INDIVIDUAL ASSIGNMENT

TECHNOLOGY PARK MALAYSIA

CT010-3-1-PYP

PYTHON PROGRAMMING

APD1F2106/APU1F2016 –
CE/ME/TE/PE/EEE/CS/CS(CYB)/SE/IS/IT/CS(DF)/MMT/CGD

HAND OUT DATE: **19TH JULY 2021**

HAND IN DATE: **17TH SEPTEMBER 2021**

WEIGHTAGE: **100%**

INSTRUCTIONS TO CANDIDATES:

1. Submit your assignment online in MS Teams unless advised otherwise
2. Late submission will be awarded zero (0) unless Extenuating Circumstances (EC) are upheld
3. Cases of plagiarism will be penalized
4. You must obtain at least 50% in each component to pass this module

Name and Tp No

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Intake	APU1F2106CS

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Introduction and assumptions

Introduction

Coronavirus disease (COVID-19) is a hazardous disease with the first known case identified in December 2019 in Wuhan, China. This disease has widely spread all around the world causing global pandemic. There is no treatment and medication that can be used to cure this disease. Therefore, the Covid-19 vaccination is essentially needed to build up protection against this disease. In Malaysia, vaccination should be finished as soon as possible so the pandemic can end quickly. Therefore, COVID-19 Vaccination Record Management System can be used to accelerate the vaccination process. With this vaccination record management system, people can get vaccinated within a short period of time in the particular vaccination centre. All the patients information can be kept securely and found easily in the system.

Assumptions

A few assumptions had been made while designing the program for COVID-19 vaccination record management system. First, there are two vaccination centres near this place, VC1 and VC2. Users can choose to register themselves whether get their vaccination in vaccination centre, VC1 or VC2. Apart from vaccination centre, users will need to choose the type of vaccines based on their age group. In the vaccination centres, there are 5 different types of vaccines which are AF, BV, CZ, DM and EC. Not only the vaccines can be chosen by people from different age groups, the dosage required and interval between doses are also different for each vaccine. Two dosages are required for AF, BV, CZ and DM vaccines but only 1 dosage needed for EC vaccines. The interval between doses for AF vaccine is 2 weeks while both BV and CZ are 3 weeks, 4 weeks for DM vaccines. The EC vaccine do not have interval between doses because only 1 dosage is required. For the AF vaccine, only the patients 12 years old and above can select. The BV vaccine can be selected by patients 18 years old and above while the CZ vaccine is only for patients between 12 to 45 years old. The DM vaccine is for patients who 12 years old and above as well as the EC vaccine for 18 years old and above patients. New patients can register themselves by this program and their information will be automatically saved. Besides, the assumption

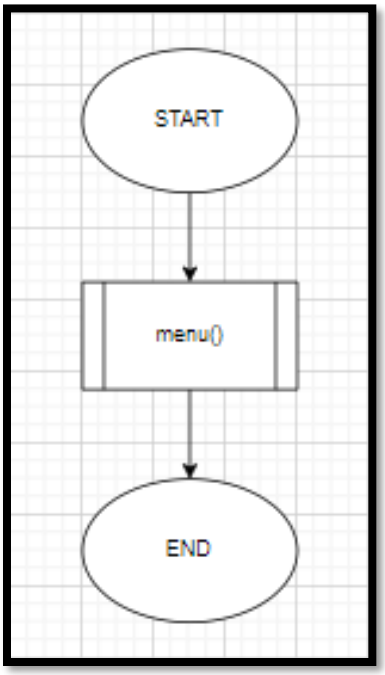
of fixed first dose date in this program has been made. In order to get the vaccination status, first dose date will be compared to system date and second dose date. The program can also be used to check patient record and also the statistical information which the statistical information contains total number of patients vaccinated by each vaccination centres, people who waiting for dose 2 and people who have completed vaccination.

Design of the program

Pseudocode and flowchart

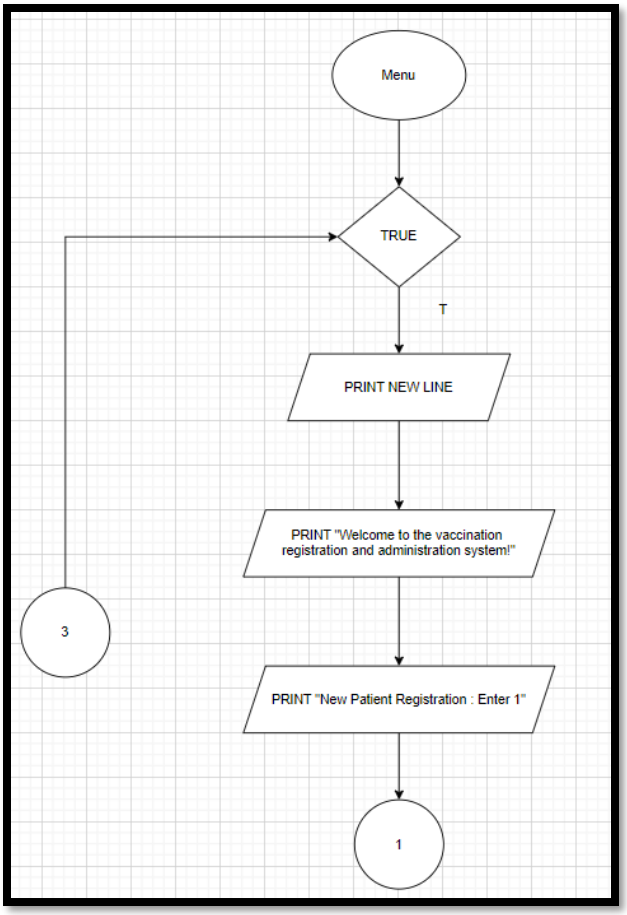
Main Program

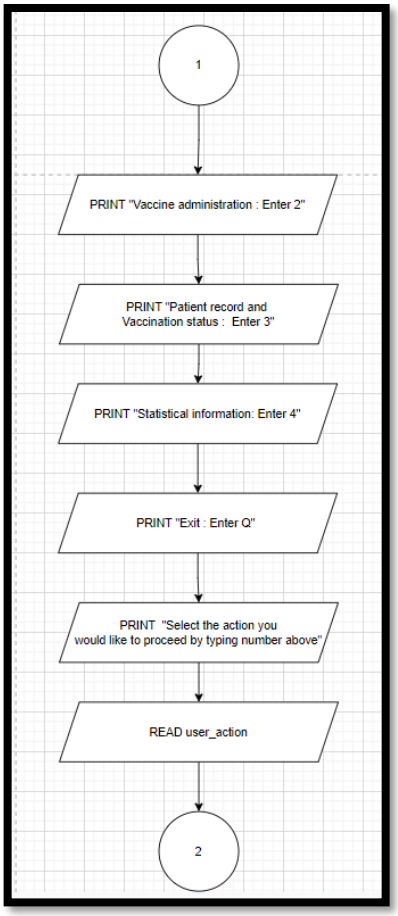
```
PROGRAM COVID-19 VACCINATION RECORD MANAGEMENT SYSTEM

BEGIN
        CALL menu()
END
```

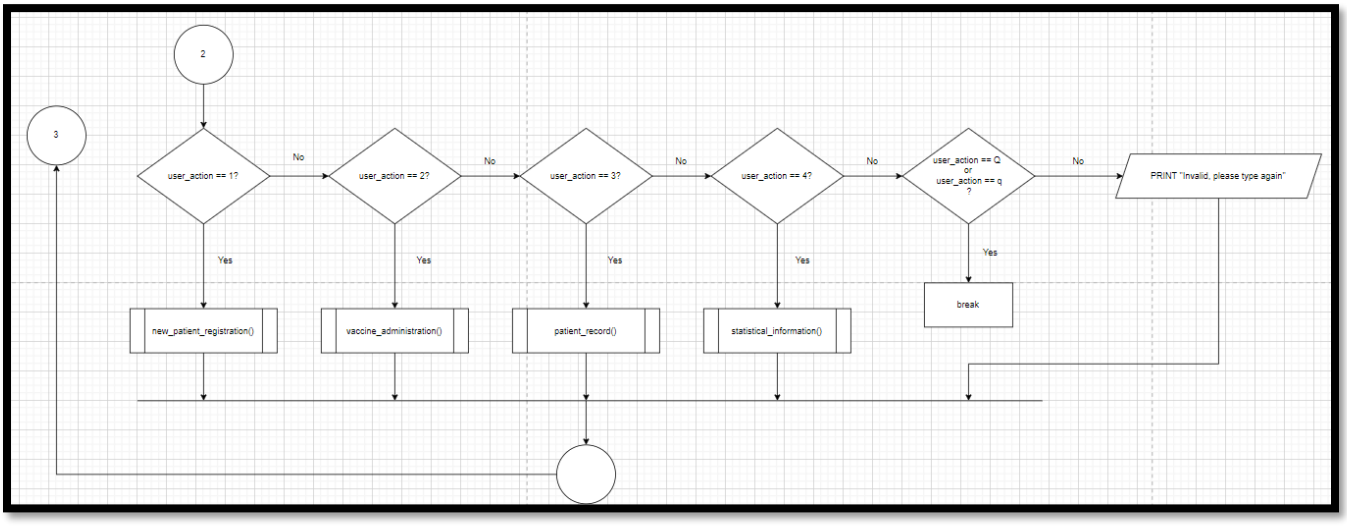


Menu

```
FUNCTION menu()
        WHILE TRUE
                PRINT NEW LINE
                PRINT "Welcome to the vaccination registration and administration system!"
                PRINT "New Patient Registration                  : Enter 1"
                PRINT "Vaccine administration                    : Enter 2"
                PRINT "Patient record and Vaccination status     : Enter 3"
                PRINT "Statistical information                   : Enter 4"
                PRINT "Exit                                      : Enter Q"

                PRINT "Select the action you would like to proceed by typing number above"

                READ user_action

                IF (user_action == 1) THEN
                        CALL new_patient_registration()

                ELSE
                        IF (user_action == 2) THEN
                                CALL vaccine_administration()
                        ELSE
                                IF (user_action == 3) THEN
                                        CALL patient_record()
                                ELSE
                                        IF (user_action == 4) THEN
                                                CALL statistical_information()

                                        ELSE
                                                IF (user_action == q or user_action == Q) THEN
                                                        break
                                                ELSE
                                                        PRINT "Invalid, please type again"
        ENDWHILE
ENDFUNCTION
```

