

Portfolio Project 1
INFO 3401 - Information Exploration
University of Colorado Boulder
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Project Overview:

This portfolio project demonstrates my ability to apply fundamental SQL concepts across structured relational databases. The project walks through core querying skills, including SELECT statements, numeric, text, date, and NULL filtering with WHERE, sorting results using ORDER BY, aggregating data with GROUP BY and COUNT, and combining related tables using JOIN and LEFT JOIN. It also includes multi-table joins and subqueries to perform calculated comparisons, such as identifying patients whose weight exceeds the overall average. Each section builds on the previous one to show a clear progression from basic data retrieval to more complex relational querying, highlighting practical understanding of schema relationships, foreign keys, and complete SQL query construction.

Database Structure



1. SELECT

Question

Display all patients in the patients table

Query

SELECT

*

FROM

patients

Result

```
1 /* Hospital_DB
2 Display all patients in the patients table */
3
4 SELECT
5 *
6 FROM
7 patients
```

100 rows returned

patient_id	first_name	last_name	gender	birth_date	city	province_id	allergies	height	weight
1	Donald	Waterfield	M	1963-02-12	Barrie	ON	null	156	65
2	Mickey	Baasha	M	1981-05-28	Dundas	ON	Sulfa	185	76
3	Ji	Sharma	M	1957-09-05	Hamilton	ON	Penicillin	194	106
4	Blair	Diaz	M	1967-01-07	Hamilton	ON	null	191	104
5	Charles	Wolfe	M	2017-11-19	Misty	AB	Penicillin	47	10
6	Sue	Falcon	F	2017-09-30	Ajax	ON	Penicillin	43	5
7	Thomas	O'Neill	M	1993-01-31	Burlington	ON	null	180	117
8	Sonny	Beckett	M	1952-12-11	Port Hawkesbury	NS	null	174	105
9	Sister	Spitzer	F	1966-10-15	Toronto	ON	Penicillin	173	95
10	Cedric	Coltrane	M	1961-11-10	Toronto	ON	null	157	61
11	Hank	Spencer	M	1969-08-10	Peterborough	ON	null	158	74
12	Sara	di Marco	F	1949-04-29	Walnut Grove	AB	null	145	46
13	Daphne	Seabright	F	1954-11-18	Ancaster	ON	Codeine	146	77
14	Rick	Bennett	M	1977-01-27	Ancaster	ON	Penicillin	220	95
15	Amy	Leela	F	1977-06-25	Hamilton	ON	null	172	72
16	Woody	Bashir	M	1951-11-15	Barrie	ON	Penicillin	153	59
17	Tom	Hallwell	M	1987-08-01	Hamilton	ON	Ragweed	179	114
18	Rachel	Winterbourne	F	1966-04-26	Hamilton	ON	null	163	95
19	John	West	M	1961-06-19	Red River	MB	null	138	61
20	Jon	Doggett	M	1951-12-25	Hamilton	ON	null	194	116
21	Angel	Edwards	F	1975-08-22	Saskatoon	SK	null	176	106
22	Brodie	Beck	F	1975-08-01	Carlisle	ON	null	157	66
23	Beanie	Foster	F	1998-11-22	Ancaster	ON	Sulfa	154	75
24	Nino	Andrews	M	2001-04-21	Hamilton	ON	Peanuts	186	85
25	John	Farley	M	1956-09-12	Hamilton	ON	Gluten	213	104

2a. WHERE (Numeric)

Question

Display all data from admissions for patient_ids of 1,7,8,10 and 54

Query

```
SELECT
*
FROM
admissions
WHERE
patient_id IN (1,7,8,10,54)
```

Result

```
1 /* Hospital_DB
2 Display all data from admissions for patient_ids of 1,7,8,10 and 54 */
3
4 SELECT
5 *
6 FROM
7 admissions
8 WHERE
9 patient_id IN (1,7,8,10,54)
```

