

## CSC 404/604, Fall 2024, Assignment 5

handed out Sept. 26, due Oct. 17 at 11:59pm on Canvas

Write a **Python** program that begins by building a database of patients and their medical test results and then builds a few methods and functions that query the database and issue certain statistics. Your program will use the advanced concepts we have recently studied in the course including file manipulation, modules, objects, collections (dictionaries, tuples), as well as the more basic material we studied earlier (variables, conditionals, iterations, etc.)

Please see the details below and note that even though the problem is small enough to be solved manually, your solution should assume that there will be thousands of patient records that arrive over time.

Your program should be subdivided into modules. Ideally, you would have the main program, a set-up module and one module per set of questions (there are four such sets).

### Detailed description of the programming problem:

A hospital needs to keep track of its patients. You are asked to create two classes:

- A Tests Class with the following components:

- Patient ID: int
- Anemia: int (1/0)
- Diabetes: int (1/0)
- High Blood Pressure: int (1/0)
- Platelets: int
- Creatinine: float
- Sodium: int

and the following method:

- printResults()

- A Patient Class with the following components:

- Patient ID: int
- Characteristics: tuple (DOB: integer, sex at birth: int, smoker: int)
  - Notes: we assume that these characteristics are immutable and implement them using a tuple. Also, for sex at birth, 1/0 is Male/Female and for smoker, 1/0 is smoker/non-smoker
- Test results: object of the class Tests

And the following method:

- printRecord()

The patients are organized in a dictionary where the key is the patient ID and the value, the patient object. Your program will be composed of three modules plus the main program. Each module is now described:

### **Module 1: Database Management**

Module 1 contains four functions and methods:

- A function that reads a file and creates a new dictionary of patients based on the contents of the file.
- A Dictionary method to add a new patient to the dictionary
- A Dictionary method to delete a patient from the dictionary
- A Tests method to modify a test result

### **Module 2: Display**

Module 2 contains 3 methods:

- A function to print all the records in the Dictionary
- A function that asks the user to enter a patient's ID and calls the method that prints that patient's full record
- A function that asks the user to enter a patient's ID and a test and that prints the patient's specific test results.

### **Module 3: Statistics**

Module 3 contains one function:

- A function that calculates the percentage of men and women who have anemia or diabetes.

### **Main Program:**

The main program proceeds as follows:

1. The Dictionary of patients is created from the input file
2. The program enters a loop that asks the user what s/he would like to do:
  1. Enter a new patient in the database (Dictionary)
  2. Delete a patient from the database (Dictionary)
  3. Modify a patient's test result
  4. Print all the patients' records
  5. Print a patient's entire record
  6. Print a patient's specific test result
  7. Print statistics requested by the user
  8. Exit the program

Here is an example of the output of the program (the user's inputs are in red):

Reloaded modules: databaseManagement, printActions, statisticActions, actionLoop

Enter 1 to add a patient to the database

2 to delete a patient from the database

3 to modify a patient's test result

4 to print all the patient's records

5 to print a single patient's record

6 to print a single patient's test result

7 to print a statistic

8 to exit the program

Enter your choice now: 4

Patient Record of Patient # 1

DOB, Sex at Birth, Smoker: ('1950', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	0		1		265000
	1.9	130			

Patient Record of Patient # 2

DOB, Sex at Birth, Smoker: ('1969', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	0		0		263358
	1.1	136			

Patient Record of Patient # 3

DOB, Sex at Birth, Smoker: ('1956', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	0		0		162000
	1.3	129			

Patient Record of Patient # 4

DOB, Sex at Birth, Smoker: ('1975', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		0		210000
	1.9	137			

Patient Record of Patient # 5

DOB, Sex at Birth, Smoker: ('1955', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
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1	1	0	327000
	2.7	116	

Patient Record of Patient # 6

DOB, Sex at Birth, Smoker: ('1935', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		1		204000
	2.1	132			

Patient Record of Patient # 7

DOB, Sex at Birth, Smoker: ('1951', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		0		127000
	1.2	137			

Patient Record of Patient # 8

DOB, Sex at Birth, Smoker: ('1962', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	1		0		454000
	1.1	131			

Patient Record of Patient # 9

DOB, Sex at Birth, Smoker: ('1965', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	0		0		263358
	1.5	138			

