# Aggregation

Monday, October 22, 2018 9:49 AM

(10) Give the history of the maximum salary

EmployeeSalary

| SSN | Salary | FromDate | ToDate |
|---|---|---|---|
| 123456789 | 30 000 | 01-01-1985 | 01-01-2005 |
| 123456789 | 30 000 | 01-01-2005 | 01-01-2079 |
| 333445555 | 40 000 | 01-01-1982 | 01-01-1985 |
| 333445555 | 45 000 | 01-01-1982 | 01-01-2079 |
| 453453453 | 25 000 | 01-01-1985 | 01-01-2079 |
| 666884444 | 38 000 | 01-01-1985 | 01-01-2079 |
| 888665555 | 55 000 | 01-01-1982 | 01-01-2005 |
| 888665555 | 33 000 | 01-01-1981 | 01-01-2079 |
| 987654321 | 43 000 | 01-01-1982 | 01-01-2079 |
| 987987987 | 25 000 | 01-01-1985 | 01-01-2079 |
| 999887777 | 25 000 | 01-01-1985 | 01-01-2079 |

① Find all times where a salary changed

```
select distinct E.FromDate from Employee
union
select distinct E.ToDate from Employee
```

Instants

| |
|---|
| 01-01-1981 |
| 01-01-1982 |
| 01-01-1985 |
| 01-01-2005 |
| 01-01-2079 |

② Build intervals during which all salaries remained the same

```
Select distinct start, stop
From Instant start, Instant stop
Where not exists (select *
                  from Instant I
                  where start < I and I < stop)
```

Intervals

| Start | End |
|---|---|
| 01-01-1981 | 01-01-1982 |
| 01-01-1982 | 01-01-1985 |
| 01-01-1985 | 01-01-2005 |
| 01-01-2005 | 01-01-2079 |

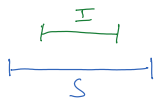
③ For each interval, find the highest valid salary

EmployeeSalary

| SSN | Salary | FromDate | ToDate |
|---|---|---|---|
| 123456789 | 30 000 | 01-01-1985 | 01-01-2005 |
| 123456789 | 30 000 | 01-01-2005 | 01-01-2079 |
| 333445555 | 40 000 | 01-01-1982 | 01-01-1985 |
| 333445555 | 45 000 | 01-01-1982 | 01-01-2079 |
| 453453453 | 25 000 | 01-01-1985 | 01-01-2079 |
| 666884444 | 38 000 | 01-01-1985 | 01-01-2079 |
| 888665555 | 55 000 | 01-01-1982 | 01-01-2005 |
| 888665555 | 33 000 | 01-01-1981 | 01-01-2079 |
| 987654321 | 43 000 | 01-01-1982 | 01-01-2079 |
| 987987987 | 25 000 | 01-01-1985 | 01-01-2079 |
| 999887777 | 25 000 | 01-01-1985 | 01-01-2079 |

Intervals

| Start | End |
|---|---|
| 01-01-1981 | 01-01-1982 |
| 01-01-1982 | 01-01-1985 |
| 01-01-1985 | 01-01-2005 |
| 01-01-2005 | 01-01-2079 |




```
select max(S.Salary), I.FromDate, I.ToDate
from EmployeeSalary S, Intervals I
where S.FromDate <= I.FromDate and I.ToDate <= S.ToDate
group by I.FromDate, I.ToDate
```

④ Coalesce the results

Max Salary History

| Start | End | MaxSalary |
|---|---|---|
| 01-01-1981 | 01-01-1982 | 33 000 |
| 01-01-1982 | 01-01-1985 | 55 000 |
| 01-01-1985 | 01-01-2005 | 55 000 |
| 01-01-2005 | 01-01-2079 | 45 000 |

→

Max Salary History

| Start | End | MaxSalary |
|---|---|---|
| 01-01-1981 | 01-01-1982 | 33 000 |
| 01-01-1982 | 01-01-2005 | 55 000 |
| 01-01-2005 | 01-01-2079 | 45 000 |

```
select distinct F.SalaryMax, F.FromDate, L.ToDate
from TempMax F, TempMax L
where F.FromDate < L.ToDate and F.SalaryMax = L.SalaryMax
and not exists ( select *
                 from TempMax M
                 where M.SalaryMax = F.SalaryMax
                 and F.ToDate < M.FromDate and M.FromDate <= L.FromDate
                 and not exists ( select *
                                  from TempMax T1
                                  where T1.SalaryMax = F.SalaryMax
                                  and T1.FromDate < M.FromDate
                                  and M.FromDate <= T1.ToDate ) )
and not exists ( select *
                 from TempMax T2
                 where T2.SalaryMax = F.SalaryMax
                 and ( ( T2.FromDate < F.FromDate and F.FromDate <= T2.ToDate )
                 or ( T2.FromDate <= L.ToDate and L.ToDate < T2.ToDate ) ) )
```

① F … L

② F … L, M … T1

⇒ All M such that M.start ∈ ]F.start, L.start] must have its own start covered (∃ T1 such that M.start ∈ [T1.start, T1.end])

③ no T2 extends F or L