24. RELATIONAL CALCULUS (ex. 2, 5, 6)

② a) $\{FN.follower\_nick \mid Follows(FN) \wedge \exists FN2 (Follows(FN2) \wedge followed\_nick = 'Luis' \wedge \exists FN3 (Follows(FN3) \wedge followed\_nick = 'Maria' \wedge FN2.follower\_nick = FN3.follower\_nick))\}$

b) $\{FN.Follower\_nick \mid Follows(FN) \wedge \exists FN2 (Follows(FN2) \wedge FN.follower\_nick = FN2.followed\_nick \wedge \exists FN3 (Follows(FN3) \wedge FN2.follower\_nick = FN3.followed\_nick \wedge FN3.followed\_nick = 'Nicola'))\}$

c) $\{FN.Followed\_nick \mid Follows(FN) \wedge \exists FN2 (Follows(FN2) \wedge follower\_nick = 'Luis' \wedge \exists FN3 (Follows(FN3) \wedge follower\_nick = 'Maria' \wedge FN2.followed\_nick = FN3.followed\_nick))\}$

$\{FN.Follower\_nick \mid Follows(FN) \wedge \exists FN2 (Follows(FN2) \wedge FN.followed\_nick = FN2.follower\_nick \wedge \exists FN3 (Follows(FN3) \wedge FN2.followed\_nick = FN3.follower\_nick \wedge FN3.follower\_nick = 'Nicola'))\}$

⑤ a) $\{F.flight\_id \mid Flight(F) \wedge \exists A (Airport(A) \wedge F.origin = A.code \wedge A.city = 'Paris')\}$

b) $\{F.flight\_id \mid Flight(F) \wedge \exists A (Airport(A) \wedge F.origin = A.code \wedge A.city = 'Madrid' \wedge \exists A2 (Airport(A2) \wedge F.destination = A2.code \wedge A2.city = 'Paris' \wedge F.departure\_time = '12:00:00'))\}$

c) $\{P.name, B.date \mid Passengers(P) \wedge Bookings(B) \quad \exists F, \exists A(Flights(F) \wedge Airport(A)$
$F.origin = A.code \wedge A.city = 'London' \wedge \exists A2(Airport(A2) \wedge F.destination = A2.code$
$\wedge A2.city = 'Paris') \wedge F.flight\_id = B.flight\_id) \wedge P.dni = B.dni\}$

d) $\{P.name \mid Passengers(P) \wedge \exists A, \exists B, \exists F(Flights(F) \wedge Bookings(B) \wedge Airport(A) \wedge$
$B.dni = P.dni \wedge F.flight\_id = B.flight\_id \wedge \exists A2(Airport(A2) \wedge$
$((F.origin = A.code \wedge A.city = 'London' \wedge F.destination = A2.code \wedge A2.city = 'Paris')$
$OR (F.origin = A.code \wedge A.city = 'Paris' \wedge F.destination = A2.code \wedge A2.city = 'London')$
$))\}$

e) $\{P.name \mid Passengers(P) \wedge \exists B, \exists F(Flights(F) \wedge Bookings(B) \wedge Airport(A) \wedge$
$B.dni = P.dni \wedge F.flight\_id = B.flight\_id \wedge \exists F2, \exists B2(Flights(F2) \wedge$
$Bookings(B2) \wedge B2.dni = P.dni \wedge B2.flight\_id = F2.flight\_id \wedge$
$\wedge F2.origin = F.destination \wedge F2.destination = F.origin \wedge$
$\wedge((B1.date - B2.date) < 24)))\}$

6) a) $\{A.name \mid Airlanes(A) \wedge \exists F, \exists Ap(Flights(F) \wedge Airports(Ap) \wedge$
$A.abbreviation = F.abbr\_airlane \wedge F.origin = Ap.code \wedge Ap.city = 'London')\}$

c) $\{F.flight\_id \mid Flights(F) \wedge \neg\exists B(Bookings(B) \wedge B.flight\_id =$
$F.flight\_id)\}$

d) $\{Al.name \mid Airlanes(Al) \wedge \forall F(Flights(F) \wedge F.abbr.airlane = Al\_abbreviation \wedge$

$\wedge \exists Ap(Airport(Ap) \wedge ((F.origin = Ap.code \wedge Ap.city != 'Madrid') or (F.destination = Ap.code \wedge$

$\wedge Ap.city != 'Madrid'))))\}$

25. RELATIONAL ALGEBRA (ex. 2, 5, 6)

② a)

$RES1 \leftarrow \Pi_{follower\_nick}(\sigma_{followed\_nick = 'Luis'}(Follows))$

$RES2 \leftarrow \Pi_{follower\_nick}(\sigma_{followed\_nick = 'Maria'}(Follows))$

$RES\_FINAL \leftarrow RES1 \cap RES2$

b)

$RES1 \leftarrow \Pi_{follower\_nick}(\sigma_{followed\_nick = 'Nicola'}(Follows))$

