

Flights

Flno	from	To	distance	departs	arrives	Price

Aircraft

aid	aname	cruising range

Certified

eid	aid

Employees

eid	ename	salary

$$1) T_1 \leftarrow \pi_{eid} (\sigma_{\text{salary} > 80000} \text{EMPLOYEE})$$

$$\pi_{aname} (\text{Aircraft} \bowtie_{aid=aid} (\pi_{\text{certified}} \bowtie_{eid=eid} \text{CERTIFIED}))$$

$$2) T_1 \leftarrow eid \searrow_{\text{count}(eid)} \text{CERTIFIED}$$

$$T_2 \leftarrow \pi_{aid} (\sigma_{\text{count-eid} > 3} T_1 \text{ EMPLOYEES})$$

$$\pi_{eid, \text{cruisingrange}} (T_2 \bowtie_{aid=aid} \text{AIRCRAFT})$$

$$3) T_1 \leftarrow \pi_{price} (\sigma_{\text{FROM} = \text{"LOS Angeles"} \text{ AND } \text{TO} = \text{"Honolulu"}} \text{FLIGHTS})$$

$$T_2 \leftarrow \searrow_{\text{min}(price)} T_1$$

$$\pi_{ename} (\text{EMPLOYEE} \bowtie_{\text{salary} < \text{price}} T_2)$$

$$\pi_{ename} (\sigma_{\text{salary} < \text{price}} (\text{EMPLOYEE} \times T_2))$$

$$4) T_1 \leftarrow \pi_{aid,aname} (\sigma_{cruisingrange > 1000} \text{AIRCRAFT})$$

$$T_2 \leftarrow (\text{EMPLOYEE} \bowtie_{\substack{eid=eid \\ aid=aid}} (T_1 \bowtie \text{CERTIFIED}))$$

$$\pi_{aname} (\gamma_{avg(salary)} T_2)$$

avg-salary.

$$5) T_1 \leftarrow \pi_{aid} (\sigma_{aname = "Boeing"} \text{AIRCRAFT})$$

$$\pi_{ename} (\text{EMPLOYEE} \bowtie_{\substack{eid=eid \\ aid=aid}} (T_1 \bowtie \text{CERTIFIED}))$$

$$6) T_1 \leftarrow \pi_{fline} (\sigma_{\text{From "Los Angeles" AND to "Chicago"}} \text{FLIGHTS})$$

$$\pi_{aname} (\pi \bowtie \text{AIRCRAFT})$$

("Assuming aid is a candidate key referencing fline")

$$7) T_1 \leftarrow \pi_{aid} (\sigma_{cruisingrange > 3000} \text{AIRCRAFT})$$

$$T_2 \leftarrow \pi_{aid} (\sigma_{aname = "Boeing"} \text{AIRCRAFT})$$

$$T_3 \leftarrow (\pi_{eid} (T_1 \bowtie \text{CERTIFIED})_{aid=aid} - \pi_{eid} (T_2 \bowtie \text{CERTIFIED})_{aid=aid})$$

$$\pi_{ename} (T_3 \bowtie \text{EMPLOYEE})_{eid=eid}$$

$$8) T_1 \leftarrow \pi_{\text{Fline, arrival}} (\sigma_{\text{From} = \text{"Madison"}} \text{FLIGHTS})$$

$$T_2 \leftarrow \pi_{\text{Fline, departure}} (\sigma_{\text{to} = \text{"Newyork"}} \text{FLIGHTS})$$

$$\pi_{\text{aname}} (\text{AIRCRAFT} \bowtie (T_1 \bowtie T_2) \text{, "to = from AND Fline = Fline"})$$

$$a) T_1 \leftarrow \pi_{\text{eid, ename}} (\text{CERTIFIED} \bowtie \text{EMPLOYEE}) \{ \text{Pilots} \}$$

$\text{eid} = \text{eid}$

$$T_2 \leftarrow \text{EMPLOYEE} - T_1 \quad \{ \text{Non Pilots} \}$$

$$T_3 \leftarrow \gamma_{\text{avg}(\text{salary})} T_1 \quad \{ \text{Avg sal of pilots} \}$$

$$\pi_{\text{ename, salary}} (\text{~~T_2~~ } \bowtie \sigma_{\text{avg-salary} < \text{Salary}} (T_3 \times T_2))$$

$$10) T_1 \leftarrow \pi_{\text{aid}} (\sigma_{\text{cwingrange} > 1000} \text{AIRCRAFT})$$

$$\pi_{\text{ename}} (\text{EMPLOYEE} \bowtie (\pi_{\text{aid}} \text{CERTIFIED}))$$

$\text{eid} = \text{eid} \quad \text{aid} = \text{aid}$