Solution Tutorial 03 :

Exercise 01 :

Q1: Provide the titles of existing films.

A1: π Title (Film)

Q2: Which films were produced by Pathé?

A2: π Title (σ Production =’Pathé’ (Film))

Q3: We would like to obtain the titles of the films as well as the labels of their categories.

A3: π Title, Category-Label (Film ⋈Category(Film.ID-Category= Category.ID-Category))

Q4: Provide the number, titles of the films, and labels of their categories only for films longer than 100 minutes.

π Num-Film,Title, Category-Label (σ Duration >100 (Film ⋈Category(Film.ID-Category= Category.ID-Category)))

Exercise 02 :

Q1: List the planes with a capacity greater than 350 passengers.

A1: σ Cap>350(PLANE)

Q2: Provide the numbers and names of planes located in Constantine.

A2: πNum-Plane, Name-Plane (σLoc = ’Constantine’(PLANE))

Q3: Provide the numbers of pilots on duty and the departure cities of their flights.

A3: π Numpil, City_Dep (FLIGHT)

Q4: Provide all the information about the pilots in the company.

A4: PILOT ⋈ FLIGHT (PILOT. Numpil =FLIGHT. Numpil)

Q5: Which pilots residing in Algiers have a salary greater than 220,000 DA?

A5: σ Adr = ’Algiers’∧Sal > 220000(PILOT)

Q6: Which planes (number and name) are located in Constantine or have a capacity less than 350 passengers?

A6: π Num-Plane, Name-Plane (σ Loc = ’Constantine’ ∨Cap < 350(PLANE))

Q7 : Provide a list of flights departing from Constantine to Algiers after 6 PM.

A7 : σ City_Dep = ’Constantine’∧City_Arr = ’Algiers’∧ H_Dep > ’6 PM’(FLIGHT)

Q8: . Provide the numbers of pilots who are not on duty.

A8: π Numpil(PILOT)−π Numpil(FLIGHT)

Q9: Which flights (number, departure city) are conducted by pilots numbered 100 or 204?

A9: π Num-FL, City_Dep (σNumpil = 100∨Numpil = 204(FLIGHT))

Q10: Provide the numbers of flights departing from Constantine with pilots from Constantine.

A10: π Num-FL(σCity_Dep = 'Constantine'∧Adr = 'Constantine'(FLIGHT⋈PILOT (FLIGHT. Numpil =PILOT. Numpil)))

Q11: Which flights are conducted with a plane that is not located in Constantine?

A11: π Num-FL(σLoc='Constantine'(FLIGHT⋈PLANE (FLIGHT. Num-plane =PLANE. Num-plane)))

Q12: Which pilots (number and name) conduct at least one flight departing from Constantine with a plane of capacity greater than 300 seats?

A2: π Numpil , Name-pil (σ City_Dep = 'Constantine' ∧ Cap>300 (FLIGHT⋈PILOT⋈ PLANE ((FLIGHT. Numpil =PILOT. Numpil) ∧(FLIGHT. Num-plane=PLANE. Num-plane))))

Q13: Which pilots residing in Algiers with a salary over 220,000 DA conduct a flight departing from Constantine with an Airbus?

A13: π Numpil , Name-pil (σ Adr = 'Algiers'∧ Sal > 220000 ∧ City_Dep='Constantine' ∧ Name-Plane='Airbus' (FLIGHT⋈PILOT⋈ PLANE ((FLIGHT. Numpil =PILOT. Numpil) ∧(FLIGHT. Num-plane=PLANE. Num-plane))))

Q14: Provide the numbers of flights departing from or arriving in Constantine with a plane located in Algiers.

A14: π Num-FL (σ (City_Dep='Constantine' ∨ City_Arr='Constantine') ∧ Loc = 'Algiers' (FLIGHT⋈PLANE(FLIGHT. Num-plane=PLANE. Num-plane)))

Q15: Which pilots (number, name) live in the same city as pilot Ali?

A15: πNumpil, Name-pil(σAdr = π adr (σName-pil = 'Ali' (PILOT)) PILOT)

Q16: Provide the numbers of pilots on duty other than Ali.

A16: π Numpil(FLIGHT) − π Numpil(σNompil = 'Ali'(PILOT))

Q17: Which cities are served from the destination city of a flight departing from Algiers?

A17: π City_Dep (FLIGHT) ∩ (π City_Arr ((σ City_Dep= 'Algiers')FLIGHT))

Q18: Which planes (their numbers) are located in the same city as plane number 100?

A18: π Num-Plane (σLoc = π Loc (σNum-Plan= 100 (PLANE)) PLANE)

Q19: Which pilots (numbers and names) reside in the same city as pilot Ali and earn a salary greater than his?

A19: πNumpil, Name-pil ((σAdr = π adr (σName-pil = 'Ali' (PILOT))PILOT) ∩ πNumpil, Name-pil (σ Sal > π Sal (σName-pil = 'Ali' (PILOT)) PILOT)

Q20: Which pilots (numbers and names) conduct a flight departing from their city of residence?

A20: πNumpil, Name-pil(σAdr =City-Dep FLIGHT⋈PILOT(FLIGHT. Numpil =PILOT. Numpil))

Exercise 03:

Q1: Provide Titles of films lasting at least two hours.

A1: π Title (σ Duration>=2 (Film))

Q2: Provide Names of cities hosting a cinema named "Elmodjahed."

A2: π CityName(σ CinemaName='Elmodjahed.' CITY⋈ CINEMA(CITY. PostalCode = CINEMA. PostalCode))

Q3 : Provide Names of cinemas located in Oran or having at least one room with more than 100 seats.

A3 : (π CinemaName(σ CityName='oran' CITY⋈ CINEMA(CITY. PostalCode = CINEMA. PostalCode))) ∪ (π CinemaName (σ Capacity>100 ROOM⋈ CINEMA (ROOM.CinemaNum = CINEMA. CinemaNum)))

Q4: Provide Names, addresses, and cities of cinemas showing the film "Star Wars" in week 18.

A4: π CinemaNum, CinemaName, Address, CityName(σ Title = 'Star Wars' ∧ WeekNum=18(CITY ⋈ CINEMA⋈ SCREENING ⋈FILM (CITY. PostalCode = CINEMA. PostalCode ∧CINEMA. CinemaNum = SCREENING. CinemaNum ∧ SCREENING. ExploitationNum = FILM. ExploitationNum)))

Q5: Provide Exploitation numbers of films shown in all rooms.

A5: π ExploitationNum(SCREENING ÷ (π CinemaNum, RoomNum (ROOM)))

Q6 : Provide Titles of films that have not been shown.

A6 : π Title(FILM)- π Title(SCREENING ⋈FILM(SCREENING. ExploitationNum = FILM. ExploitationNum))