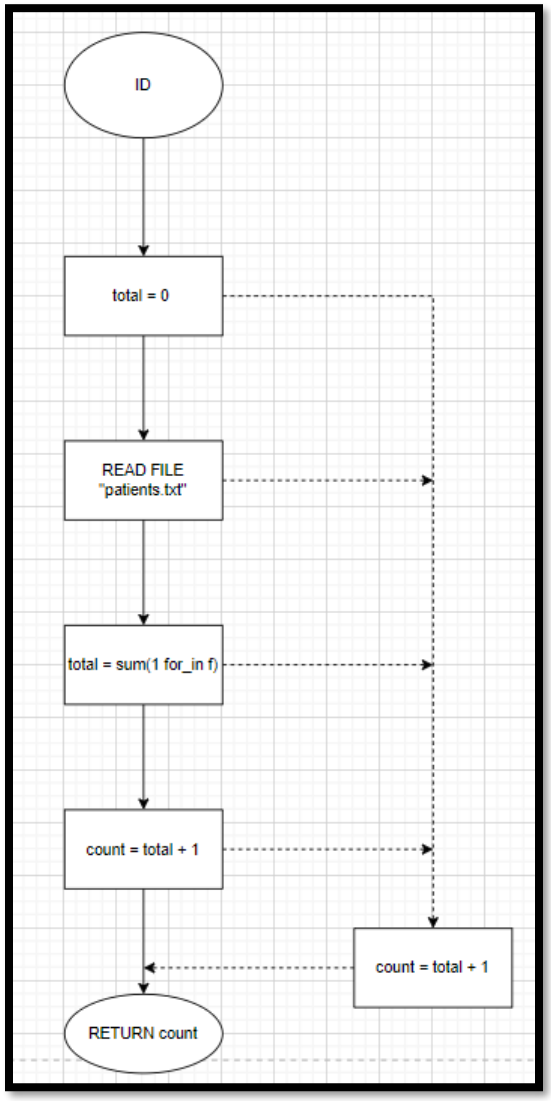

Menu
TRUE
T
PRINT NEW LINE
PRINT "Welcome to the vaccination registration and administration system!"
PRINT "New Patient Registration : Enter 1"
1
3


1
PRINT "Vaccine administration : Enter 2"
PRINT "Patient record and Vaccination status : Enter 3"
PRINT "Statistical information: Enter 4"
PRINT "Exit : Enter Q"
PRINT "Select the action you would like to proceed by typing number above"
READ user_action
2


2
3
user_action == 1?
No
user_action == 2?
No
user_action == 3?
No
user_action == 4?
No
user_action == Q or user_action == q ?
No
PRINT "Invalid, please type again"
Yes
Yes
Yes
Yes
Yes
new_patient_registration()
vaccine_administration()
patient_record()
statistical_information()
break

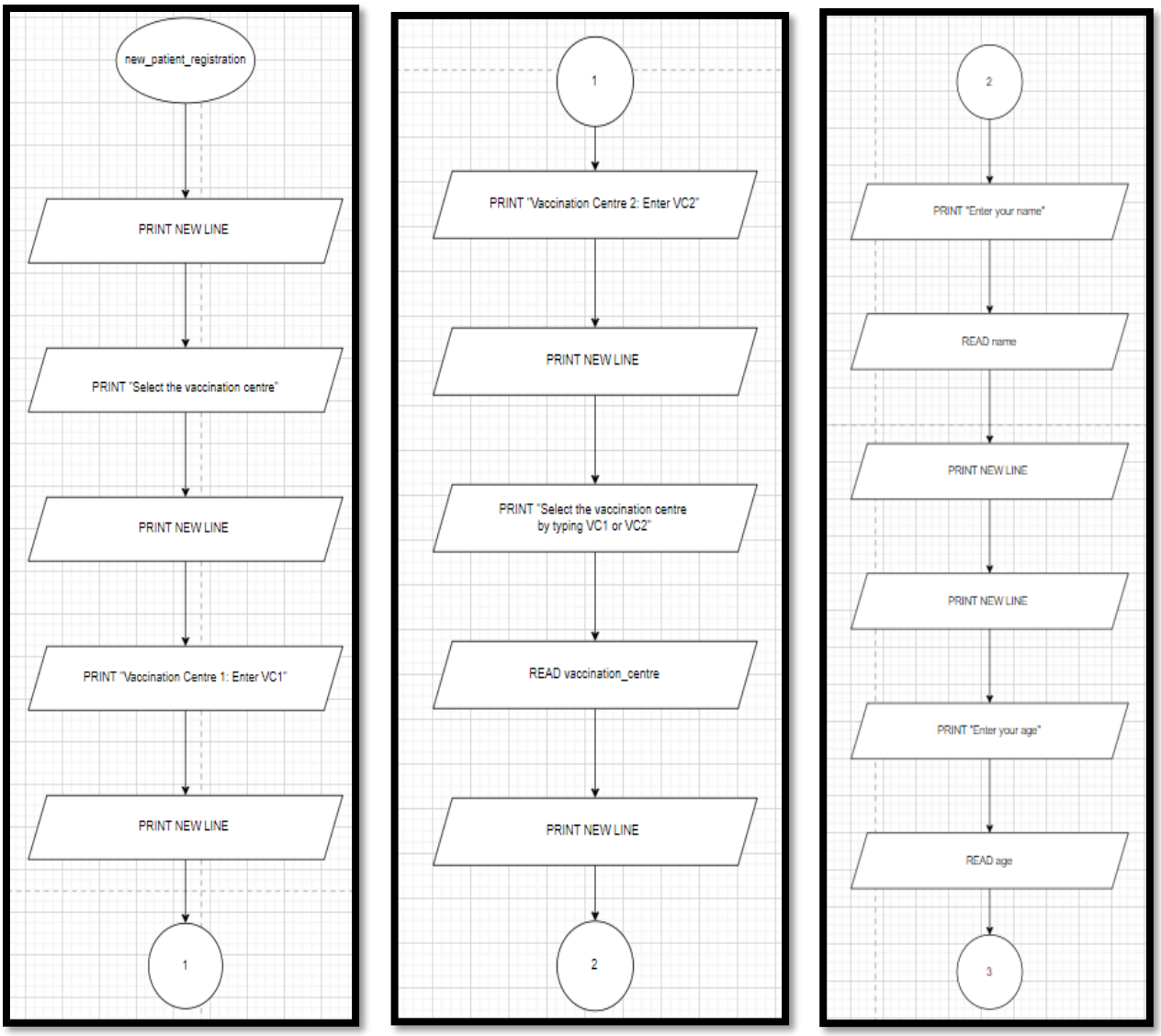
Id

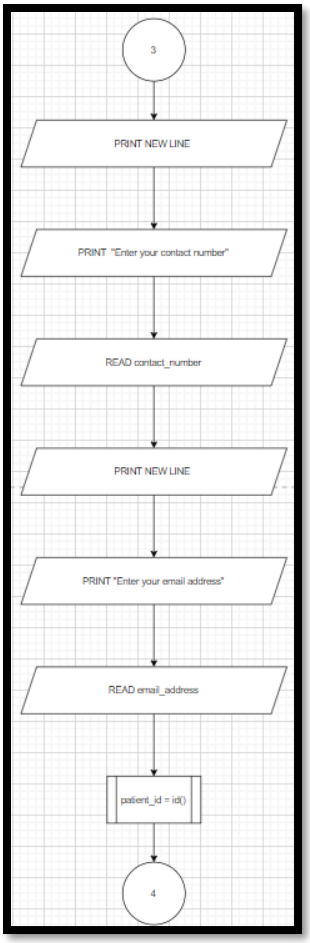
```
FUNCTION id()
        TRY
                total = 0
                OPEN FILE "patients.txt" IN READ MODE
                        total = sum(1 for_in f)
                        count = total + 1
                        return count

        EXCEPT
                count = 1
                return count

ENDFUNCTION
```

