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Watch1

Star0

Fork0

<> Code

Issues0

Pull requests0

Projects0

Insights

Branch: master

w4111-bloodbank / Part2 / README.md

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COMS 4111 - Introduction to Databases

Project Part 2

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PostgreSQL account - sv2525 (UNI)

Online Readme - <https://github.com/pankhurikumar23/w4111-bloodbank/blob/master/Part2/README.md>

Project Description Implementing the advanced features (mostly object-relational) of the PostgreSQL database management system for our Blood Bank Project.

-> Design changes to existing schema are as follows:-

1. Composite type:

- Created 'contact_details' with two fields (Phno VARCHAR, addr VARCHAR) as a type.
 - Used the new composite data type in our existing database by appending to the donor and recipients table, and dropped the separate 'phone' and 'address' columns. The combined field is set to NOT NULL to ensure data integrity of the original table is maintained.

2. Arrays:

- Created a new array of integers called 'bloodquantity' of size 8 - It helps map the blood type to quantity.

0	1	2	3	4	5	6	7
A+	A-	B+	B-	O+	O-	AB+	AB-

The array now helps to store the amount of blood of each type effectively withing the 'bloodbanks' and 'hospital' tables itself, thereby eliminating the need for an extra tale like 'bloodcapacity' (table has been dropped).

```
proj1part2=> select * from bloodcapacity;
 hospitalid | bloodtype | unitsofblood
-----+-----+-----
          202 | B+       |          200
          201 | B+       |          500
          203 | AB+      |          100
          204 | AB-      |           90
          205 | B-       |          160
          205 | O-       |          260
          201 | O+       |          190
          201 | A-       |          200
          201 | AB-      |          200
          202 | AB-      |          200
(10 rows)
```

Earlier we had multiple rows for capturing the amount of blood each blood bank or hospital had for each type of blood, but now with the use of array we are able to make the design more effortless with just one row dedicated to each institution in the respective tables.

3. Documents:

- Created a new 'notes' documents field along with the 'internalrequests' table.
 - This helps store the special instructions or notes from doctors while they try to retrieve blood from their hospital for any internal request. This note will be useful when doctors have to communicate the need for immediate blood transfers during critical procedures or for high-risk patients for instance. This note will also be beneficial in instances when a hospital admin wants to classify all those notes for a particular patient, particular illness or procedure. It allows for various new kinds of text-based manipulations of our existing database design.
 - Eg. searching for 'immediate' in notes will reveal all the notes that doctors have asked urgent attention or care for. Similarly we could query for all notes that were given for a certain illness like 'Brain hemorrhage' or 'Diabetes.'

-> Meaningful SQL QUERIES on updated DB design:-

1. To find all hospitals/bloodbanks with the quantity of a particular blood type

- Query: `SELECT * FROM bloodbanks WHERE bloodquantity[2] is NOT NULL;`

Result:

```
proj1part2=> SELECT * FROM bloodbanks WHERE bloodquantity[2] is NOT NULL;
institutionid | bloodquantity
-----+-----
119 | [2:5]={170,NULL,NULL,270}
118 | [2:6]={200,NULL,NULL,NULL,100}
122 | {150,100,NULL,NULL,155}
107 | {100,100}
108 | [0:6]={200,NULL,200,NULL,NULL,NULL,200}
(5 rows)
```

- Query: `SELECT * FROM hospitals WHERE bloodquantity[3] > 100;`

Result:

```
proj1part2=> SELECT * FROM hospitals WHERE bloodquantity[3] > 100;
institutionid | hospitalid | bloodquantity
-----+-----
105 | 205 | [3:5]={160,NULL,260}
112 | 207 | [0:3]={100,NULL,NULL,200}
(2 rows)
```

2. Select all donors/recipients that belong to a particular area (based on phone and address)

- Query: `Select * FROM donor WHERE (condet).phno LIKE '212%' ORDER BY (condet).addr;`

Result:

```
proj1part2=> select * from donor where (condet).phno like '212%' order by (condet).addr;
donorid | bloodtype | name | condet
-----+-----
406 | O+ | Mark Benjamin | (2124536578,"45 W 11th St New York, New York 10065")
408 | B+ | Katie Holmes | (2125789123,"87 5th Avenue New York, NY 10035")
401 | B- | Alex Biliris | (212854HELP,"Data @1127 Mudd")
402 | AB+ | Mark Hansen | (212-851-9652,"Pulitzer Hall, 201 MA")
(4 rows)
```

3. Find and retrieve all notes that doctors gave for a particular illness like 'Diabetes' or with 'Immediate' requirements

- Query: `SELECT * FROM internalrequest WHERE to_tsvector(notes) @@ to_tsquery('diabetes');`

Result: Displays rows with closest matches to 'diabetes'.

```
proj1part2=> select * from internalrequest where to_tsvector(notes) @@ to_tsquery('diabetes');
requestid | bloodtype | unitsrequested | deptid | hospitalid | notes
-----
1 | B+ | 12 | 1 | 201 | Limited sugar intake, illness: type A diabetes
9 | O- | 10 | 1 | 201 | patient requires blood, illness : diabetes
(2 rows)
```

- Query: `SELECT * FROM internalrequest WHERE to_tsvector(notes) @@ to_tsquery('immediately');`

Result: Displays rows with closest matches to 'immediately,' including 'immediate'

```
proj1part2=> select * from internalrequest where to_tsvector(notes) @@ to_tsquery('immediately');
requestid | bloodtype | unitsrequested | deptid | hospitalid | notes
-----
6 | AB- | 5 | 2 | 204 | patient has internal bleeding, immediate requirement
8 | B- | 5 | 2 | 201 | blood required immediately since patient is pregnant
5 | O- | 10 | 2 | 203 | various requirements, universal donor immediately needed
(3 rows)
```