Patient Record of Patient # 10

DOB, Sex at Birth, Smoker: ('1943', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		1		388000
	9.4	133			

Patient Record of Patient # 11

DOB, Sex at Birth, Smoker: ('1948', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		1		368000
	4	131			

Patient Record of Patient # 12

DOB, Sex at Birth, Smoker: ('1960', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
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0	0	1	253000
	0.9	140	

Patient Record of Patient # 13

DOB, Sex at Birth, Smoker: ('1980', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		0		136000
	1.1	137			

Patient Record of Patient # 14

DOB, Sex at Birth, Smoker: ('1975', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		1		276000
	1.1	137			

Patient Record of Patient # 15

DOB, Sex at Birth, Smoker: ('1984', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		1		427000
	1	138			

Patient Record of Patient # 16

DOB, Sex at Birth, Smoker: ('1940', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		0		47000
	1.3	136			

Patient Record of Patient # 17

DOB, Sex at Birth, Smoker: ('1937', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		0		262000
	0.9	140			

Patient Record of Patient # 18

DOB, Sex at Birth, Smoker: ('1981', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	0		0		166000
	0.8	127			

Patient Record of Patient # 19

DOB, Sex at Birth, Smoker: ('1952', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
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1	0	1	237000
	1	140	

Patient Record of Patient # 20

DOB, Sex at Birth, Smoker: ('1973', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	1		0		87000
	1.9	121			

Patient Record of Patient # 21

DOB, Sex at Birth, Smoker: ('1952', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		1		276000
	1.3	137			

Patient Record of Patient # 22

DOB, Sex at Birth, Smoker: ('1954', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	1		1		297000
	1.6	136			

Patient Record of Patient # 23

DOB, Sex at Birth, Smoker: ('1949', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		1		289000
	0.9	140			

Patient Record of Patient # 24

DOB, Sex at Birth, Smoker: ('1970', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	1		0		368000
	0.8	135			

Patient Record of Patient # 25

DOB, Sex at Birth, Smoker: ('1949', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	1		1		263358
	1.83	134			

Patient Record of Patient # 26

DOB, Sex at Birth, Smoker: ('1943', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
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0	1	0	149000
	1.9	144	

Patient Record of Patient # 27

DOB, Sex at Birth, Smoker: ('1927', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		1		196000
	1	138			

Patient Record of Patient # 28

DOB, Sex at Birth, Smoker: ('1938', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	1		1		284000
	1.3	136			

Patient Record of Patient # 29

DOB, Sex at Birth, Smoker: ('1966', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	0		0		153000
	5.8	134			

Patient Record of Patient # 30

DOB, Sex at Birth, Smoker: ('1042', 'M', '1')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	1		0		200000
	1.2	132			

Patient Record of Patient # 31

DOB, Sex at Birth, Smoker: ('1928', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	1		1		263358
	1.83	134			

Patient Record of Patient # 32

DOB, Sex at Birth, Smoker: ('1940', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	0		0		360000
	3	132			

Patient Record of Patient # 33

DOB, Sex at Birth, Smoker: ('1972', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
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1	1	1	319000
	1	128	

Patient Record of Patient # 34

DOB, Sex at Birth, Smoker: ('1974', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	1		0		302000
	1.2	138			

Patient Record of Patient # 35

DOB, Sex at Birth, Smoker: ('1956', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	1		1		188000
	1	140			

Patient Record of Patient # 36

DOB, Sex at Birth, Smoker: ('1951', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	1		0		228000
	3.5	134			

Patient Record of Patient # 37

DOB, Sex at Birth, Smoker: ('1932', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	1		0		226000
	1	134			

Patient Record of Patient # 38

DOB, Sex at Birth, Smoker: ('1933', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
1	1		1		321000
	1	145			

Patient Record of Patient # 39

DOB, Sex at Birth, Smoker: ('1960', 'M', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	1		0		305000
	2.3	137			

Patient Record of Patient # 40

DOB, Sex at Birth, Smoker: ('1963', 'F', '0')

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
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0

1  
3

0  
142

329000

Enter 1 to add a patient to the database  
2 to delete a patient from the database  
3 to modify a patient's test result  
4 to print all the patient's records  
5 to print a single patient's record  
6 to print a single patient's test result  
7 to print a statistic  
8 to exit the program

