1.Select all patients provided services by a specific clinic:	SELECT patient.* FROM provideing, patient WHERE provideing.pr_patient_ID = patient.patient_ID and provideing.pr_clinic_ID = 1001;
2. List all clinics along with the count of staff members working in each clinic:	SELECT clinic.clinic_ID, clinic.clinic_name, COUNT(staff.SSN) AS staff_count FROM clinic, staff WHERE clinic.clinic_ID = staff.s_clinic_id GROUP BY clinic.clinic_ID, clinic.clinic_name;
3.Get details of all invoices paid by a specific patient:	SELECT invoice.* FROM pay JOIN invoice ON pay.pa_invoice_ID = invoice.invoice_ID WHERE pay.pa_patient_ID = 2001;
4. Find the total salary expenditure for each clinic:	SELECT clinic.clinic_name, SUM(staff.salary) AS total_salary FROM clinic JOIN staff ON clinic.clinic_ID = staff.s_clinic_id GROUP BY clinic.clinic_name;
5.Find all patients who have an appointment (reserved) in more than a specific number of clinics:	SELECT r_patient_ID, COUNT(r_clinic_ID) AS clinic_count FROM reserve_in GROUP BY r_patient_ID HAVING COUNT(r_clinic_ID) > 0;

6. Retrieve the total amount and VAT for invoices of a specific patient:	SELECT patient_ID, (SELECT SUM(total_amount) FROM invoice JOIN pay ON invoice.invoice_ID = pay.pa_invoice_ID WHERE pay.pa_patient_ID = patient.patient_ID) AS total_amount, (SELECT SUM(VAT) FROM invoice JOIN pay ON invoice.invoice_ID = pay.pa_invoice_ID WHERE pay.pa_patient_ID = patient.patient_ID) AS total_VAT FROM patient WHERE patient_ID = 2003;
7. Find the clinic with the highest number of patients:	SELECT clinic_name FROM (SELECT clinic_name, COUNT(pr_patient_ID) AS total_patients FROM clinic JOIN provideing ON clinic.clinic_ID = provideing.pr_clinic_ID GROUP BY clinic_name ORDER BY total_patients DESC)

8. Find the highest paid staff member in each clinic:	SELECT s_clinic_id, staff_name, salary
	FROM staff
	WHERE (s_clinic_id, salary) IN (
	  SELECT s_clinic_id, MAX(salary)
	  FROM staff
	  GROUP BY s_clinic_id
	);

9. Find the number of staff members supervised by each supervisor:	SELECT supervisor, COUNT(SSN) AS num_staff FROM staff GROUP BY supervisor;

10. Find the total number of invoices generated and paid by each clinic:	SELECT clinic_name,
	  (SELECT COUNT(*) FROM invoice WHERE invoice.I_clinic_ID = clinic.clinic_ID) AS total_invoices,
	  (SELECT COUNT(*) FROM pay JOIN invoice ON pay.pa_invoice_ID = invoice.invoice_ID WHERE invoice.I_clinic_ID = clinic.clinic_ID) AS paid_invoices
	FROM clinic;

Relational Algebra

1.Select all patients provided services by a specific clinic:	$\pi_{\text{patient\_ID,insurance\_policy, gender, BOD, s\_address, salary, supervisor, s\_clinic\_id}}$ ($\sigma_{\text{pr\_clinic\_ID=1001}}$ (*provideing* $\bowtie_{\text{pr\_patient\_ID=patient\_ID}}$ *patient*))
2. List all clinics along with the count of staff members working in each clinic:	$\pi_{\text{clinic.clinic\_ID, clinic.clinic\_name,}}$ $\mathcal{F}_{\text{COUNT}}$(staff.SSN)($\sigma_{\text{clinic.clinic\_ID = staff.s\_clinic\_id}}$ (clinic×staff))
3.Get details of all invoices paid by a specific patient:	$\pi_{\textit{invoice\_ID, total\_amount, VAT, l\_clinic\_ID}}$($\sigma_{\text{pa\_patient\_ID = 2001}}$(pay $\bowtie_{\text{pa\_invoice\_ID = invoice\_ID}}$ invoice))
4.Find the total salary expenditure for each clinic:	$\pi_{\text{clinic.clinic\_name}}$, $\mathcal{F}_{\text{SUM}}$(staff.salary) AS total_salary ($\gamma_{\text{clinic.clinic\_name}}$, $\mathcal{F}_{\text{SUM}}$(staff.salary)(clinic $\bowtie_{\text{clinic.clinic\_ID = staff.s\_clinic\_id}}$ staff))
8. Find the highest paid staff member in each clinic:	$\pi_{\text{s\_clinic\_id, staff\_name, salary}}$($\sigma_{\text{(s\_clinic\_id, salary)}}$ IN ($\gamma_{\text{s\_clinic\_id}}$, $\mathcal{F}_{\text{MAX}}$(salary)(staff)) (staff))
9. Find the number of staff members supervised by each supervisor:	$\pi_{\text{supervisor}}$, $\mathcal{F}_{\text{COUNT}}$(SSN) AS num_staff($\gamma_{\text{supervisor}}$, $\mathcal{F}_{\text{COUNT}}$(SSN)(staff))

1.Select all patients provided services by a specific clinic:

```
SELECT patient.*
FROM provideing, patient
WHERE provideing.pr_patient_ID = patient.patient_ID
and provideing.pr_clinic_ID = 1001;
```

$\pi_{\text{patient\_ID,insurance\_policy, gender, BOD, s\_address, salary, supervisor, s\_clinic\_id}}(\sigma_{\text{pr\_clinic\_ID=1001}}(\textit{provideing} \bowtie_{\text{pr\_patient\_ID=patient\_ID}} \textit{patient}))$