8 rows returned

patient_id	admission_date	discharge_date	diagnosis	attending_doctor
1	2018-11-06	2018-11-08	Ovarian Dermoid-Cyst	21
1	2018-09-20	2018-09-20	Ineffective Breathing Pattern R/T Fluid Accumulation	24
7	2018-06-24	2018-07-03	Cancer	8
8	2018-09-18	2018-09-21	Angina	6
10	2018-12-30	2019-01-05	Lower Quadrant Pain	14
10	2019-02-27	2019-02-27	Lower Quadrant Pain	27
54	2018-10-31	2018-11-03	Diabetes	21
54	2019-04-07	2019-04-07	Hypertension	21

2b. WHERE (Text)

Question

Display all data for doctors who are surgeons

Query

```
SELECT
*
FROM
doctors
WHERE
speciality LIKE '%surgeon'
```

Result

```
1 /* Hospital_DB
2 Display all data for doctors who are surgeons */
3
4 SELECT
5 *
6 FROM
7 doctors
8 WHERE
9 speciality LIKE '%surgeon'
```

5 rows returned

doctor_id	first_name	last_name	speciality
3	Miriam	Tregre	General Surgeon
10	Monica	Singleton	Orthopaedic Surgeon
12	Flora	Moore	Cardiovascular Surgeon
20	Ralph	Wilson	General Surgeon
26	Larry	Miller	Cardiovascular Surgeon

result code 3466104785

2c. WHERE (Date)

Question

Display all data for admission dates on the 2nd of the month in 2018

Query

```
SELECT
*
FROM
admissions
WHERE
strftime('%d', admission_date) LIKE '02' AND
strftime('%Y', admission_date) LIKE '2018'
```

Result

```
1 /* Hospital_DB
2 Display all data for admission dates on the 2nd of the month in 2018 */
3
4 SELECT
5 *
6 FROM
7 admissions
8 WHERE
9 strftime('%d', admission_date) LIKE '02' AND
10 strftime('%Y', admission_date) LIKE '2018'
```

4 rows returned

patient_id	admission_date	discharge_date	diagnosis	attending_doctor
18	2018-07-02	2018-07-05	Spinal Infection	3
32	2018-10-02	2018-10-11	Stomache Pain	12
61	2018-09-02	2018-09-05	Cva (Left) - Cerebral Vascular Accident (Stroke)	20
68	2018-12-02	2018-12-07	Diabetes Mellitus	12

result code 4149981042

2d. WHERE (NULL)

Question

Display all data from patients with no known allergies

Query

SELECT

*

FROM

patients

WHERE

allergies IS null

Result

```
1 /* Hospital_DB
2 Display all data from patients with no known allergies */
3
4 SELECT
5 *
6 FROM
7 patients
8 WHERE
9 allergies IS null
```

52 rows returned

patient_id	first_name	last_name	gender	birth_date	city	province_id	allergies	height	weight
1	Donald	Waterfield	M	1963-02-12	Barrie	ON	null	156	65
4	Blair	Diaz	M	1967-01-07	Hamilton	ON	null	191	104
7	Thomas	O'Neill	M	1993-01-31	Burlington	ON	null	180	117
8	Sonny	Beckett	M	1952-12-11	Port Hawkesbury	NS	null	174	105
10	Cedric	Coltrane	M	1961-11-10	Toronto	ON	null	157	61
11	Hank	Spencer	M	1969-08-10	Peterborough	ON	null	158	74
12	Sara	di Marco	F	1949-04-29	Walnut Grove	AB	null	145	46
15	Amy	Leela	F	1977-06-25	Hamilton	ON	null	172	72
18	Rachel	Winterbourne	F	1966-04-26	Hamilton	ON	null	163	95
19	John	West	M	1961-06-19	Red River	MB	null	138	61
20	Jon	Doggett	M	1951-12-25	Hamilton	ON	null	194	116
21	Angel	Edwards	F	1975-08-22	Saskatoon	SK	null	176	106
22	Brodie	Beck	F	1975-08-01	Carlisle	ON	null	157	66
26	Nea	Kobayakawa	F	1995-10-18	Toronto	ON	null	147	62
27	Laura	Halliwel	F	1964-11-26	Brantford	ON	null	146	76
28	Lucille	Maureen	F	1953-08-22	Hamilton	ON	null	184	87
30	Roderick	Payne	M	2015-03-22	Halifax	NS	null	58	17
32	Bertha	Crowley	F	2009-03-14	Delhi	ON	null	125	39
34	Don	Wiggum	M	2002-11-15	Hamilton	ON	null	189	91
35	Anthony	Maxwell	M	2011-02-11	Oakville	ON	null	92	37
37	Anne	Marlowe	F	1996-09-17	Pickering	ON	null	165	88
39	Charles	Andonuts	M	2016-05-20	Hamilton	ON	null	62	15
41	Don	Edwards	M	1975-07-02	Hamilton	ON	null	215	118