Enter your choice now: 1

Enter the patients year of birth, sex, whether the patient smokes

DOB: 1975

Sex at birth (1 for male, 0 for female): 1

Smoker (1 for smoker; 0 for non-smoker): 0

Enter Test Results

Anemia (1/0): 0

Diabetes (1/0): 0

High Blood Pressure (1/0): 1

Platelet level: 23456

Creatinine level: 2.1

Sodium level: 250

Enter 1 to add a patient to the database  
2 to delete a patient from the database  
3 to modify a patient's test result  
4 to print all the patient's records  
5 to print a single patient's record  
6 to print a single patient's test result  
7 to print a statistic  
8 to exit the program

Enter your choice now: 5

Please enter the id of the patient whose record you would like to see: 41

Patient Record of Patient # 41

DOB, Sex at Birth, Smoker: (1975, 'M', 0)

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	0		1		23456
	2.1	250			

Enter 1 to add a patient to the database  
 2 to delete a patient from the database  
 3 to modify a patient's test result  
 4 to print all the patient's records  
 5 to print a single patient's record  
 6 to print a single patient's test result  
 7 to print a statistic  
 8 to exit the program

Enter your choice now: 6

Please enter the id of the patient you are treating: 41

What test results you would like to view?

Enter 1 for Anemia/2 for Diabetes/3 for High Blood Pressure/4 for Platelets/5 for Creatinine/6 for Sodium

Enter your selection now: 4

Patient # 41's platelets level is 23456

Enter 1 to add a patient to the database  
 2 to delete a patient from the database  
 3 to modify a patient's test result  
 4 to print all the patient's records  
 5 to print a single patient's record  
 6 to print a single patient's test result  
 7 to print a statistic  
 8 to exit the program

Enter your choice now: 3

Enter the ID of the patient and the test result you would like to modify

Patient ID Number: 41

Test Selection: Enter 1 for Anemia/2 for Diabetes/3 for High Blood Pressure/4 for Platelets/5 for Creatinine/6 for Sodium

Enter your selection now: 4

Enter the new test result 123455

Enter 1 to add a patient to the database  
 2 to delete a patient from the database

- 3 to modify a patient's test result
- 4 to print all the patient's records
- 5 to print a single patient's record
- 6 to print a single patient's test result
- 7 to print a statistic
- 8 to exit the program

Enter your choice now: 5

Please enter the id of the patient whose record you would like to see: 41

Patient Record of Patient # 41

DOB, Sex at Birth, Smoker: (1975, 'M', 0)

Anemia	Diabetes	High Blood Pressure	Platelets	Creatinine	Sodium
0	0		1		123455
	2.1	250			

- Enter 1 to add a patient to the database
- 2 to delete a patient from the database
  - 3 to modify a patient's test result
  - 4 to print all the patient's records
  - 5 to print a single patient's record
  - 6 to print a single patient's test result
  - 7 to print a statistic
  - 8 to exit the program

Enter your choice now: 7

The percentage of women who have anemia is 77%

The percentage of men who have anemia is 46%

The percentage of women who have diabetes is 62%

The percentage of men who have diabetes is 36%

- Enter 1 to add a patient to the database
- 2 to delete a patient from the database
  - 3 to modify a patient's test result
  - 4 to print all the patient's records
  - 5 to print a single patient's record
  - 6 to print a single patient's test result
  - 7 to print a statistic
  - 8 to exit the program

Enter your choice now: 2

Enter the ID of the patient you would like to delete from the Database

ID Number: 41

Enter 1 to add a patient to the database

2 to delete a patient from the database

3 to modify a patient's test result

4 to print all the patient's records

5 to print a single patient's record

6 to print a single patient's test result

7 to print a statistic

8 to exit the program

Enter your choice now: 7

The percentage of women who have anemia is 77%

The percentage of men who have anemia is 48%

The percentage of women who have diabetes is 62%

The percentage of men who have diabetes is 37%

Enter 1 to add a patient to the database

2 to delete a patient from the database

3 to modify a patient's test result

4 to print all the patient's records

5 to print a single patient's record

6 to print a single patient's test result

7 to print a statistic

8 to exit the program

Enter your choice now: 8