PATIENT_ID	INSURANCE_POLICY	GENDER	BOD	PHONE	ADDRESS
2001	6812	M	18-FEB-04	55878743	alfaiha

2. List all clinics along with the count of staff members working in each clinic:

```
SELECT clinic.clinic_ID, clinic.clinic_name, COUNT(staff.SSN) AS staff_count
FROM clinic, staff
WHERE clinic.clinic_ID = staff.s_clinic_id
GROUP BY clinic.clinic_ID, clinic.clinic_name;
```

$\pi_{\text{clinic.clinic\_ID, clinic.clinic\_name,}} \mathcal{F}_{\text{COUNT}}(\text{staff.SSN})(\sigma_{\text{clinic.clinic\_ID = staff.s\_clinic\_id}}(\text{clinic} \times \text{staff}))$

CLINIC_ID	CLINIC_NAME	STAFF_COUNT
1001	Dental	2
1002	Hearing	3
1003	Rural	2

3.Get details of all invoices paid by a specific patient:

```
SELECT invoice.* FROM pay
JOIN invoice ON pay.pa_invoice_ID = invoice.invoice_ID
WHERE pay.pa_patient_ID = 2001;
```

$\pi_{invoice\_ID,\ total\_amount,\ VAT,\ I\_clinic\_ID}(\sigma_{pa\_patient\_ID = 2001}(pay \bowtie_{pa\_invoice\_ID = invoice\_ID} invoice))$

INVOICE_ID	TOTAL_AMOUNT	VAT	I_CLINIC_ID
7329	45	7	1001

4. Find the total salary expenditure for each clinic:

```
SELECT clinic.clinic_name, SUM(staff.salary) AS total_salary
FROM clinic
JOIN staff ON clinic.clinic_ID = staff.s_clinic_id
GROUP BY clinic.clinic_name;
```

$\pi_{clinic.clinic\_name},\ \mathcal{F}_{SUM}(staff.salary)\ AS\ total\_salary(\gamma_{clinic.clinic\_name},\ \mathcal{F}_{SUM}(staff.salary)(clinic \bowtie_{clinic.clinic\_ID = staff.s\_clinic\_id} staff))$

CLINIC_NAME	TOTAL_SALARY
Rural	50000
Hearing	70000
Dental	49000

5.Find all patients who have an appointment (reserved) in more than a specific number of clinics:

```
SELECT r_patient_ID, COUNT(r_clinic_ID) AS clinic_count
FROM reserve_in
GROUP BY r_patient_ID
HAVING COUNT(r_clinic_ID) > 0;
```

R_PATIENT_ID	CLINIC_COUNT
2001	1
2002	1
2003	1
2004	1

6. Retrieve the total amount and VAT for invoices of a specific patient:

```
SELECT patient_ID,
(SELECT SUM(total_amount) FROM invoice JOIN pay ON invoice.invoice_ID = pay.pa_invoice_ID WHERE pay.pa_patient_ID = patient.patient_ID) AS total_amount,
 (SELECT SUM(VAT) FROM invoice JOIN pay ON invoice.invoice_ID = pay.pa_invoice_ID WHERE pay.pa_patient_ID = patient.patient_ID) AS total_VAT
FROM patient
WHERE patient_ID = 2003;
```

PATIENT_ID	TOTAL_AMOUNT	TOTAL_VAT
2003	1190	179

7. Find the clinic with the highest number of patients:

```
SELECT clinic_name
FROM (
   SELECT clinic_name, COUNT(pr_patient_ID) AS total_patients
   FROM clinic
   JOIN provideing ON clinic.clinic_ID = provideing.pr_clinic_ID
   GROUP BY clinic_name
   ORDER BY total_patients DESC)
```

CLINIC_NAME
Rural
Dental
Hearing

8. Find the highest paid staff member in each clinic:

```
SELECT s_clinic_id, staff_name, salary
FROM staff
WHERE (s_clinic_id, salary) IN (SELECT s_clinic_id, MAX(salary)
   FROM staff
   GROUP BY s_clinic_id);
```

$\pi_{s\_clinic\_id,\ staff\_name,\ salary}(\sigma_{(s\_clinic\_id,\ salary)}$ IN $(\gamma_{s\_clinic\_id}, \mathcal{F}_{MAX}(salary)$ (staff))

S_CLINIC_ID	STAFF_NAME	SALARY
1001	Wassem	30000
1002	Fatima	30000
1003	Abdullah	30000

9. Find the number of staff members supervised by each supervisor

```
SELECT supervisor, COUNT(SSN) AS num_staff
FROM staff
GROUP BY supervisor;
```

$\pi_{supervisor}, \mathcal{F}_{COUNT}(SSN)$ AS num_staff($\gamma_{supervisor}, \mathcal{F}_{COUNT}(SSN)$(staff))

SUPERVISOR	NUM_STAFF
8120	1
8820	1
8911	1
-	3
8409	1

10. Find the total number of invoices generated and paid by each clinic:

```
SELECT clinic_name,
    (SELECT COUNT(*) FROM invoice WHERE invoice.I_clinic_ID = clinic.clinic_ID)
AS total_invoices,
    (SELECT COUNT(*) FROM pay JOIN invoice ON pay.pa_invoice_ID =
invoice.invoice_ID WHERE invoice.I_clinic_ID = clinic.clinic_ID) AS paid_invoices
FROM clinic;
```

CLINIC_NAME	TOTAL_INVOICES	PAID_INVOICES
Dental	1	1
Hearing	1	1
Rural	2	2