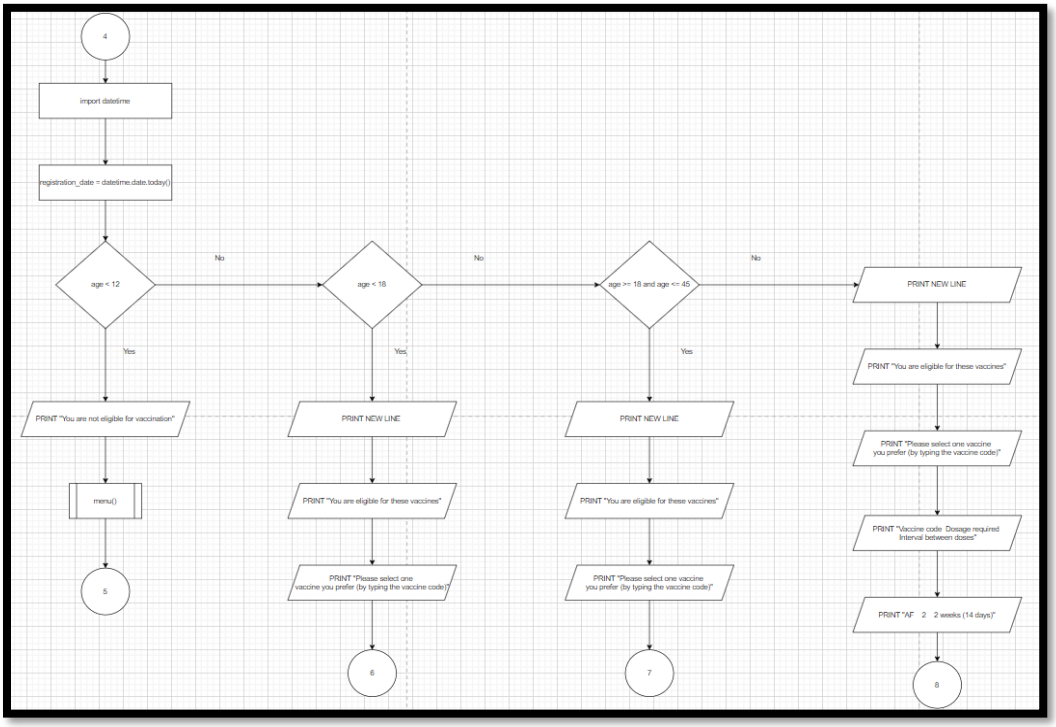


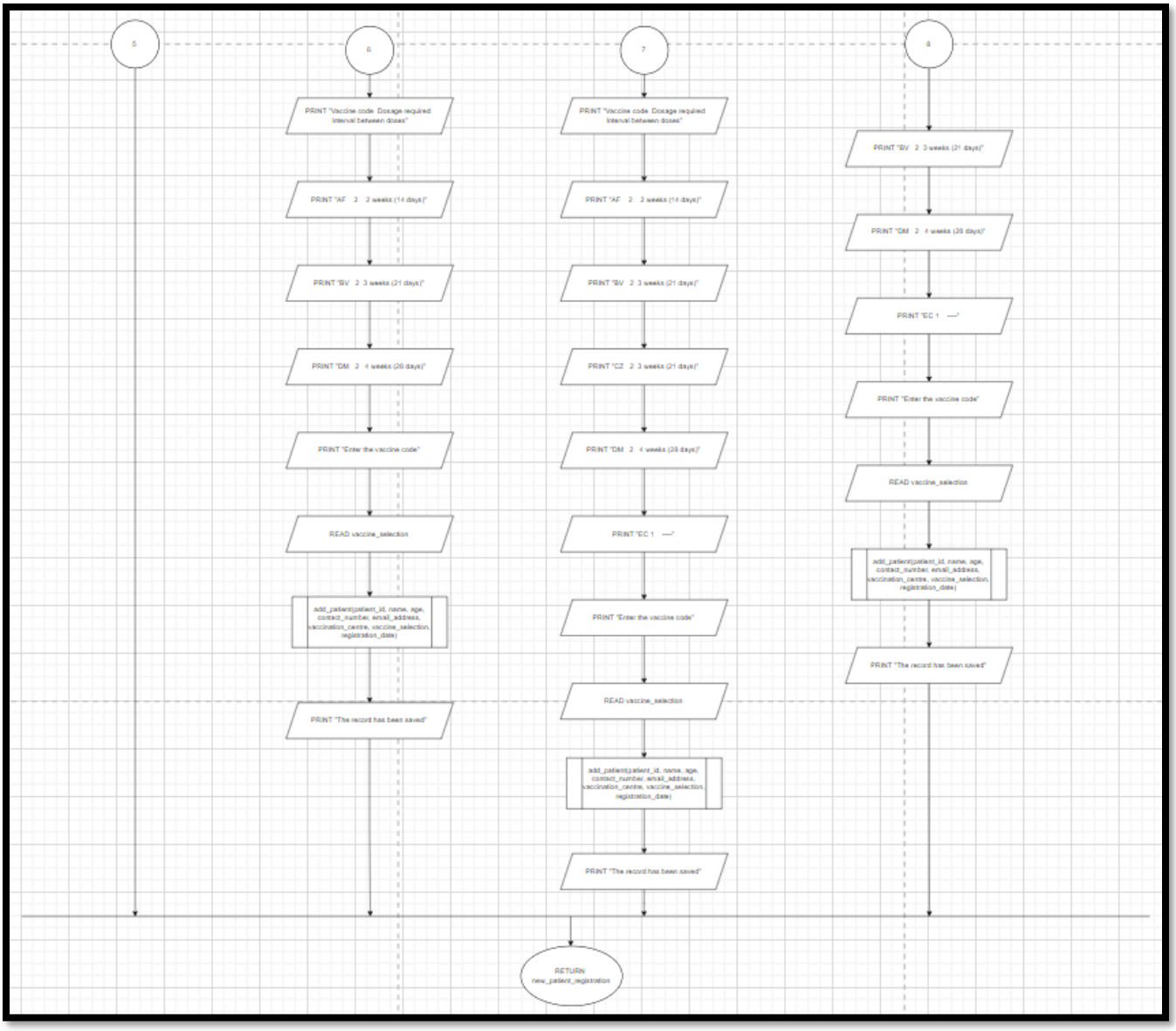
New_patient_registration

```
FUNCTION new_patient_registration()
        PRINT NEW LINE
        PRINT "Select the vaccination centre"
        PRINT NEW LINE
        PRINT "Vaccination Centre 1: Enter VC1"
        PRINT NEW LINE
        PRINT "Vaccination Centre 2: Enter VC2"
        PRINT NEW LINE

        PRINT "Select the vaccination centre by typing VC1 or VC2"
        READ vaccination_centre

        PRINT NEW LINE
        PRINT "Enter your name"
        READ name

        PRINT NEW LINE
        PRINT "Enter your age"
        READ age

        PRINT NEW LINE
        PRINT "Enter your contact number"
        READ contact_number

        PRINT NEW LINE
        PRINT "Enter your email address"
        READ email_address

        patient_id = CALL id()

        import datetime
        registration_date = datetime.date.today()

        IF age < 12
                PRINT "You are not eligible for vaccination"
                CALL menu()

                ELSE
                        IF age < 18
                                PRINT NEW LINE
                                PRINT "You are eligible for these vaccines"
                                PRINT "Please select one vaccine you prefer (by typing the vaccine code)"
                                PRINT "Vaccine code            Dosage required         Interval between doses"
                                PRINT "AF                       2                       2 weeks (14 days)"
                                PRINT "BV                       2                       3 weeks (21 days)"
                                PRINT "DM                       2                       4 weeks (28 days)"

                                PRINT "Enter the vaccine code"
                                READ vaccine_selection
                                CALL add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
                                PRINT "The record has been saved"

                        ELSE
                                IF age >= 18 and age <= 45
                                        PRINT NEW LINE
                                        PRINT "You are eligible for these vaccines"
                                        PRINT "Please select one vaccine you prefer (by typing the vaccine code)"
                                        PRINT "Vaccine code            Dosage required         Interval between doses"
                                        PRINT "AF                       2                       2 weeks (14 days)"
                                        PRINT "BV                       2                       3 weeks (21 days)"
                                        PRINT "CZ                       2                       3 weeks (21 days)"
                                        PRINT "DM                       2                       3 weeks (21 days)"
                                        PRINT "EC                       1                       -----------------"
                                        PRINT "Enter the vaccine code"
                                        READ vaccine_selection
                                        CALL add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
                                        PRINT "The record has been saved"

                                ELSE
                                        PRINT NEW LINE
                                        PRINT "You are eligible for these vaccines"
                                        PRINT "Please select one vaccine you prefer (by typing the vaccine code)"
                                        PRINT "Vaccine code            Dosage required         Interval between doses"
                                        PRINT "AF                       2                       2 weeks (14 days)"
                                        PRINT "BV                       2                       3 weeks (21 days)"
                                        PRINT "DM                       2                       3 weeks (21 days)"
                                        PRINT "EC                       1                       -----------------"
                                        PRINT "Enter the vaccine code"
                                        READ vaccine_selection
                                        CALL add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
                                        PRINT "The record has been saved"
        RETURN new_patient_registration()
ENDFUNCTION
```


new_patient_registration
PRINT NEW LINE
PRINT "Select the vaccination centre"
PRINT NEW LINE
PRINT "Vaccination Centre 1: Enter VC1"
PRINT NEW LINE
1
1
PRINT "Vaccination Centre 2: Enter VC2"
PRINT NEW LINE
PRINT "Select the vaccination centre
by typing VC1 or VC2"
READ vaccination_centre
PRINT NEW LINE
2
2
PRINT "Enter your name"
READ name
PRINT NEW LINE
PRINT NEW LINE
PRINT "Enter your age"
READ age
3

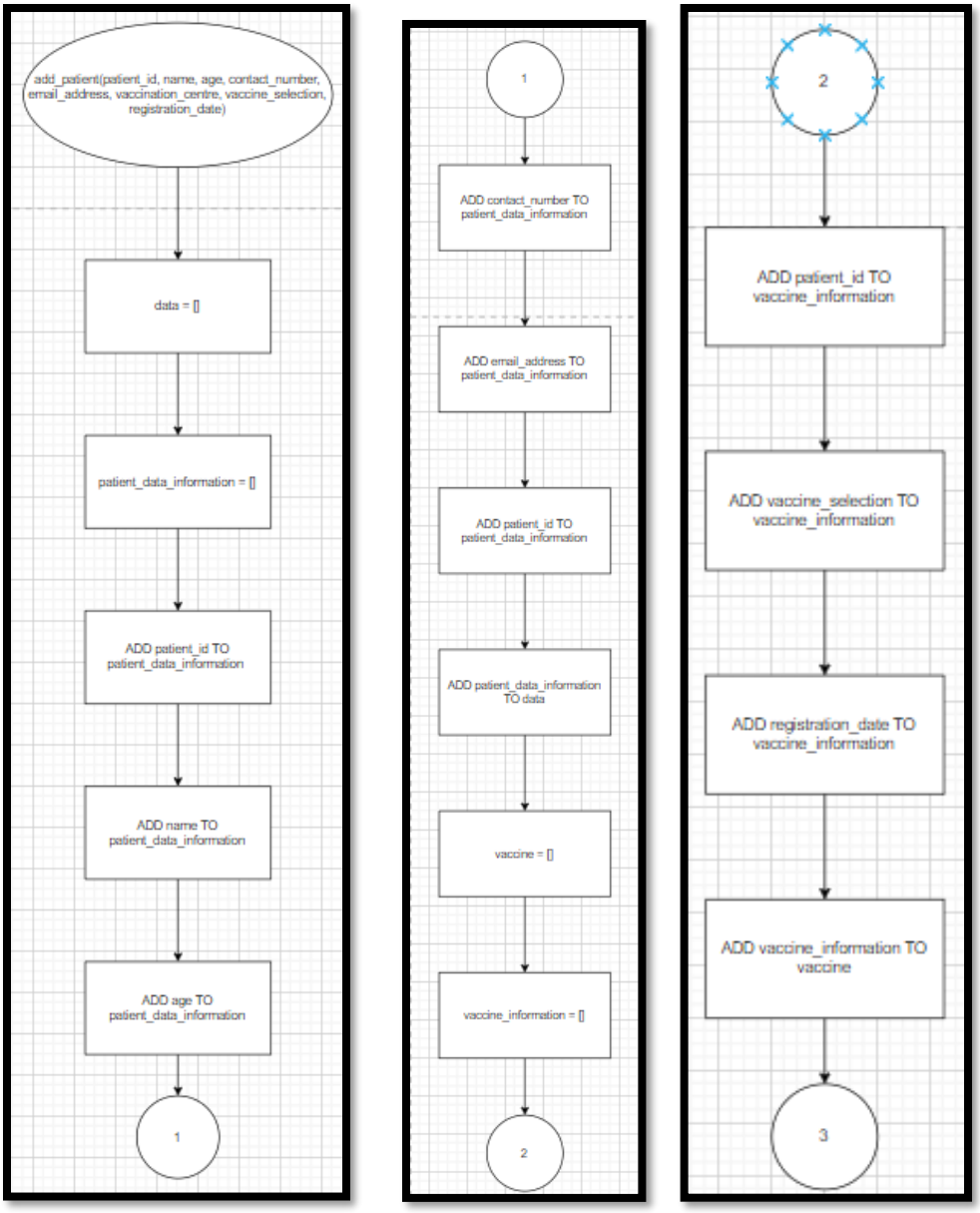

3
PRINT NEW LINE
PRINT "Enter your contact number"
READ contact_number
PRINT NEW LINE
PRINT "Enter your email address"
READ email_address
patient_id = id()
4