result code 1565238007

2e. WHERE (Combined)

Question

Show all the columns from admissions where the patient was admitted and discharged on the same day

Query

SELECT

*

FROM

admissions

WHERE

admission_date = discharge_date

Result

```
1 /* Hospital_DB
2 Show all the columns from admissions where the patient was admitted and discharged on the same day. */
3
4 SELECT
5 *
6 FROM
7 admissions
8 WHERE
9 admission_date = discharge_date
```

10 rows returned

patient_id	admission_date	discharge_date	diagnosis	attending_doctor
1	2018-09-20	2018-09-20	Ineffective Breathing Pattern R/T Fluid Accumulation	24
9	2018-12-31	2018-12-31	Ruptured Appendicitis	19
10	2019-02-27	2019-02-27	Lower Quadrant Pain	27
17	2019-03-04	2019-03-04	Diabetes Mellitus	9
28	2019-03-30	2019-03-30	Cancer Of The Stomach	26
31	2018-09-26	2018-09-26	Cardiovascular Disease	19
53	2018-10-24	2018-10-24	Urinary Tract Infection	8
54	2019-04-07	2019-04-07	Hypertension	21
70	2018-07-17	2018-07-17	Migraine	20
78	2018-06-17	2018-06-17	Hypertension	17

3. ORDER BY

Question

Display a sorted list (Z-A) of doctor specialities as "Speciality" with no duplicates

Query

```
SELECT DISTINCT
speciality AS "Speciality"
FROM
doctors
ORDER BY
speciality DESC
```

Result

```
1 /* Hospital_DB
2 Display a sorted list (Z-A) of doctor specialities as "Speciality" with no duplicates */
3
4 SELECT DISTINCT
5 speciality AS "Speciality"
6 FROM
7 doctors
8 ORDER BY
9 speciality DESC
```

15 rows returned

Speciality
Urologist
Respirologist
Psychiatrist
Pediatrician
Orthopaedic Surgeon
Oncologist
Obstetrician/Gynecologist
Nuclear Medicine
Neurologist
Internist
Gerontologist
General Surgeon
Gastroenterologist
Cardiovascular Surgeon
Cardiologist

4. GROUP BY

Question

Display the number of admissions per month as 2 columns "Admission Month" and

"Admissions"

Query

```
SELECT
strftime('%m', admission_date) AS 'Admission Month',
COUNT(*) AS 'Admissions'
FROM
admissions
GROUP BY
strftime('%m', admission_date)
ORDER BY
'Admission Month'
```

Result

```
1 /* Hospital_DB
2 Display the number of admissions per month as 2 columns "Admission Month" and "Admissions" */
3
4 SELECT
5 strftime('%m', admission_date) AS 'Admission Month',
6 COUNT(*) AS 'Admissions'
7 FROM
8 admissions
9 GROUP BY
10 strftime('%m', admission_date)
11 ORDER BY
12 'Admission Month'
```

12 rows returned result code 2433846276

Admission Month	Admissions
01	10
02	5
03	8
04	7
05	9
06	9
07	4
08	3
09	8
10	10
11	16
12	11

5a. JOIN (2 tables)