$RES\_FINAL \leftarrow \Pi_{follower\_nick}(\sigma_{followed\_nick}(RES1))$

c) a) $RES1 \leftarrow \Pi_{followed\_nick}(\sigma_{follower\_nick = 'Luis'}(Follows))$

$RES2 \leftarrow \Pi_{followed\_nick}(\sigma_{follower\_nick = 'Maria'}(Follows))$

$RES\_FINAL \leftarrow RES1 \cap RES2$

b) $RES1 \leftarrow \Pi_{followed\_nick}(\sigma_{follower\_nick = 'Nicola'}(Follows))$

$RES\_FINAL \leftarrow \Pi_{followed\_nick}(\sigma_{follower\_nick}(RES1))$

⑤ a) $\Pi_{flight\_id}\left(\sigma_{\delta}\left(Flights \times Airport\right)\right)$

$\delta = (origin = code \wedge city = 'Paris')$

b) $A \leftarrow \left(\sigma_{origin=code \wedge city='Madrid'}(Flights, Airports)\right)$

$B \leftarrow \Pi_{flight\_id}\left(\sigma_{destination=code \wedge city='Paris' \wedge departure\_time='12:00:00'}(A)\right)$

c) $A \leftarrow \Pi_{flight\_id}\left(\sigma_{origin=code \wedge city='London'}(Flights \times Airport)\right)$

$B \leftarrow \Pi_{flight\_id}\left(\sigma_{destination=code \wedge city!='Paris'}(Flights \times Airport)\right)$

$C \leftarrow A - B$

$RES\_FINAL \leftarrow \Pi_{passengers\_name, date}\left(\sigma_{C.flight\_id = Bookings.flight\_id \wedge Passengers.dni = Bookings.dni}(C \times Passengers \times Bookings)\right)$

d) $A \leftarrow \Pi_{flight\_id}\left(\sigma_{origin=code \wedge city='London'}(Flights \times Airport)\right)$

$B \leftarrow \Pi_{flight\_id}\left(\sigma_{destination=code \wedge city!=Paris}(Flights \times Airport)\right)$

$C \leftarrow \Pi_{flight\_id}\left(\sigma_{origin=code \wedge city='Paris'}(Flights \times Airport)\right)$

$D \leftarrow \Pi_{flight\_id}\left(\sigma_{destination=code \wedge city!='London'}(Flights \times Airport)\right)$

$RES1 \leftarrow ((A-B) \cup (C-D))$

$RES\_FINAL \leftarrow \Pi_{passengers.name}\left(\sigma_{RES1.flight\_id = Bookings.flight\_id \wedge pass.dni = book.dni}(RES1 \times Bookings \times Passengers)\right)$

(6.)

a) $RES1 \leftarrow \Pi_{airlanes.name}(Airlanes)$

$RES2 \leftarrow \Pi_{airlanes.name}\left(\sigma_{abbreviation=abbr\_airlane \wedge origin=code \wedge city='London'}(Airlanes \times Flights \times Airport)\right)$

$RESFINAL \leftarrow RES1 - RES2$

c) $RES1 \leftarrow \Pi_{flight\_id}(Flights)$

$RES2 \leftarrow \Pi_{flight\_id}(Bookings)$

$RES\_FINAL \leftarrow RES1 - RES2$

d) $A \leftarrow \Pi_{airlanes.name}(Airlanes)$

$B \leftarrow \Pi_{airlanes.name}\left(\sigma_{origin=code \wedge city!='Madrid' \wedge abbr\_airlane = abbreviation}(Airlanes \times Flights \times Airport)\right)$

$C \leftarrow \Pi_{airlanes.name}\left(\sigma_{destination=code \wedge city!='Madrid' \wedge abbr\_airlane = abbreviation}(Airlanes \times Flights \times Airports)\right)$

$REI\_FINAL \leftarrow A - (B \cup C)$

28.

a) PASSENGER

DNI	Name
123	María
456	Pedro
789	Isabel

RESERVATION

DNI	Number	Date	Price
123	345	20-12-10	170
456	345	03-11-10	190

b) Passenger's and reservation's tables completed

c) PASSENGER

DNI	Name
123	María
456	Pedro
789	Isabel

RESERVATION

Number
165
345
321
345

d) PASSENGER

Name
Pedro
María

e) PASSENGER

Name
Isabel

31.

a) RESERVATION

DNI
789
789

b) PASSENGER / RESERVATION

DNI	Name	DNI	Number	Date	Price
123	María	789	165	07-01-11	210
123	María	123	345	20-12-10	170
123	María	789	321	15-12-10	250
123	María	456	345	03-11-10	190

c)

NAME	DNI	NUMBER	DATE	PRICE
~~Isabel~~	~~789~~	~~165~~	~~07-01-11~~	~~210~~
María	123	345	20-12-10	170
~~Isabel~~	~~789~~	~~321~~	~~15-12-10~~	~~250~~
~~Pedro~~	~~456~~	~~345~~	~~03-11-10~~	~~190~~

d)

NAME	DNI	NUMBER	DATE	PRICE
María	123	345	20-12-10	170

e)

NAME	PRECIO	DNI
Pedro	190	456

f)