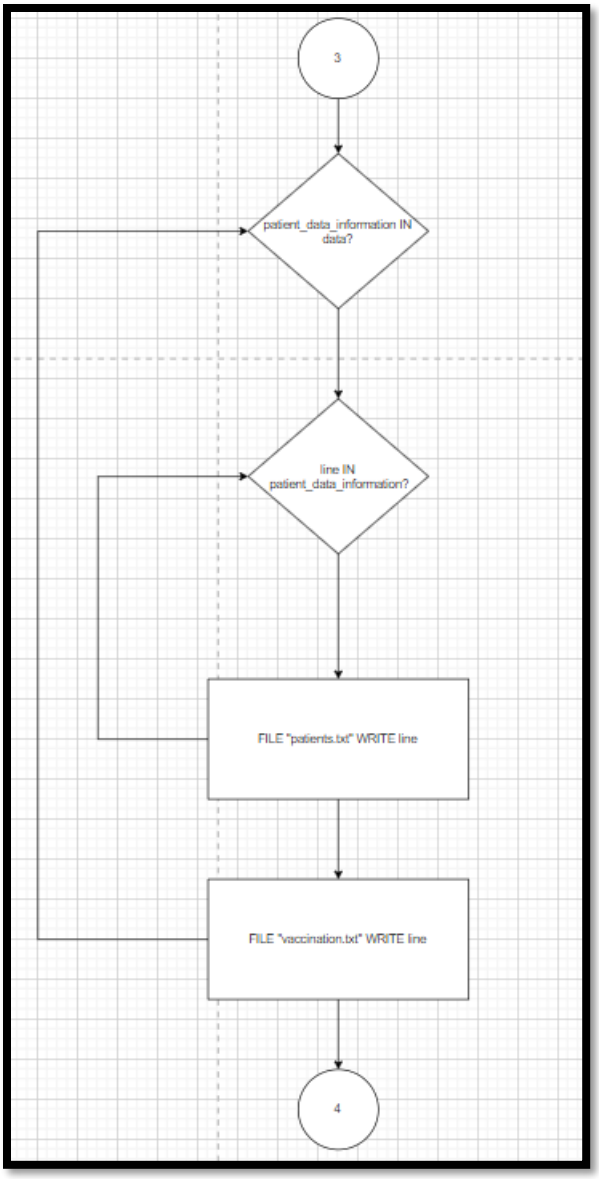

4
import datetime
registration_date = datetime.date.today()
age < 12
No
age < 18
No
age >= 18 and age <= 45
No
PRINT NEW LINE
Yes
Yes
Yes
PRINT "You are not eligible for vaccination"
PRINT NEW LINE
PRINT NEW LINE
PRINT "You are eligible for these vaccines"
menu()
PRINT "You are eligible for these vaccines"
PRINT "You are eligible for these vaccines"
PRINT "Please select one vaccine you prefer (by typing the vaccine code)"
PRINT "Vaccine code Dosage required Interval between doses"
PRINT "AF 2 2 weeks (14 days)"
5
6
7
8

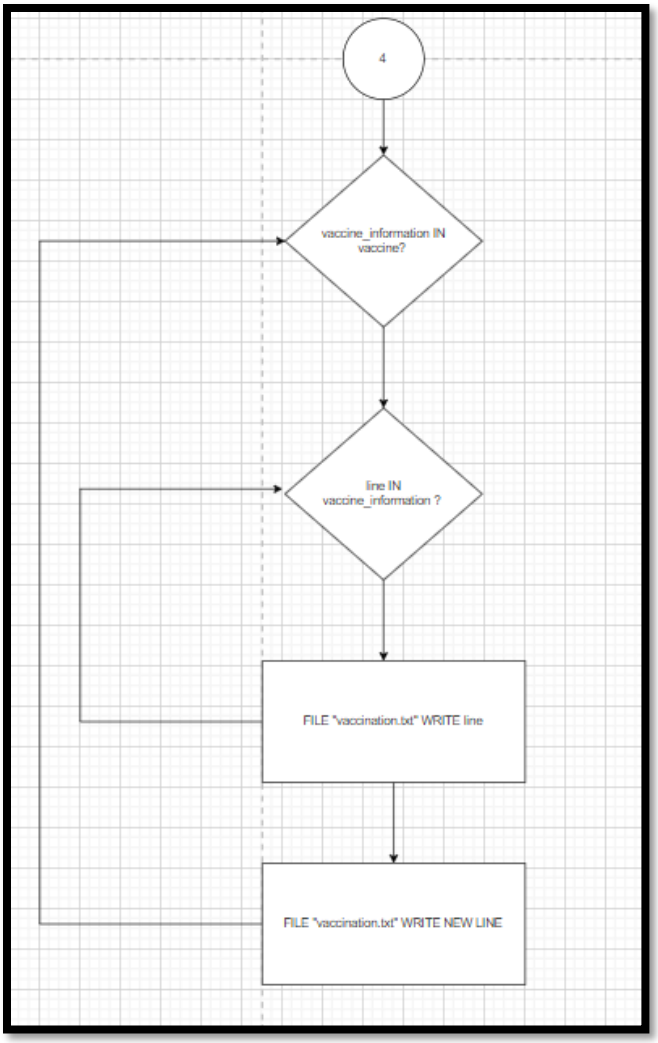

5
6
7
8
PRINT "Vaccine code Dosage required Interval between doses"
PRINT "AF 2 2 weeks (14 days)"
PRINT "BV 2 3 weeks (21 days)"
PRINT "DM 2 4 weeks (28 days)"
PRINT "Enter the vaccine code"
READ vaccine_selection
add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
PRINT "The record has been saved"
PRINT "Vaccine code Dosage required Interval between doses"
PRINT "AF 2 2 weeks (14 days)"
PRINT "BV 2 3 weeks (21 days)"
PRINT "CZ 2 3 weeks (21 days)"
PRINT "DM 2 4 weeks (28 days)"
PRINT "EC 1 ----"
PRINT "Enter the vaccine code"
READ vaccine_selection
add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
PRINT "The record has been saved"
PRINT "BV 2 3 weeks (21 days)"
PRINT "DM 2 4 weeks (28 days)"
PRINT "EC 1 ----"
PRINT "Enter the vaccine code"
READ vaccine_selection
add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
PRINT "The record has been saved"
RETURN new_patient_registration

Add_patient

```
FUNCTION add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
        data = []
        patient_data_information = []
        ADD patient_id TO patient_data_information
        ADD name TO patient_data_information
        ADD age TO patient_data_information
        ADD contact_number TO patient_data_information
        ADD email_address TO patient_data_information
        ADD patient_id TO patient_data_information
        ADD patient_data_information TO data
        vaccine = []
        vaccine_information = []
        ADD patient_id TO vaccine_information
        ADD vaccine_selection TO vaccine_information
        ADD registration_date TO vaccine_information
        ADD vaccine_information TO vaccine

        OPEN FILE "patients.txt" IN APPEND MODE
                FOR EACH patient_data_information IN data
                        FOR EACH line IN patient_data_information
                                FILE "patients.txt" WRITE line
                        FILE "patients.txt" WRITE NEW LINE
        CLOSE FILE "patients.txt"

        OPEN FILE "vaccination.txt" IN APPEND MODE
                FOR EACH vaccine_information IN vaccine
                        FOR EACH line IN vaccine_information
                                FILE "vaccination.txt" WRITE line
                        FILE "vaccination.txt" WRITE NEW LINE
        CLOSE FILE "vaccination.txt"


ENDFUNCTION
```

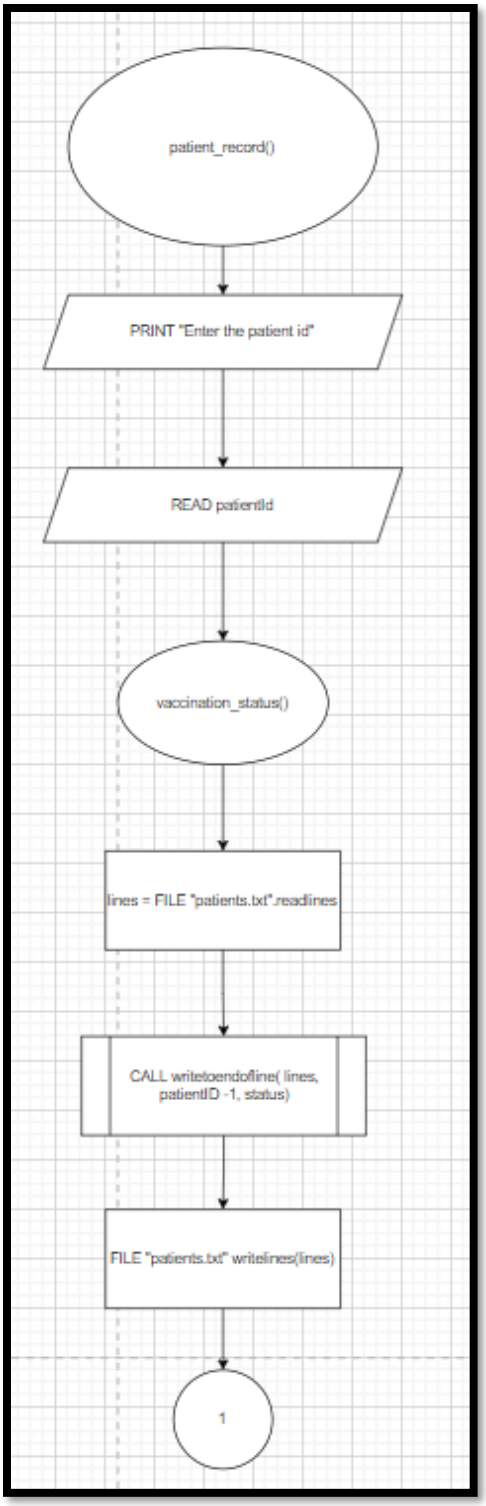

add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
data = []
patient_data_information = []
ADD patient_id TO patient_data_information
ADD name TO patient_data_information
ADD age TO patient_data_information
1
1
ADD contact_number TO patient_data_information
ADD email_address TO patient_data_information
ADD patient_id TO patient_data_information
ADD patient_data_information TO data
vaccine = []
vaccine_information = []
2
2
ADD patient_id TO vaccine_information
ADD vaccine_selection TO vaccine_information
ADD registration_date TO vaccine_information
ADD vaccine_information TO vaccine
3