Question

Display "Patient First Name", "Patient Last Name", and "Province"
Start with the patients table

Query

```
SELECT
patients.first_name AS 'Patient First Name',
patients.last_name AS 'Patient Last Name',
provinces.name AS 'Province'
FROM
patients
JOIN
provinces
ON patients.province_id = provinces.province_id
```

Result

```
1 /* Hospital_DB
2 Display "Patient First Name", "Patient Last Name", and "Province"
3 Start with the patients table */
4
5 SELECT
6 patients.first_name AS 'Patient First Name',
7 patients.last_name AS 'Patient Last Name',
8 provinces.name AS 'Province'
9 FROM
10 patients
11 JOIN
12 provinces
13 ON patients.province_id = provinces.province_id
```

100 rows returned

result code 2156725848

Patient First Name	Patient Last Name	Province
Donald	Waterfield	Ontario
Mickey	Baasha	Ontario
Jiji	Sharma	Ontario
Blair	Diaz	Ontario
Charles	Wolfe	Alberta
Sue	Falcon	Ontario
Thomas	O'Neill	Ontario
Sonny	Beckett	Nova Scotia
Sister	Spitzer	Ontario
Cedric	Coltrane	Ontario
Hank	Spencer	Ontario
Sara	di Marco	Alberta
Daphne	Seabright	Ontario
Rick	Bennett	Ontario
Amy	Lesla	Ontario
Woody	Bashir	Ontario
Tom	Hallwell	Ontario
Rachel	Winterbourne	Ontario
John	West	Manitoba
Jon	Doggett	Ontario

5b. JOIN (2+ tables)

Question

Display admission_date, discharge_date, "Patient First Name", "Patient Last Name",
"Doctor First Name", "Doctor Last Name"

Start with the admissions table

Query

```
SELECT
admissions.admission_date,
admissions.discharge_date,
patients.first_name AS 'Patient First Name',
patients.last_name AS 'Patient Last Name',
doctors.first_name AS 'Doctor First Name',
doctors.last_name AS 'Doctor Last Name'
FROM
admissions
JOIN
patients
ON admissions.patient_id = patients.patient_id
JOIN
doctors
ON admissions.attending_doctor = doctors.doctor_id
```

Result

```
1 /* Hospital_08
2 Display admission_date, discharge_date, "Patient First Name", "Patient Last Name", "Doctor First Name", "Doctor Last Name"
3 Start with the admissions table. */
4
5 SELECT
6 admissions.admission_date,
7 admissions.discharge_date,
8 patients.first_name AS 'Patient First Name',
9 patients.last_name AS 'Patient Last Name',
10 doctors.first_name AS 'Doctor First Name',
11 doctors.last_name AS 'Doctor Last Name'
12 FROM
13 admissions
14 JOIN
15 patients
16 ON admissions.patient_id = patients.patient_id
17 JOIN
18 doctors
19 ON admissions.attending_doctor = doctors.doctor_id
```

100 rows returned

result code 891733578

admission_date	discharge_date	Patient First Name	Patient Last Name	Doctor First Name	Doctor Last Name
2018-11-06	2018-11-08	Donald	Waterfield	Lisa	Cuddy
2018-09-20	2018-09-20	Donald	Waterfield	Jenny	Pulaski
2019-01-24	2019-01-29	Jiji	Sharma	Joshua	Green
2018-10-21	2018-10-27	Jiji	Sharma	Mickey	Duval
2018-06-13	2018-06-15	Sue	Falcon	Miriam	Tregre
2018-11-08	2018-11-09	Sue	Falcon	Simon	Santiago
2018-06-24	2018-07-03	Thomas	O'Neill	Mickey	Duval
2018-09-18	2018-09-21	Sonny	Beckett	Tasha	Phillips
2019-03-02	2019-03-09	Sister	Spitzer	Mickey	Duval
2018-12-31	2018-12-31	Sister	Spitzer	Stephanie	Cohen
2018-12-30	2019-01-05	Cedric	Coltrane	Tyrone	Smart
2019-02-27	2019-02-27	Cedric	Coltrane	Donna	Greenwood
2018-12-14	2018-12-16	Hank	Spencer	Marie	Brinkman
2019-04-27	2019-05-04	Sara	di Marco	Lisa	Cuddy
2019-04-28	2019-05-01	Daphne	Seabright	Claude	Walls

