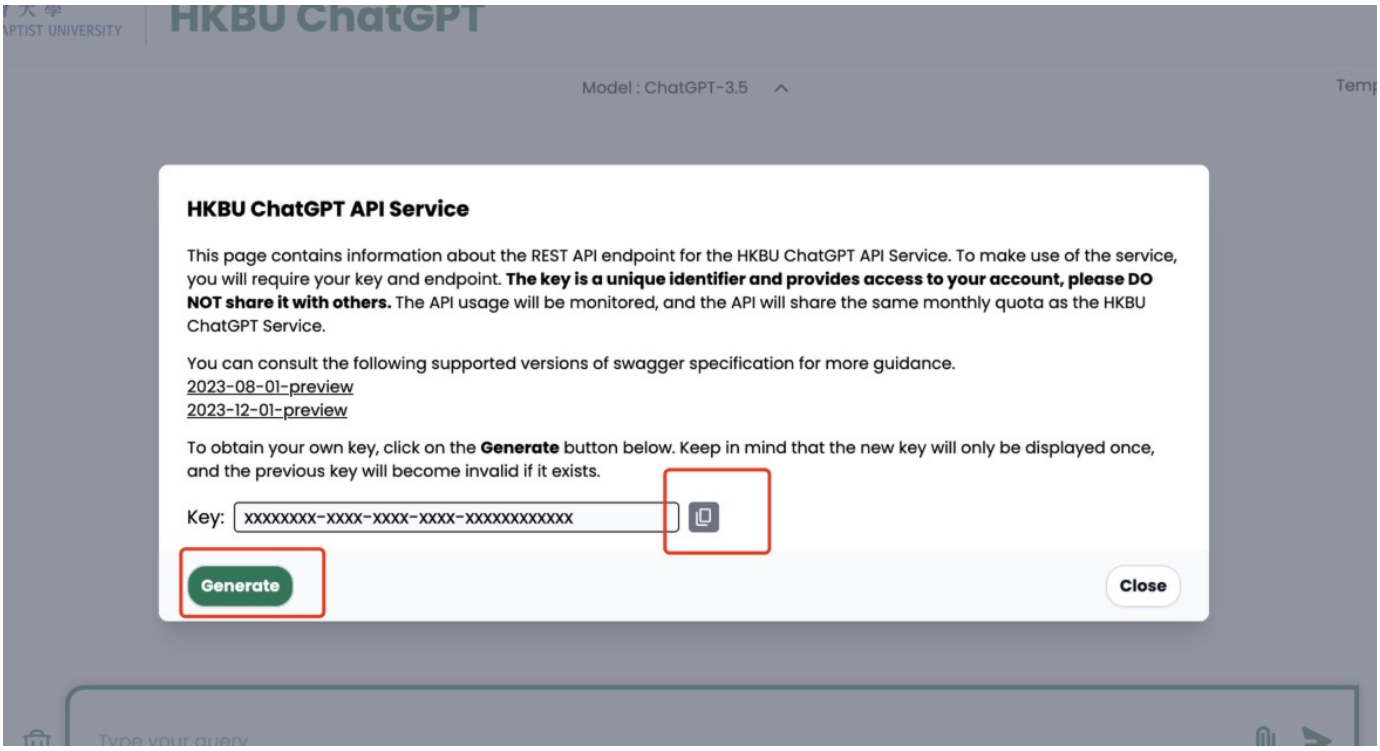
Breakthrough: The top-tier scientific journal *Nature* featured ChatGPT as one of "Ten people (and one non-human) who helped shape science in 2023".

3.1 Get the access token of HKBU's ChatGPT

- HKBU's ChatGPT webpage: https://chatgpt.hkbu.edu.hk/
- Select `API` in the upper-right corner of the webpage



- Generate a access token



3.2 Update your configuration file

```
[TELEGRAM]
ACCESS_TOKEN = 6735106346:AAFHGTtRYDzw7YMxq7dJOwwS-i8Ids4SKGM
[REDIS]
HOST = edis-19878.c302.asia-northeast1-1.gce.cloud.redislabs.com
PASSWORD = KLB4jPzIEB5kmXwKLwwUTAyeSX5qKVoi
REDISPORT = 19878
[CHATGPT]
BASICURL = https://chatgpt.hkbu.edu.hk/general/rest
MODELNAME = gpt-35-turbo-16k
APIVERSION = 2023-12-01-preview
ACCESS_TOKEN = YOUR_ACCESS_TOKEN
```

3.3 Access ChatGPT using Python

- You may need to install requests first if you have not installed before.

```
pip install requests
```