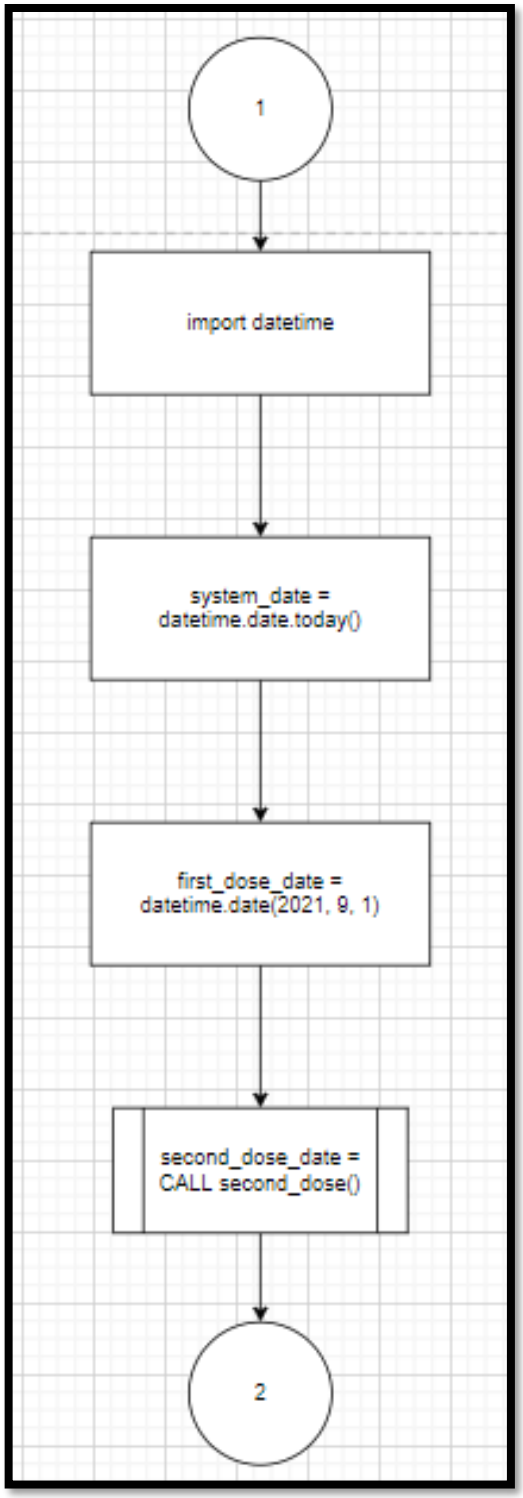

3
patient_data_information IN data?
line IN patient_data_information?
FILE "patients.txt" WRITE line
FILE "vaccination.txt" WRITE line
4

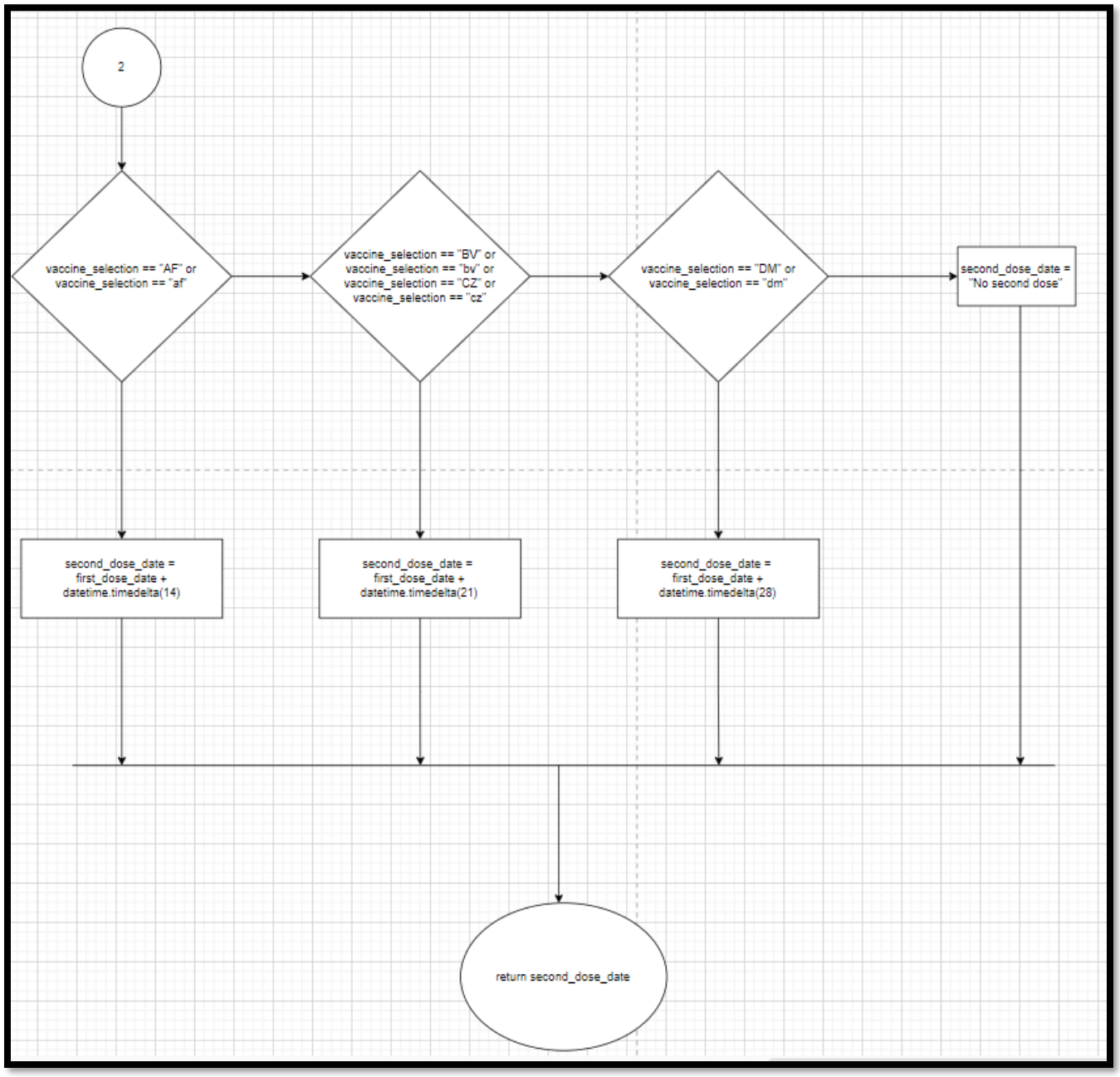

4
vaccine_information IN vaccine?
line IN vaccine_information ?
FILE "vaccination.txt" WRITE line
FILE "vaccination.txt" WRITE NEW LINE

Patient_record

```
FUNCTION patient_record()
        PRINT "Enter the patient id"
        READ patientId

        FUNCTION vaccination_status()
                OPEN FILE "patients.txt" IN READ MODE
                        lines = FILE "patients.txt".readlines
                CLOSE FILE "patients.txt"
                CALL writetoendofline( lines, patientID -1, status)

                OPEN FILE "patients.txt" IN WRITE MODE
                        FILE "patients.txt" writelines(lines)
                CLOSE FILE "patients.txt"
        import datetime
        system_date = datetime.date.today()
        first_dose_date = datetime.date(2021, 9, 1)
        second_dose_date = CALL second_dose()

        IF system_date < first_dose_date
                status = "new"
                PRINT "Vaccination status is", status
                CALL vaccination_status()

        ELSE
                IF system_date >= first_dose_date
                        status = "Completed-D1"
                        PRINT "Vaccination status is", status
                        CALL vaccination_status()
                ELSE
                        IF system_date >= second_dose_date
                                status = "Completed"
                                PRINT "Vaccination status is", status
                                CALL vaccination_status()
                        ELSE
                                status = "Completed"
                                PRINT "Vaccination status is", status
                                CALL vaccination_status()
        OPEN FILE "patients.txt" IN READ MODE
                i = 1
                FOR EACH line IN FILE "patients.txt"
                        IF i == patientID
                                break
                i = i + 1

                print line
        CLOSE FILE "patients.txt"

        return patient_record
ENDFUNCTION
```

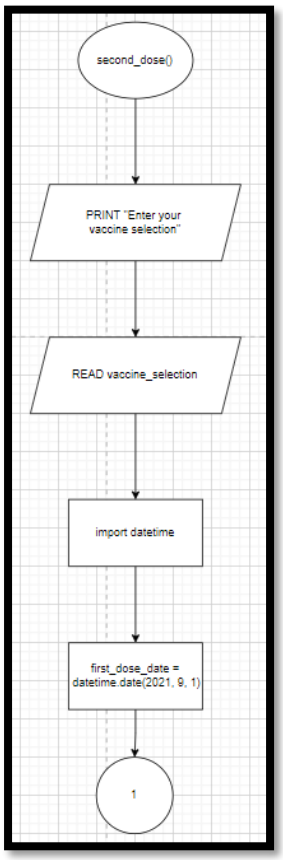

patient_record()
PRINT "Enter the patient id"
READ patientId
vaccination_status()
lines = FILE "patients.txt".readlines
CALL writetoendofline(lines, patientID -1, status)
FILE "patients.txt" writelines(lines)
1

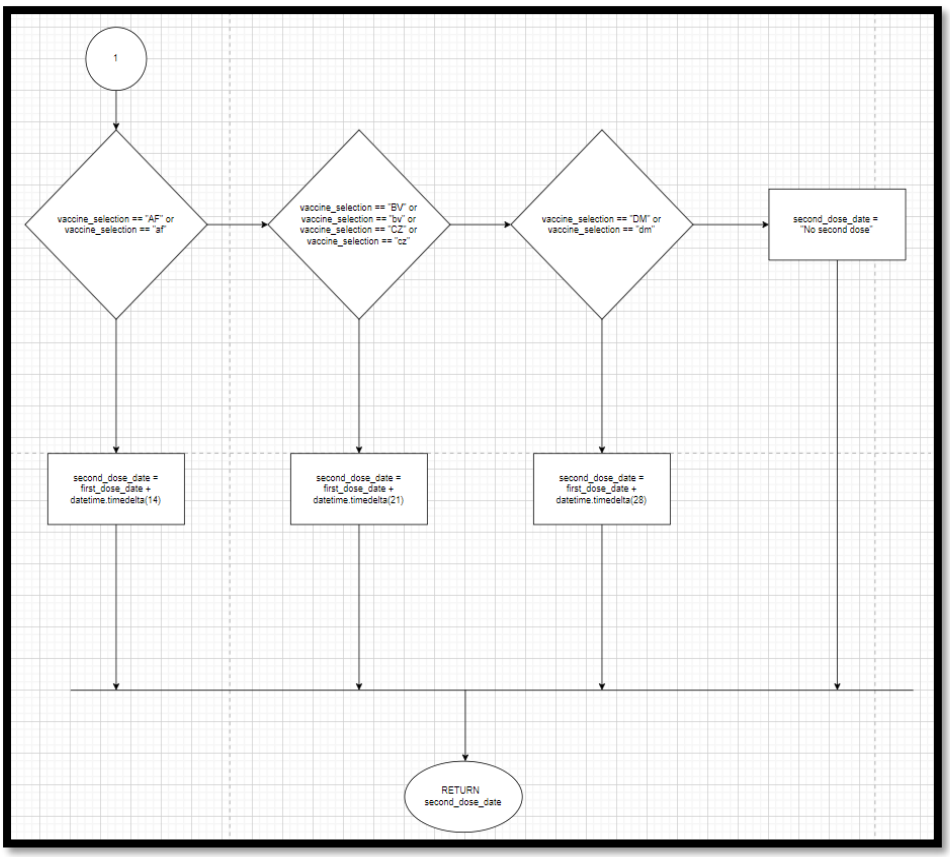

1
import datetime
system_date = datetime.date.today()
first_dose_date = datetime.date(2021, 9, 1)
second_dose_date = CALL second_dose()
2