6. LEFT JOIN

Question

Display the name of all provinces with no patients

Name the columns "Province"

Sort by province name (A-Z)

Start with the provinces table

Query

```
SELECT
provinces.name AS 'Province'
FROM
provinces
LEFT JOIN
patients
ON provinces.province_id = patients.province_id
WHERE
patients.first_name IS NULL
ORDER BY
provinces.name ASC
```

Result

```
1 /* Hospital_DB
2 Display the name of all provinces with no patients.
3 Name the columns "Province".
4 Sort by province name (A-Z)
5 Start with the provinces table */
6
7 SELECT
8 provinces.name AS 'Province'
9 FROM
10 provinces
11 LEFT JOIN
12 patients
13 ON provinces.province_id = patients.province_id
14 WHERE
15 patients.first_name IS NULL
16 ORDER BY
17 provinces.name ASC
```

7 rows returned

result code 1867034563

Province

New Brunswick

Newfoundland and Labrador

Northwest Territories

Nunavut

Prince Edward Island

Quebec

Yukon

7. Sub-queries

Question

Write a SQL query to retrieve all patient details (all columns from patients table) for patients whose weight is greater than the average weight of all patients. Use a subquery to calculate the average weight.

Query

SELECT

*

FROM

patients

WHERE

weight > (

SELECT

AVG(weight)

FROM

patients

)

Result

```
1 /* Hospital_08
2 Write a SQL query to retrieve all patient details (all columns from patients table) for patients whose weight is greater than the average
3 weight of all patients. Use a subquery to calculate the average weight.
4 Expected Output Columns: All columns from patients table */
5
6 SELECT
7 *
8 FROM
9 patients
10 WHERE
11 weight > (
12     SELECT
13     AVG(weight)
14     FROM
15     patients
16 )
```

45 rows returned

								result code
patient_id	first_name	last_name	gender	birth_date	city	province_id	allergies	height weight
3	Jiji	Sharma	M	1957-09-05	Hamilton	ON	Penicillin	194 106
4	Blair	Diaz	M	1967-01-07	Hamilton	ON	null	191 104
7	Thomas	O'Neill	M	1993-01-31	Burlington	ON	null	180 117
8	Sonny	Beckett	M	1952-12-11	Port Hawkesbury	NS	null	174 105
9	Sister	Spitzer	F	1966-10-15	Toronto	ON	Penicillin	173 95
14	Rick	Bennett	M	1977-01-27	Ancaster	ON	Penicillin	220 95
17	Tom	Hallwell	M	1987-08-01	Hamilton	ON	Ragweed	179 114
18	Rachel	Winterbourne	F	1966-04-26	Hamilton	ON	null	163 95
20	Jon	Doggett	M	1951-12-25	Hamilton	ON	null	194 116
21	Angel	Edwards	F	1975-08-22	Saskatoon	SK	null	176 106
24	Nino	Andrews	M	2001-04-21	Hamilton	ON	Peanuts	186 85
25	John	Farley	M	1956-09-12	Hamilton	ON	Gluten	213 104
28	Lucille	Maureen	F	1953-08-22	Hamilton	ON	null	184 87
31	Sam	Threep	M	1982-06-16	Hamilton	ON	Sulpha	199 141
33	Roland	Edge	M	1967-09-25	Brantford	ON	Peanut Oil	199 134
34	Don	Wiggum	M	2002-11-15	Hamilton	ON	null	189 91
37	Anne	Marlowe	F	1996-09-17	Pickering	ON	null	165 88
40	Temple	Russert	F	1953-05-11	Hamilton	ON	Hay Fever	166 102
41	Don	Edwards	M	1975-07-02	Hamilton	ON	null	215 118