SQL Queries for Hospital Staff Shift Allocation

with sqlite3 and ipython-sql

In [1]:
```
import sqlite3
%load_ext sql
%config SqlMagic.style = '_DEPRECATED_DEFAULT'
```

In [2]:
```
%sql sqlite:///hospital.db
```

Corresponding materials are availale at Hospital Staff Shift Allocation GitHub Repository

Task 1

In [3]:
```
%%sql
SELECT
        allocation_people_id AS peopleID,
        COUNT(allocation_ID) AS allocation_times,
        COUNT(allocation_ID)* 8  AS allocation_hours
FROM
        allocation
WHERE
        allocation_people_id = 10566
GROUP BY
        allocation_people_id
```

```
 * sqlite:///hospital.db
Done.
```

Out[3]:

peopleID	allocation_times	allocation_hours
10566	52	416

Task 2

In [4]:
```
%%sql
SELECT
                people_id,
                "[" || people_first_name || "]"  || "[" || people_surname || "]"  ,
                people_email,
                people_telephone,
                people_dob,
                people_band,
                people_specialty
FROM
                people
WHERE
                DATE(people_dob) BETWEEN "1957-01-01" AND "1957-12-31"
ORDER BY
                DATE(people_dob)
```

```
 * sqlite:///hospital.db
Done.
```

Out[4]:

people_id	"[" || people_first_name || "]" || "[" || people_surname || "]"	people_email	people_telephone	people_dob	people_band	people_specialty
10582	[GEORGIA][STEVENSON]	GEORGIA.STEVENSON@soton.ac.uk	07765012790	1957-09-15	N2	Geriatric
10796	[RYAN][SMITH]	RYAN.SMITH@bbc.com	07007758225	1957-09-22	N2	Orthopaedics
10688	[MARTHA][GRANT]	MARTHA.GRANT@bbc.com	07692421102	1957-09-23	N1	General
10462	[MILLIE][WALLACE]	MILLIE.WALLACE@bbc.com	07254680451	1957-10-07	HCA3	General
11000	[AARON][HUNTER]	AARON.HUNTER@soton.ac.uk	07570357553	1957-10-17	N2	Opthalmology
10644	[NOAH][FLEMING]	NOAH.FLEMING@google.com	07372019977	1957-11-16	N1	Orthopaedics
10721	[OLIVIA][MACLEOD]	OLIVIA.MACLEOD@bbc.com	07127146659	1957-12-01	D1	General
10890	[ARTHUR][MURRAY]	ARTHUR.MURRAY@soton.ac.uk	07142676881	1957-12-19	D1	Oncology
10695	[TYLER][CHRISTIE]	TYLER.CHRISTIE@bbc.com	07229520601	1957-12-21	D1	Psychiatry

Task3

In [5]:
```
%%sql
SELECT DISTINCT
        people.people_id,
        "[" || people.people_first_name || "]"  || "[" || people.people_surname || "]"  AS full_name,
        allocation_date,
        allocation_ward,
        ward.ward_specialty
FROM
        allocation
LEFT JOIN
        people
        ON people.people_id = allocation_people_id
LEFT JOIN
        ward
        ON allocation.allocation_ward = ward.ward_id
WHERE ward.ward_specialty ="Neurology" AND allocation_date = "2024-06-01"
```

```
 * sqlite:///hospital.db
Done.
```

Out[5]:

people_id	full_name	allocation_date	allocation_ward	ward_specialty
10570	[JOSHUA][DICKSON]	2024-06-01	N1	Neurology
10168	[JAYDEN][MCDONALD]	2024-06-01	N1	Neurology
10108	[GEORGE][MCDONALD]	2024-06-01	N1	Neurology
10148	[SETH][HUNTER]	2024-06-01	N1	Neurology
10343	[LUCY][WALLACE]	2024-06-01	N1	Neurology
10445	[ADAM][WALKER]	2024-06-01	N1	Neurology
10504	[BOBBY][SHAW]	2024-06-01	N1	Neurology
10668	[BENJAMIN][REILLY]	2024-06-01	N1	Neurology
10791	[ALFIE][CHRISTIE]	2024-06-01	N1	Neurology
10822	[DYLAN][MILLAR]	2024-06-01	N1	Neurology
10578	[MIA][SMITH]	2024-06-01	N1	Neurology
10687	[LUCA][MITCHELL]	2024-06-01	N1	Neurology
10700	[AMELIE][KENNEDY]	2024-06-01	N1	Neurology
10455	[ALICE][MCINTYRE]	2024-06-01	N1	Neurology
10921	[DARCEY][MARTIN]	2024-06-01	N1	Neurology
10968	[FLORENCE][KERR]	2024-06-01	N1	Neurology