2
vaccine_selection == "AF" or vaccine_selection == "af"
vaccine_selection == "BV" or vaccine_selection == "bv" or vaccine_selection == "CZ" or vaccine_selection == "cz"
vaccine_selection == "DM" or vaccine_selection == "dm"
second_dose_date = "No second dose"
second_dose_date = first_dose_date + datetime.timedelta(14)
second_dose_date = first_dose_date + datetime.timedelta(21)
second_dose_date = first_dose_date + datetime.timedelta(28)
return second_dose_date

Second_dose

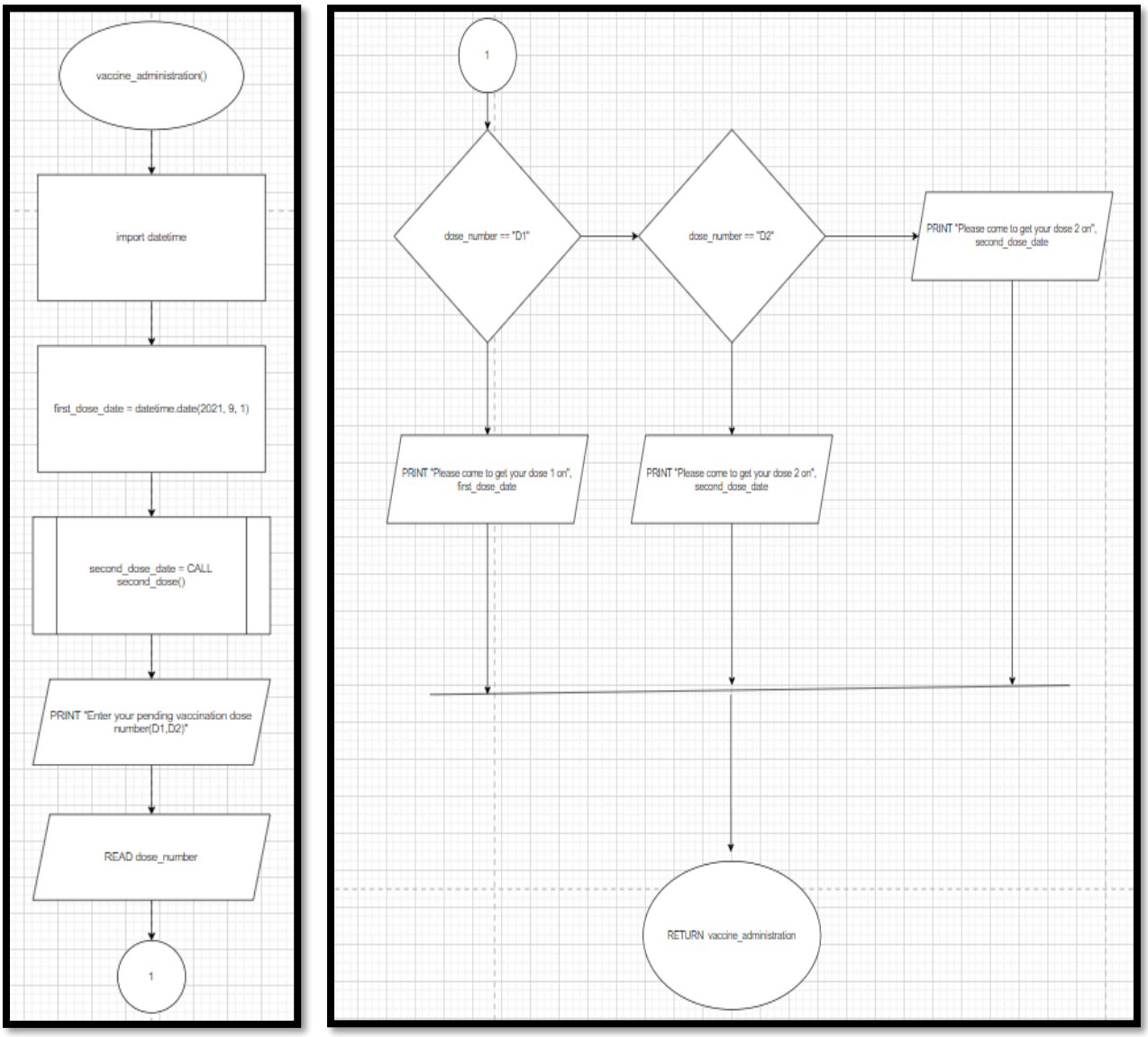
```
FUNCTION second_dose()

        PRINT "Enter your vaccine selection"
        READ vaccine_selection
        import datetime
        first_dose_date = datetime.date(2021, 9, 1)

        IF vaccine_selection == "AF" or vaccine_selection == "af"
                second_dose_date = first_dose_date + datetime.timedelta(14)
                return second_dose_date

        ELSE
                IF vaccine_selection == "BV" or vaccine_selection == "bv" or vaccine_selection == "CZ" or vaccine_selection == "cz"
                        second_dose_date = first_dose_date + datetime.timedelta(21)
                        return second_dose_date


                ELSE
                        IF vaccine_selection == "DM" or vaccine_selection == "dm"
                                second_dose_date = first_dose_date + datetime.timedelta(28)
                                return second_dose_date

                        ELSE
                                second_dose_date = "No second dose"
                                return second_dose_date
ENDFUNCTION
```





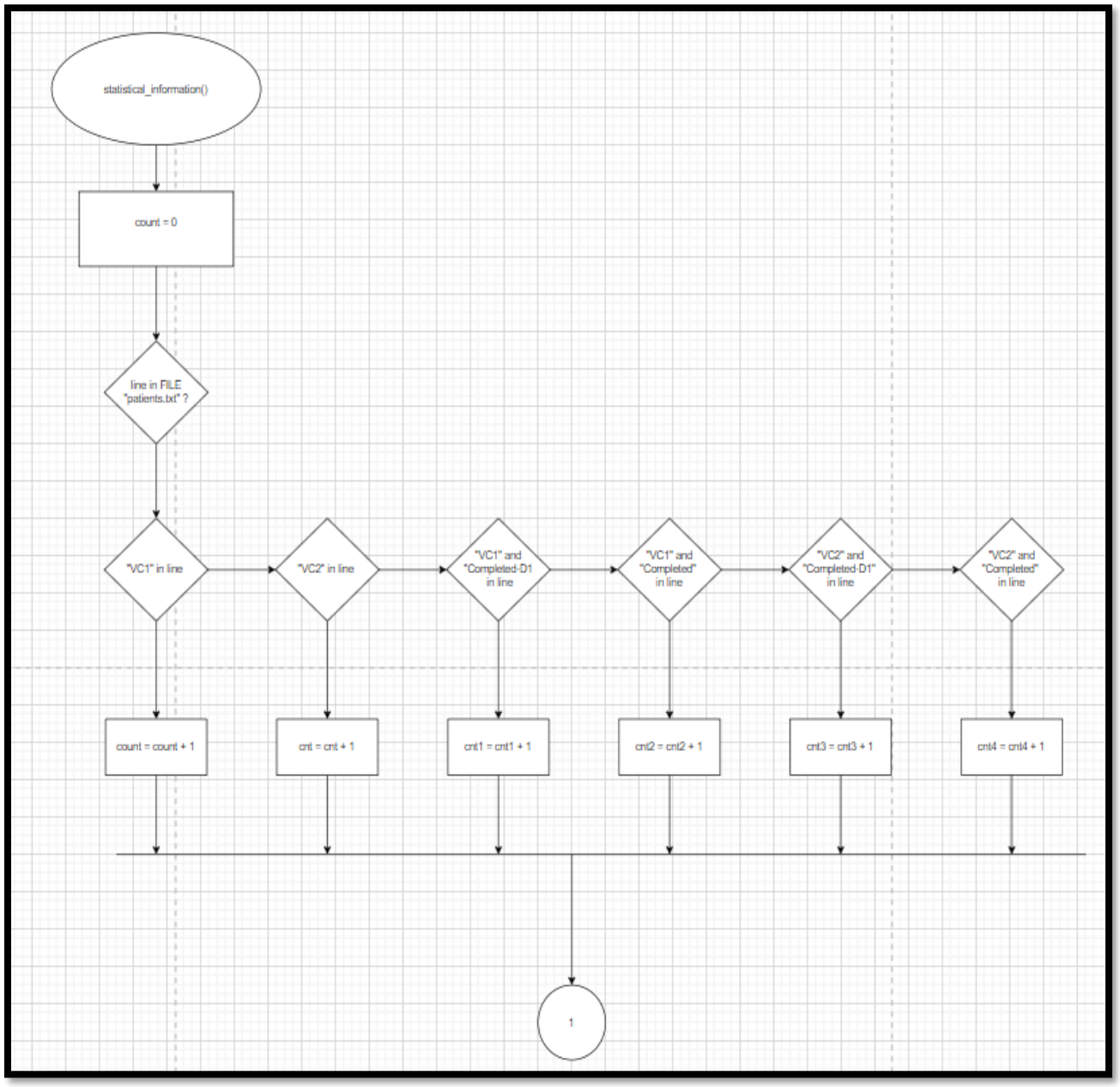
Vaccine_administration

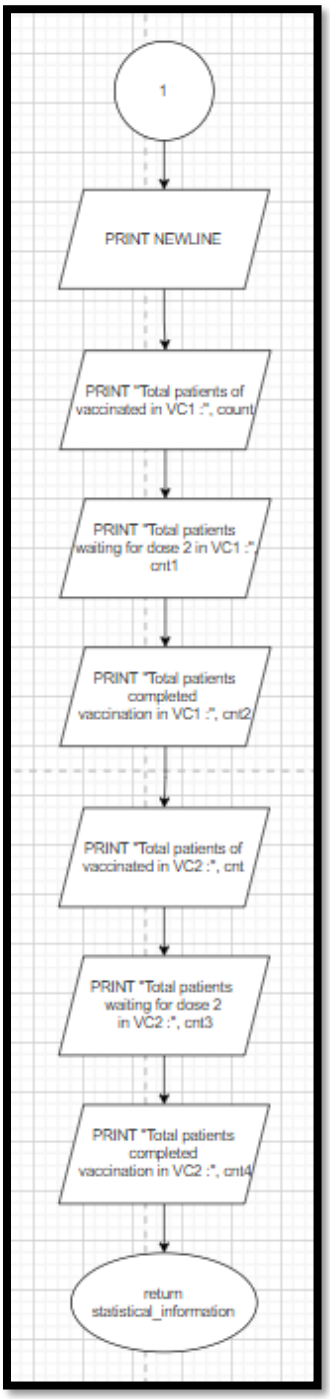
```
FUNCTION vaccine_administration()
        import datetime
        first_dose_date = datetime.date(2021, 9, 1)
        second_dose_date = CALL second_dose()
        PRINT "Enter your pending vaccination dose number(D1,D2)"
        READ dose_number

        IF dose_number == "D1"
                PRINT "Please come to get your dose 1 on", first_dose_date
        ELSE
                IF dose_number == "D2"
                        PRINT "Please come to get your dose 2 on", second_dose_date
                ELSE
                        PRINT "You have finished vaccination"
        return vaccine_administration
ENDFUNCTION
```


vaccine_administration()
import datetime
first_dose_date = datetime.date(2021, 9, 1)
second_dose_date = CALL second_dose()
PRINT "Enter your pending vaccination dose number(D1,D2)"
READ dose_number
1
1
dose_number == "D1"
dose_number == "D2"
PRINT "Please come to get your dose 2 on", second_dose_date
PRINT "Please come to get your dose 1 on", first_dose_date
PRINT "Please come to get your dose 2 on", second_dose_date
RETURN vaccine_administration

