

CS245: Databases

SQL

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Primary key vs temporal key

Example Schema

- `eid` and `pcn` stand for primary key
- Only in the absence of timed attributes
- `start_date` and `end_date` are included in the relation
- No employee can have a particular position twice at the same time.
- `eid`, `pcn`, `start_date`, `end_date` not a primary key

eid	pcn	start_date	end_date
123	900225	01-Jan-1996	01-June-1996
123	900225	01-Apr-1996	01-Oct-1996

Primary key vs temporal key

```
CREATE TABLE Incumbents( eid INT, pcn INT, start_date date,
    end_date date,
    CHECK(
        NOT EXISTS (
            SELECT *
            FROM Incumbents as I1
            WHERE 1 <
                (SELECT COUNT(eid)
                 FROM Incumbents as I2
                 WHERE I1.eid = I2.eid
                 AND I1.pcn = I2.pcn
                 AND I1.start_date < I2.end_date
                 AND I2.start_date < I1.end_date)
        )
        AND NOT EXISTS (
            SELECT *
            FROM Incumbents AS I1
            WHERE I1.eid is null OR I1.pcn is null
        )
    )
)
```

Example queries involving time

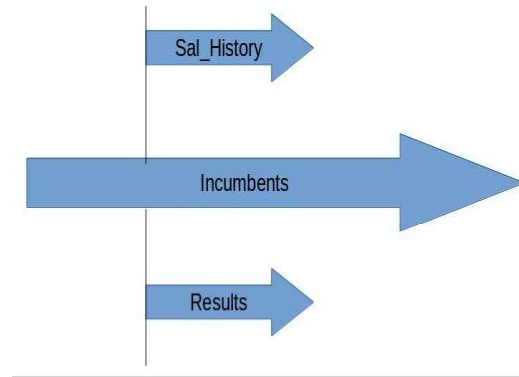
Query involving time

Provide the salary and position history of all employees

Salary history is in Sal_History table.

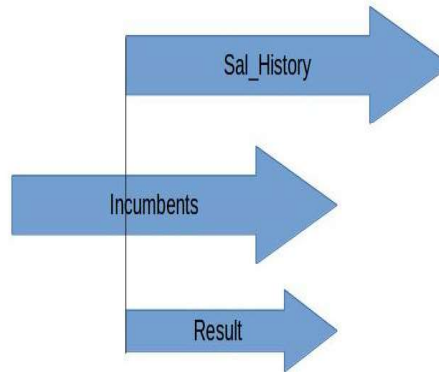
Position is in Incumbents table.

Join Query - Case_1



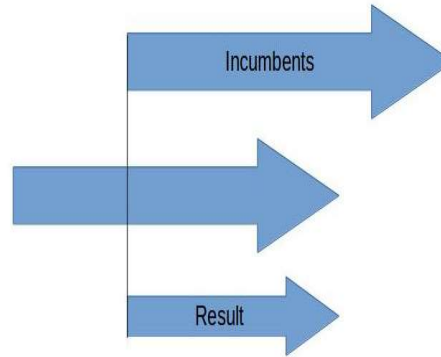
```
SELECT  eid , amount , pcn , SH.start_date , SH.end_date
FROM    Sal-History AS SH
JOIN    Incumbents AS I
ON      SH.eid = I.eid
WHERE   I.start_date <= SH.start_date
AND     SH.end_date <= I.end_date
```

Join Query - Case_2



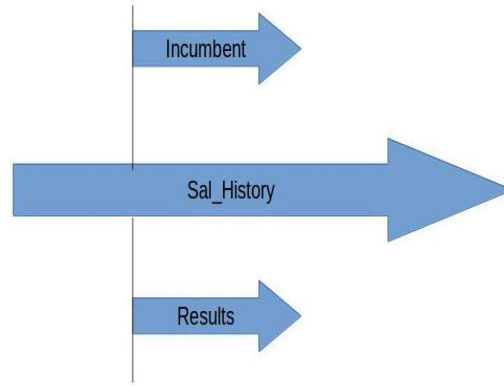
```
SELECT  eid, amount, pcn, SH.start_date, I.end_date
FROM    Sal_History AS SH
JOIN    Incumbents AS I
ON      SH.eid = I.eid
WHERE   SH.start_date >= I.start_date
AND     I.end_date <= SH.end_date
AND     SH.start_date <= I.end_date
```

Join Query - Case_3



```
SELECT  eid , amount , pcn , I.start_date , SH.end_date
FROM    Sal_History AS SH
JOIN    Incumbents AS I
ON      SH.eid = I.eid
WHERE   I.start_date > SH.start_date
AND     SH.end_date <= I.end_date
```

Join Query - Case_4



```
SELECT  eid , amount , pcn , I.start_date , I.end_date
FROM    Sal_History AS SH
JOIN    Incumbents AS I
ON      SH.eid = I.eid
WHERE   I.start_date > SH.start_date
AND     I.end_date <= SH.end_date
```


Full query

Provide the salary and position history of all employees

```

SELECT  eid, amount, pcn, SH.start_date, SH.end_date
FROM    Sal_History AS SH
JOIN    Incumbents AS I
ON      SH.eid = I.eid
WHERE   I.start_date <= SH.start_date
AND     SH.end_date <= I.end_date
UNION
SELECT  eid, amount, pcn, SH.start_date, I.end_date
FROM    Sal_History AS SH
JOIN    Incumbents AS I
ON      SH.eid = I.eid
WHERE   SH.start_date >= I.start_date
AND     I.end_date <= SH.end_date
AND     SH.start_date <= I.end_date
UNION
SELECT  eid, amount, pcn, I.start_date, SH.end_date
FROM    Sal_History AS SH
JOIN    Incumbents AS I
ON      SH.eid = I.eid
WHERE   I.start_date > SH.start_date
AND     SH.end_date <= I.end_date
AND     I.start_date < SH.end_date
UNION
SELECT  eid, amount, pcn, I.start_date, I.end_date
FROM    Sal_History AS SH
JOIN    Incumbents AS I
ON      SH.eid = I.eid
WHERE   I.start_date > SH.start_date
AND     I.end_date < SH.end_date

```