

**GQ4:** (No Azure SQL is required to solve this problem):

Given the following relational database table:

Patients (ID, name, symptom, days\_in\_hospital)

The following insertions are performed on the table Patients:

Insert record <20, Johnson, cough, 3>

Insert record <10, Black, fever, 5>

Insert record <30, Miller, fever, 10>

Insert record <70, Brown, fatigue, 2>

Insert record <60, Grant, headache, 4>

Insert record <50, Miller, nausea, 15>

Insert record <90, Brown, cough, 8 >

Assume each block in the Patients file can store up to 2 patient records. Do the following:

1. (4 points) Assuming that Patients is organized as a sequential file with days\_in\_hospital as the ordering field, show the contents (i.e. the data values as well as the associated block/bucket/record addresses) of the file after the last insertion.

Block 1:

- Address 101: (70, Brown, fatigue, 2)
- Address 102: (20, Johnson, cough, 3)

Block 2:

- Address 103: (60, Grant, headache, 4)
- Address 104: (10, Black, fever, 5)

Block 3:

- Address 105: (90, Brown, cough, 8)
- Address 106: (30, Miller, fever, 10)

Block 4:

- Address 107: (50, Miller, nausea, 15)

2. (8.5 points) Assuming that Patients is organized as an index-sequential file on the search key days\_in\_hospital and assuming that the primary index, the secondary index on ID, and the secondary index on name have been created, show the contents of Patients, the primary index, and the two secondary indices after the last insertion.

Patients:

ID	Name	Symptom	Days in Hospital
70	Brown	fatigue	2
20	Johnson	cough	3
60	Grant	headache	4
10	Black	fever	5

90	Brown	cough	8
30	Miller	fever	10
50	Miller	nausea	15

Primary index:

Days in hospital	Record Address
2	101
3	102
4	103
5	104
8	105
10	106
15	107

Secondary index on ID:

ID	Record Address
10	104
20	102
30	106
50	107
60	103
70	101
90	105

Secondary index on name:

Name	Record Address
Black	104

Brown	101
Brown	105
Grant	103
Johnson	102
Miller	106
Miller	107

3. (4 points) Given the index-sequential file organization as described in (3), explain step-by-step how the DBMS would conduct search on this file organization to answer the following SQL query:

```
select name
from Patients
where ID between 30 and 60
```

From Block 3, Address 103: (30, Miller, fever, 10)  
 From Block 4, Address 106: (50, Miller, nausea, 15)  
 From Block 2, Address 107: (60, Grant, headache, 4)