Statistical_information

```
FUNCTION statistical_information
        OPEN FILE "patients.txt" IN READ MODE
                count = 0
                FOR EACH line in FILE "patients.txt"
                        IF "VC1" in line
                                count = count + 1
        CLOSE FILE "patients.txt"

        OPEN FILE "patients.txt" IN READ MODE
                cnt = 0
                FOR EACH line in FILE "patients.txt"
                        IF "VC2" in line
                                cnt = cnt + 1
        CLOSE FILE "patients.txt"

        OPEN FILE "patients.txt" IN READ MODE
                cnt1 = 0
                FOR EACH line in FILE "patients.txt"
                        IF "VC1" and "Completed-D1 in line
                                cnt1 = cnt1 + 1
        CLOSE FILE "patients.txt"

        OPEN FILE "patients.txt" IN READ MODE
                cnt2 = 0
                FOR EACH line in FILE "patients.txt"
                        IF "VC1" and "Completed" in line
                                cnt2 = cnt2 + 1
        CLOSE FILE "patients.txt"

        OPEN FILE "patients.txt" IN READ MODE
                cnt3 = 0
                FOR EACH line in FILE "patients.txt"
                        IF "VC2" and "Completed-D1 in line
                                cnt3 = cnt3 + 1
        CLOSE FILE "patients.txt"

        OPEN FILE "patients.txt" IN READ MODE
                cnt4 = 0
                FOR EACH line in FILE "patients.txt"
                        IF "VC2" and "Completed" in line
                                cnt4 = cnt4 + 1
        CLOSE FILE "patients.txt"

        PRINT NEWLINE
        PRINT "Total patients of vaccinated in VC1 :", count
        PRINT "Total patients waiting for dose 2 in VC1 :", cnt1
        PRINT "Total patients completed vaccination in VC1 :", cnt2
        PRINT "Total patients of vaccinated in VC2 :", cnt
        PRINT "Total patients waiting for dose 2 in VC2 :", cnt3
        PRINT "Total patients completed vaccination in VC2 :", cnt4

        return statistical_information
ENDFUNCTION
```


statistical_information()
count = 0
line in FILE "patients.txt" ?
"VC1" in line
"VC2" in line
"VC1" and "Completed-D1 in line
"VC1" and "Completed" in line
"VC2" and "Completed-D1" in line
"VC2" and "Completed" in line
count = count + 1
cnt = cnt + 1
cnt1 = cnt1 + 1
cnt2 = cnt2 + 1
cnt3 = cnt3 + 1
cnt4 = cnt4 + 1
1


1
PRINT NEWLINE
PRINT "Total patients of vaccinated in VC1 :", count
PRINT "Total patients waiting for dose 2 in VC1 :", cnt1
PRINT "Total patients completed vaccination in VC1 :", cnt2
PRINT "Total patients of vaccinated in VC2 :", cnt
PRINT "Total patients waiting for dose 2 in VC2 :", cnt3
PRINT "Total patients completed vaccination in VC2 :", cnt4
return statistical_information

Program source code and explanation

Menu() function

```
#show menu
def menu():
    while True:
        print("\nWelcome to the vaccination registration and administration system!")
        print("""

            New Patient Registration                  : Enter 1
            Vaccine administration                    : Enter 2
            Patient record and Vaccination status     : Enter 3
            Statistical information                   : Enter 4
            Exit                                      : Enter Q

        """)

        user_action = input("Select the action you would like to proceed by typing number above: ")


        if user_action == "1" :
            new_patient_registration()

        elif user_action == "2" :
            vaccine_administration()

        elif user_action == "3" :
            patient_record()

        elif user_action == "4" :
            statistical_information()

        elif user_action == "q" or user_action == "Q" :
            break

        else:
            print("Invalid, please type again")
```

The menu() function will display the welcome message at first and then show the menu which users can see and choose their action in order to continue. User's choice will be stored in the user_action variable. By entering 1, the program will send the user to new patient registration page. If the user enters 2, it will redirect user to vaccine administration page. Users will be directed to patient record and vaccination status page as well as statistical information page if they enter 3 or 4 respectively. Users who want to exit can enter q to exit so the loop will break, and the program will be exited. If users enter anything other than 1, 2, 3, 4 and q, the program will show a statement "Invalid, please try again"

Id() function

```
#generate patients id for vaccination
def id():
    try:
        total = 0
        with open("patients.txt", "r") as f:
            total = sum(1 for _ in f)
            count = total + 1
            return count

    except:
        count = 1
        return count
```

The id() function is used to define the patient id by reading the line in the text file so the id will be sequential.

new_patient_registration() function

```
#register new patient
def new_patient_registration():
    print("\nSelect the vaccination centre\n\tVaccination Centre 1: Enter VC1\n\tVaccination Centre 2: Enter VC2")
    #prompt vaccination centre
    vaccination_centre = input("\nSelect the vaccination centre by typing VC1 or VC2: ")
    #prompt patient name
    name = input("\nEnter your name: ")
    #prompt patient age
    age = int(input("\nEnter your age: "))
    #prompt patient contact number
    contact_number = input("\nEnter your contact number: ")
    #prompt patient email address
    email_address = input("\nEnter your email address: ")
    #get patient id
    patient_id = id()

    #set registration date to today
    import datetime
    registration_date = datetime.date.today()

    #show vaccination type based on age group

    if age < 12:
        print("You are not eligible for vaccination")
        menu()
    #vaccine type for under 18
    elif age < 18:
        print("\nYou are eligible for these vaccines:")
        #show vaccine type for selection
        print("""
        Please select one vaccine you prefer (by typing the vaccine code):
        Vaccine code            Dosage required         Interval between doses
        AF                       2                       2 weeks (14 days)
        BV                       2                       3 weeks (21 days)
        DM                       2                       4 weeks (28 days)

        """)

        vaccine_selection = input("Enter the vaccine code: ")
        add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
        print("The record has been saved")


    #vaccine type for age group from 18 to 45
    elif age >= 18 and age <= 45:
        print("\nYou are eligible for these vaccines")
        print("""
        Please select one vaccine you prefer (#by typing the vaccine code):
        Vaccine code            Dosage required         Interval between doses
        AF                       2                       2 weeks (14 days)
        BV                       2                       3 weeks (21 days)
        CZ                       2                       3 weeks (21 days)
        DM                       2                       3 weeks (21 days)
        EC                       1                       ----------------



        """)
        vaccine_selection = input("Enter the vaccine code: ")
        add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
        print("The record has been saved")

    #vaccination type for age group over 45
    else:
        print("\nYou are eligible for these vaccines")
        print("""
        Please select one vaccine you prefer (#by typing the vaccine code):
        Vaccine code            Dosage required         Interval between doses
        AF                       2                       2 weeks (14 days)
        BV                       2                       3 weeks (21 days)
        DM                       2                       3 weeks (21 days)
        EC                       1                       ----------------
        """)

        vaccine_selection = input("Enter the vaccine code: ")
        add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date)
        print("The record has been saved")
```

The new_patient_registration() function is to prompt the user input of vaccination centre, name , age, contact number and email address and store them into variables accordingly. Besides, the program will set the registration date to today date. If the user input age is less than 12 years old, the program will display “You are not eligible for vaccination. If the user age is bigger and equals to 12, the program will display the particular vaccine code, dosage required and interval between doses. It will also ask the user to select their preferable vaccine by typing the vaccine code.

add_patient() function

```
#save patient information into txt file
def add_patient(patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection, registration_date): #patient_id

    data =[]
    patient_data_information = []
    patient_data_information.append(patient_id)
    patient_data_information.append(name)
    patient_data_information.append(age)
    patient_data_information.append(contact_number)
    patient_data_information.append(email_address)
    patient_data_information.append(vaccination_centre)
    patient_data_information.append(vaccine_selection)
    patient_data_information.append(registration_date)
    data.append(patient_data_information)
    vaccine = []
    vaccination_information = []
    vaccination_information.append(patient_id)
    vaccination_information.append(vaccine_selection)
    vaccination_information.append(registration_date)
    vaccine.append(vaccination_information)

    with open("patients.txt", "a+" ) as f:
        for patient_data_information in data:
            for line in patient_data_information:
                f.write(str(line))
                f.write("\t")
            f.write("\n")

        print("Registered" ,name, "with", vaccine_selection)

    with open("vaccination.txt", "a+" ) as f:
        for vaccination_information in vaccine:
            for line in vaccination_information:
                f.write(str(line))
                f.write("\t")
            f.write("\n")
```

The add_patient() function is to write all the variables such as patient_id, name, age, contact_number, email_address, vaccination_centre, vaccine_selection and also registration_date into a list called patient_data_information. Another list called vaccine_information was created with the variables, patient_id, vaccine_selection and registration_date. The list patient_data_information will be appended to another list called data while the vaccine_information will be appended to another list called vaccine so it would be easier to write into the patients.txt file and vaccination.txt file.

patient_record() function

```
def patient_record():
    patientId = int(input('Enter the patient id: '))

    #write vaccination status of the patient to the text file
    def vaccination_status():
        with open('patients.txt', 'r') as txtfile:
            lines = txtfile.readlines()

        writetoendofline(lines, patientId - 1, "\t" + status)

        with open('patients.txt', 'w') as txtfile:
            txtfile.writelines(lines)

    #get second dose date
    import datetime
    system_date = datetime.date.today()
    first_dose_date = datetime.date(2021, 9, 1)

    second_dose_date = second_dose()


    #get second dose date
    import datetime
    system_date = datetime.date.today()
    first_dose_date = datetime.date(2021, 9, 1)

    second_dose_date = second_dose()
    #get patient status
    if system_date < first_dose_date:
        status = "new"
        print("Vaccination status is", status)
        vaccination_status()

    elif system_date >= first_dose_date:
        status = "Completed-D1"
        print("Vaccination status is", status)
        vaccination_status()

    elif system_date >= second_dose_date:
        status = "Completed"
        print("Vaccination status is", status)
        vaccination_status()

    else:
        status = "Completed"
        print("Vaccination status is", status)
        vaccination_status()

    #print patient information by prompting patient id
    with open('patients.txt', 'r') as f:
        i = 1
        for line in f:
            if i == patientId:
                break
        i += 1
            # line now holds the line
            # (or is empty if the file is smaller than that number)
        print(line)
    return patient_record
```