- Now we create another Python file `ChatGPT_HKBU.py` for accessing ChatGPT

```
import configparser
import requests

class HKBU_ChatGPT():
    def __init__(self,config_='./config.ini'):
        if type(config_) == str:
            self.config = configparser.ConfigParser()
            self.config.read(config_)
        elif type(config_) == configparser.ConfigParser:
            self.config = config_

    def submit(self,message):
        conversation = [{"role": "user", "content": message}]

        url = (self.config['CHATGPT']['BASICURL']) +
        "/deployments/" + (self.config['CHATGPT']['MODELNAME']) +
        "/chat/completions/?api-version=" +
        (self.config['CHATGPT']['APIVERSION'])

        headers = { 'Content-Type': 'application/json',
        'api-key': (self.config['CHATGPT']['ACCESS_TOKEN']) }
        payload = { 'messages': conversation }
        response = requests.post(url, json=payload, headers=headers)
        if response.status_code == 200:
            data = response.json()
            return data['choices'][0]['message']['content']
        else:
            return 'Error:', response


if __name__ == '__main__':
    ChatGPT_test = HKBU_ChatGPT()

    while True:
        user_input = input("Typing anything to ChatGPT:\t")
        response = ChatGPT_test.submit(user_input)
        print(response)
```

- Run the script of `ChatGPT_HKBU.py` and ask some things in the terminal:

```
% python ChatGPT_HKBU.py
Typing anything to ChatGPT:     hello
Hello! How can I assist you today?
Typing anything to ChatGPT:
```

3.4 Update `chatbot.py`

Add the below code:

```
from ChatGPT_HKBU import HKBU_ChatGPT

def equiped_chatgpt(update, context):
    global chatgpt
    reply_message = chatgpt.submit(update.message.text)
    logging.info("Update: " + str(update))
    logging.info("context: " + str(context))
    context.bot.send_message(chat_id=update.effective_chat.id, text=reply_message)
```

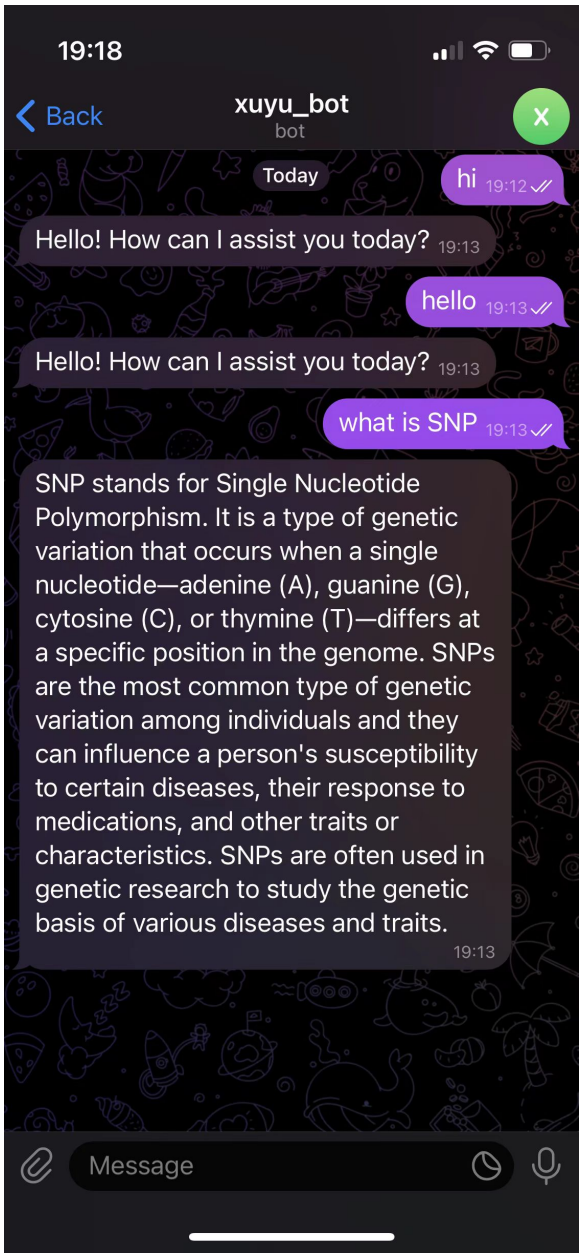
Add `dispatcher` for chatgpt and disable the part of echo function in `main()`:

```
    # register a dispatcher to handle message: here we register an echo dispatcher
    # echo_handler = MessageHandler(Filters.text & (~Filters.command), echo)
    # dispatcher.add_handler(echo_handler)

    # dispatcher for chatgpt
    global chatgpt
    chatgpt = HKBU_ChatGPT(config)
    chatgpt_handler = MessageHandler(Filters.text & (~Filters.command),
                        equiped_chatgpt)
    dispatcher.add_handler(chatgpt_handler)
```

3.5 Telegram chatbot equiped with ChatGPT

```
python chatbot.py
```

An example screenshot:



Push your code to Github

This is the end of Lab4. Please push your code to Github.

Writeup

Answer the following questions and submit them to moodle:

1. Please describe the architecture of the current chatbot system. Identify the components and check where are they running now.
2. Explain how do your chatbot handle the special command. You need to trace the code and explain that.
3. Update your code so that when user type /hello Kevin , it will reply Good day, Kevin! . Write down the change you have made.

4. Make a few screen caps to prove that you have applied your own Redis account, used it in your chatbot, and push the code on GitHub (at least 2 commits - lab3/lab4).