Task 4

In [6]:
```
%%sql
SELECT
        people.people_id,
```

```
        "[" || people.people_first_name || "]"  || "[" || people.people_surname || "]"  AS full_name,
        ward.ward_specialty,
        COUNT(
        DISTINCT CASE
                WHEN (allocation_date = "2024-01-19" AND allocation_shift = "Evening")  THEN "2024-01-19_Evenin
                WHEN (allocation_date = "2024-04-07" AND allocation_shift = "Morning") THEN "2024-04-07_Morning
                WHEN (allocation_date = "2024-06-21" AND allocation_shift = "Morning") THEN "2024-06-21_Morning
                WHEN (allocation_date = "2024-08-27" AND allocation_shift = "Evening") THEN "2024-08-27_Evening
        END) AS total_days
FROM
        allocation
LEFT JOIN
        people
        ON allocation.allocation_people_id = people.people_id
LEFT JOIN
        ward
        ON ward.ward_id = allocation.allocation_ward
WHERE
        ((allocation_date = "2024-01-19" AND allocation_shift = "Evening")
        OR (allocation_date = "2024-04-07" AND allocation_shift = "Morning")
        OR (allocation_date = "2024-06-21" AND allocation_shift = "Morning")
        OR (allocation_date = "2024-08-27" AND allocation_shift = "Evening"))
        AND ward.ward_specialty = "Orthopaedics"
GROUP BY
        people.people_id
HAVING
        total_days ==4
```

```
 * sqlite:///hospital.db
Done.
```

Out[6]:

people_id	full_name	ward_specialty	total_days
10737	[RONNIE][WHITE]	Orthopaedics	4
10812	[MATILDA][JAMIESON]	Orthopaedics	4

Task 5

In [9]:

```
%%sql
SELECT
        people.people_band,
        band.band_type,
        allocation.allocation_date,
        allocation.allocation_ward,
        COUNT(band.band_type) AS num_of_staff
FROM
    people
LEFT JOIN
    band
        ON band.band_id = people.people_band
LEFT JOIN
    allocation
        ON
        allocation.allocation_people_id = people.people_id
WHERE
    allocation.allocation_ward = "ED"
        AND allocation.allocation_date = "2024-05-01"
GROUP BY
    band.band_type
ORDER BY
    CASE    band.band_type    --- in general, to make the order consistent with the question described,
            WHEN  "Consultant" THEN 1 --- we may use CASE command.
                WHEN  "Doctor" THEN 2  --- to make it easier, we can also use alphabetic order aka
                WHEN  "Health Care Assistant"  THEN 3 --- " band.band_type  ASC"
                ELSE 4
        END
```

```
 * sqlite:///hospital.db
Done.
```

Out[9]:

people_band	band_type	allocation_date	allocation_ward	num_of_staff
C2	Consultant	2024-05-01	ED	9
D3	Doctor	2024-05-01	ED	9
HCA3	Health Care Assistant	2024-05-01	ED	30
N2	Nurse	2024-05-01	ED	18

Task6-Method1

In [10]:

```
%%sql
SELECT
    sub.band_type,
        sub.month,
    SUM(sub.hours) AS total_hours
FROM (
    SELECT
        band.band_type,
                strftime("%m",allocation.allocation_date) AS month,
        CASE
            WHEN shift.shift_end > shift.shift_start
            THEN (strftime("%H", shift.shift_end)-strftime("%H", shift.shift_start))
            ELSE (strftime("%H", shift.shift_end)+ 24 - strftime("%H", shift.shift_start))
        END AS hours
        FROM
        allocation
        LEFT JOIN
        people ON allocation.allocation_people_id = people.people_id
    LEFT JOIN
        band ON band.band_id = people.people_band
    LEFT JOIN
        shift ON shift.shift_id = allocation.allocation_shift
) AS sub
GROUP BY
    sub.band_type, sub.month
ORDER BY            ---- define the order to meet the requirement of question
    CASE band_type
                WHEN "Health care assistant" THEN 1
                WHEN "Nurse" THEN 2
                WHEN "Doctor" THEN 3
                WHEN "Consultant" THEN 4
        END
```

```
 * sqlite:///hospital.db
Done.
```

Out[10]:

band_type	month	total_hours
Health Care Assistant	01	47616
Health Care Assistant	02	44544
Health Care Assistant	03	47616
Health Care Assistant	04	46080
Health Care Assistant	05	47616
Health Care Assistant	06	46080
Health Care Assistant	07	47616
Health Care Assistant	08	47616
Nurse	01	38480
Nurse	02	35968
Nurse	03	38688
Nurse	04	37248
Nurse	05	38608
Nurse	06	37448
Nurse	07	38568
Nurse	08	38536
Doctor	01	15624
Doctor	02	14616
Doctor	03	15624
Doctor	04	15120
Doctor	05	15624
Doctor	06	15120
Doctor	07	15624
Doctor	08	15624
Consultant	01	16576
Consultant	02	15536
Consultant	03	16368
Consultant	04	16032
Consultant	05	16448
Consultant	06	15832
Consultant	07	16488
Consultant	08	16520