The patient_record() function is mainly used to search patient record by typing the patient id. There is a local function, vaccination_status() inside the patient_record function which is designed for writing the vaccination status into particular line in the patients.txt text file based on the input patient id. The patient's vaccination status will also be displayed separately on the screen after the user input the patient id.

second_dose() function

```
def second_dose():

    #find second dose date
    vaccine_selection = input("Enter your vaccine selection: ")
    import datetime
    first_dose_date = datetime.date(2021, 9, 1)

    if (vaccine_selection == "AF") or (vaccine_selection == "af") :
        second_dose_date = first_dose_date + datetime.timedelta(14)
        return second_dose_date

    elif (vaccine_selection == "BV") or (vaccine_selection == "bv") or (vaccine_selection == "CZ") or (vaccine_selection == "cz"):
        second_dose_date = first_dose_date + datetime.timedelta(21)
        return second_dose_date


    elif (vaccine_selection == "DM") or (vaccine_selection == "dm"):
        second_dose_date = first_dose_date + datetime.timedelta(28)
        return second_dose_date

    else:
        second_dose_date = "No second dose"
        return second_dose_date
```

The second_dose() function is to find the second dose date of the patients based on their vaccine selection. Different vaccine selection will have different second dose date because the interval between doses is also different. If the patient's vaccine selection is AF, the interval between doses is 14 days. Therefore, the program will sum up the interval between doses with the first dose date to get the second dose date. The interval between doses for BV and CZ vaccines is 21 days while the DM vaccine is 28 days.

vaccine_administration() function

```
#show pending vaccination date
def vaccine_administration():

    import datetime
    first_dose_date = datetime.date(2021, 9, 1)
    second_dose_date = second_dose()
    dose_number = input("Enter your pending vaccination dose number(D1,D2): ")
    if dose_number == "D1":
        print("Please come to get your dose 1 on", first_dose_date)
    elif dose_number == "D2":
        print("Please come to get your dose 2 on", second_dose_date)
    else:
        print("You have finished vaccination")
    return vaccine_administration
```

The vaccine_administration function will advice the users to get their dose on the particular date based on the dose number they have input in the program.

Writetoendofline() function

```
#function for write to the end of line in text file
def writetoendofline(lines, line_no, append_txt):
    lines[line_no] = lines[line_no].replace('\n', '') + append_txt + '\n'
```

This function is to write particular word to certain line in the text file. For example, writing the status of vaccination to the end of the line of registered patient information.

statistical_information() function

```
#show statistical information based on vaccination centre
def statistical_information():
    with open("patients.txt", "r") as f:
        count = 0
        for line in f:
            if "VC1" in line:
                count = count + 1

    with open("patients.txt", "r") as f1:
        cnt = 0
        for line1 in f1:
            if "VC2" in line1:
                cnt = cnt + 1

    with open("patients.txt", "r") as f2:
        cnt1 = 0
        for line2 in f2:
            if "VC1" and "Completed-D1" in line2:
                cnt1 = cnt1 + 1

    with open("patients.txt", "r") as f3:
        cnt2 = 0
        for line2 in f3:
            if "VC1" and "Completed" in line2:
                cnt2 = cnt2 + 1

    with open("patients.txt", "r") as f4:
        cnt3 = 0
        for line3 in f4:
            if "VC2" and "Completed-D1" in line3:
                cnt3 = cnt3 + 1

    with open("patients.txt", "r") as f5:
        cnt4 = 0
        for line4 in f5:
            if "VC2" and "Completed" in line4:
                cnt4 = cnt4 + 1

    print("\nTotal patients of vaccinated in VC1 =", count)     #print total patients in vc1
    print("Total patients waiting for dose 2 in VC1 =", cnt1)  #print total patients waiting for dose 2 in vc1
    print("Total patients completed vaccination in VC1 =", cnt2)   #print total patients completed vaccination in vc1
    print("Total patients of vaccinated in VC2 =", cnt)    #print total patients in vc2
    print("Total patients waiting for dose 2 in VC2 =", cnt3)   #print total patients waiting for dose 2 in vc2
    print("Total patients completed vaccination in VC2 =", cnt4) #print total patients completed vaccination in vc2
    return statistical_information
```

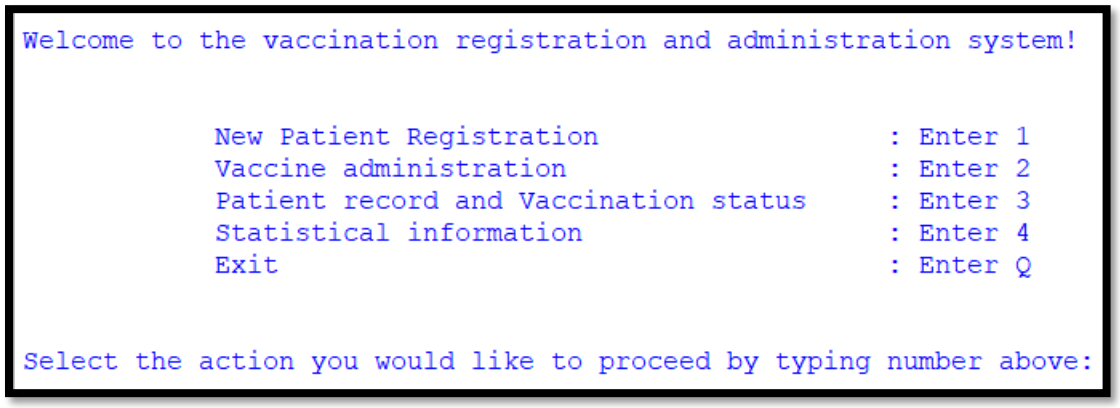
The statistical_information() function has been used to display the total vaccinated patients in VC1, VC2 respectively and also total patients waiting for dose 2 as well as total patients completed vaccination in VC1, VC2 respectively by reading the particular word in lines from patients.txt file.

Close function

```
menu()
```

This is used to call the menu function at the end so the program will run properly

Screenshots of sample input/output and explanation



When the program is executed, the welcome page and menu will be displayed. Users can enter either 1, 2, 3, 4 and Q. If the users enter anything other than 1,2,3,4 and Q, the program will restart again.

```
Welcome to the vaccination registration and administration system!


            New Patient Registration                  : Enter 1
            Vaccine administration                    : Enter 2
            Patient record and Vaccination status     : Enter 3
            Statistical information                   : Enter 4
            Exit                                      : Enter Q


Select the action you would like to proceed by typing number above: 1
```

```
Select the vaccination centre
        Vaccination Centre 1: Enter VC1
        Vaccination Centre 2: Enter VC2

Select the vaccination centre by typing VC1 or VC2: VC1

Enter your name: Lean

Enter your age: 14

Enter your contact number: 0123355775

Enter your email address: lean@mail.com

You are eligible for these vaccines:

        Please select one vaccine you prefer (by typing the vaccine code):
        Vaccine code            Dosage required         Interval between doses
        AF                       2                       2 weeks (14 days)
        BV                       2                       3 weeks (21 days)
        DM                       2                       4 weeks (28 days)


Enter the vaccine code: BV
Registered Lean with BV
The record has been saved
```

After user has entered 1, the program will prompt user's input for vaccination centre, name, age, contact number, email address and also vaccine code selection. When user has done that, the program will display statements "Registered xxx with xx" and "The record has been saved".

```
Welcome to the vaccination registration and administration system!


            New Patient Registration                  : Enter 1
            Vaccine administration                    : Enter 2
            Patient record and Vaccination status     : Enter 3
            Statistical information                   : Enter 4
            Exit                                      : Enter Q


Select the action you would like to proceed by typing number above: 2
Enter your vaccine selection: AF
Enter your pending vaccination dose number(D1,D2): D2
Please come to get your dose 2 on 2021-09-15
```

By entering 2, user will go to vaccine administration page, The program will prompt user input for vaccine selection and pending vaccination dose number so it will display “Please come to get your (dose number) on (date)”.

```
Welcome to the vaccination registration and administration system!


            New Patient Registration                  : Enter 1
            Vaccine administration                    : Enter 2
            Patient record and Vaccination status     : Enter 3
            Statistical information                   : Enter 4
            Exit                                      : Enter Q


Select the action you would like to proceed by typing number above: 3
Enter the patient id: 1
Enter your vaccine selection: AF
Vaccination status is Completed-D1
1       Tan     19      0123456789      tan@gmail.com   VC1     AF      2021-09-08              Completed-D1
```

By entering 3, user will be brought to patient record and vaccination status page. The program will prompt user input for patient id and vaccine selection, and it will immediately display the patient information based on the patient id they have input.

```
Welcome to the vaccination registration and administration system!


            New Patient Registration                  : Enter 1
            Vaccine administration                    : Enter 2
            Patient record and Vaccination status     : Enter 3
            Statistical information                   : Enter 4
            Exit                                      : Enter Q


Select the action you would like to proceed by typing number above: 4

Total patients of vaccinated in VC1 = 7
Total patients waiting for dose 2 in VC1 = 1
Total patients completed vaccination in VC1 = 1
Total patients of vaccinated in VC2 = 10
Total patients waiting for dose 2 in VC2 = 1
Total patients completed vaccination in VC2 = 1
```

By typing 4, the program will show the statistical information of vaccination.

```
Welcome to the vaccination registration and administration system!


            New Patient Registration                  : Enter 1
            Vaccine administration                    : Enter 2
            Patient record and Vaccination status     : Enter 3
            Statistical information                   : Enter 4
            Exit                                      : Enter Q


Select the action you would like to proceed by typing number above: q
>>>
```

By typing q, the loop will exit and the program will exit also.

Conclusion

In order to design a well function program, the basic python knowledge is highly essential. Some assumptions need to be made to ensure the program runs smoothly. However, it is required to do a lot of research to improve the functionalities of program. After doing research and making a few assumptions, the pseudocodes and flowcharts should be finished to visualize the program flow. The Python code can be well-designated by using pseudocode and flowcharts as guidelines. To improve the program, testing and debugging has been done again and again. Although the program can run properly, there are still have some limitations. The first limitation of this program is the vaccination status. The vaccination status of patients in patients.txt file cannot be updated more than once. Next, the patient id is sequential but not unique. In the future, the more research will be done, the better of the program will be. The program will be kept updated to improve the functionalities.