Task6-Method2

In [11]:

```
%%sql
WITH  computed_hours AS (
    SELECT
            allocation.allocation_ID,
            CASE
                WHEN  shift.shift_end > shift.shift_start
                THEN ( strftime("%H",shift.shift_end)- strftime("%H",shift.shift_start))  --- Here we use strft
                ELSE  ( strftime("%H",shift.shift_end)+24 - strftime("%H",shift.shift_start))  --- the next que
            END AS hours
        FROM   allocation
    LEFT JOIN
    shift
        ON shift.shift_id = allocation.allocation_shift
)

SELECT
        --- people.people_band,
        band.band_type,
        strftime("%m",allocation_date) AS months,
        SUM(hours) AS total_hours
FROM
    allocation
LEFT JOIN
```

```
    people
        ON allocation.allocation_people_id =  people.people_id
LEFT JOIN
    band
        ON band.band_id = people.people_band
LEFT JOIN
    shift
        ON shift.shift_id = allocation.allocation_shift
LEFT JOIN
    computed_hours
        ON computed_hours.allocation_ID = allocation.allocation_ID
GROUP BY
    band.band_type,months
ORDER BY            ---- define the order to meet the requirement of question
    CASE band_type
                WHEN "Health care assistant" THEN 1
                WHEN "Nurse" THEN 2
                WHEN "Doctor" THEN 3
                WHEN "Consultant" THEN 4
        END
```

```
 * sqlite:///hospital.db
Done.
```

Out[11]:

band_type	months	total_hours
Health Care Assistant	01	47616
Health Care Assistant	02	44544
Health Care Assistant	03	47616
Health Care Assistant	04	46080
Health Care Assistant	05	47616
Health Care Assistant	06	46080
Health Care Assistant	07	47616
Health Care Assistant	08	47616
Nurse	01	38480
Nurse	02	35968
Nurse	03	38688
Nurse	04	37248
Nurse	05	38608
Nurse	06	37448
Nurse	07	38568
Nurse	08	38536
Doctor	01	15624
Doctor	02	14616
Doctor	03	15624
Doctor	04	15120
Doctor	05	15624
Doctor	06	15120
Doctor	07	15624
Doctor	08	15624
Consultant	01	16576
Consultant	02	15536
Consultant	03	16368
Consultant	04	16032
Consultant	05	16448
Consultant	06	15832
Consultant	07	16488
Consultant	08	16520

Task 7 - Method 1

In [12]:

```
%%sql
SELECT
```

```
        sub.people_specialty,
    SUM( sub.times*sub.band_salary_pershift) AS total_expenses
FROM (
    SELECT
    allocation.allocation_people_id,
    COUNT(allocation_shift) AS times,
    people_specialty,
    people_band,
    band_salary,
    ROUND(band_salary/230,4)  AS band_salary_pershift
FROM
    allocation
LEFT JOIN
    people
    ON people.people_id = allocation.allocation_people_id
LEFT JOIN
    band
    ON band.band_id = people.people_band
GROUP BY
    allocation.allocation_people_id
 )  AS  sub
GROUP BY
        sub.people_specialty
```

```
 * sqlite:///hospital.db
Done.
```

Out[12]:

people_specialty	total_expenses
Cardiology	1948361.0
Emergency	2879456.0
General	2069228.0
Geriatric	1883914.0
Neurology	960560.0
Oncology	1893381.0
Opthalmology	1085636.0
Orthopaedics	1866702.0
Paediatrics	1877119.0
Psychiatry	2064015.0
Respiratory	1845093.0

Task 7 - Method 2

In [13]:

```
%%sql
WITH personal_salary AS (
        SELECT
                allocation.allocation_people_id,
                COUNT(allocation_shift) AS times,
                people_specialty,
                people_band,
                band_salary,
                ROUND(band_salary/230,4)  AS band_salary_pershift
        FROM
                allocation
        LEFT JOIN
                people
                ON people.people_id = allocation.allocation_people_id
        LEFT JOIN
                band
                ON band.band_id = people.people_band
        GROUP BY
                allocation.allocation_people_id )

SELECT
        personal_salary.people_specialty,
    SUM( personal_salary.times*personal_salary.band_salary_pershift) AS total_expenses
FROM
        personal_salary
 GROUP BY
        personal_salary.people_specialty
```

```
 * sqlite:///hospital.db
Done.
```

Out[13]:

people_specialty	total_expenses
Cardiology	1948361.0
Emergency	2879456.0
General	2069228.0
Geriatric	1883914.0
Neurology	960560.0
Oncology	1893381.0
Opthalmology	1085636.0
Orthopaedics	1866702.0
Paediatrics	1877119.0
Psychiatry	2064015.0
Respiratory	1845093.0

In [ ]: