Devin Hardy

Database Systems

|  |  |
| --- | --- |
| Projection | π |
| Selection | σ |
| Cartesian Product | × |
| Join | **⋈** |
| Left Outer Join | ⟕ |
| Right Outer Join | ⟖ |
| Union | ∩ |
| Intersection | ∪ |
| Set Difference | − |
| Rename | ρ |

1.

1. T1 ⟖ T1.P = T2.A T2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Q | R | A | B | C |
| a | 5 | 10 | b | 6 |
| a | 6 | 25 | c | 3 |
| a | 5 | 10 | b | 5 |

1. T1 ⟖ T1.Q = T2.B T2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | R | A | B | C |
| 15 | 8 | 10 | b | 6 |
| NULL | NULL | 25 | c | 3 |
| 15 | 8 | 10 | b | 5 |

1. T1 ⟕ T1.P = T2.A T2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | B | C |
| 10 | a | 5 | b | 6 |
| 15 | b | 8 | NULL | NULL |
| 25 | a | 6 | c | 3 |

1. T1 ⟕ T1.Q = T2.B T2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | A | C |
| 10 | a | 5 | NULL | NULL |
| 15 | b | 8 | 10 | 6 |
| 15 | b | 8 | 10 | 5 |
| 25 | a | 6 | NULL | NULL |

1. T1 ∪ T2

|  |  |  |
| --- | --- | --- |
| P | Q | R |
| 10 | a | 5 |
| 15 | b | 8 |
| 25 | a | 6 |
| 10 | b | 6 |
| 25 | c | 3 |
| 10 | b | 5 |

1. T1 **⋈** (T1.P = T2.A **AND** T1.R = T2.C) T2

|  |  |  |  |
| --- | --- | --- | --- |
| P | Q | T | B |
| 10 | a | 5 | b |

2.

|  |  |  |  |
| --- | --- | --- | --- |
| red | plaid | stripe | dot |
| red | plaid | stripe | dot |
| red | plaid | stripe | dot |
| yellow | plaid | stripe | dot |
| yellow | plaid | stripe | dot |
| yellow | plaid | stripe | dot |
| green | plaid | stripe | dot |
| green | plaid | stripe | dot |
| green | plaid | stripe | dot |

3.

1. (σlastName=’Adams’(Emp)) **⋈** Assign

|  |  |
| --- | --- |
| empId | lastName |
| E110 | Adams |

|  |  |  |  |
| --- | --- | --- | --- |
| empId | lastName | projNo | hours |
| E110 | Adams | P15 | 700 |
| E110 | Adams | P20 | 350 |

1. π empID((σbudgent > 400000(Proj)) **⋈** Assign)

|  |  |  |
| --- | --- | --- |
| projNo | ProjName | budget |
| P10 | Hudson | 500000 |
| P23 | Arkansas | 600000 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| projNo | ProjName | budget | empId | hours |
| P10 | Hudson | 500000 | E101 | 200 |
| P10 | Hudson | 500000 | E105 | 400 |
| P10 | Hudson | 500000 | E115 | 300 |

|  |
| --- |
| empId |
| E101 |
| E105 |
| E115 |

1. πbudget(πprojNo(Assign) **⋈** Proj)

|  |
| --- |
| projNo |
| P10 |
| P15 |
| P20 |

|  |  |  |
| --- | --- | --- |
| projNo | projName | budget |
| P10 | Hudson | 500000 |
| P15 | Columbia | 350000 |
| P20 | Wabash | 350000 |

|  |
| --- |
| budget |
| 500000 |
| 350000 |

4.

1. σ Quarter = ‘W09’ ((σ Name=’John Smith’ (STUDENT)) **⋈** ENROLL)
2. π Course#, Book\_isbn, Book\_title (σ Dept = ‘CS’ (COURSE) **⋈** BOOK\_ADOPTION) **⋈** TEXT
3. πDept, Book\_title, Publisher (COURSE **⋈** (BOOKADOPTION **⋈** (σ Publisher = ‘Pearson Publishing’(TEXT))))

5.

1. πDestinationCity(TRIP)
2. σDeptNo = 10(EMPLOYEE)
3. σAmount > 2000(EXPENSE)
4. πSSN, Name, DestinationCity (σDestinationCity = ‘Honolulu’(TRIP) **⋈** EMPLOYEE)
5. EXPENSE **⋈** (πSSN, Name, TripId(σSSN = ‘234-56-7890’(EMPLOYEE) **⋈** TRIP))
6. πName, TripId, DepartureCity(EMPLOYEE **⋈** (σDepartureCity = ‘London’(TRIP)))
7. πSNN, Name, Item, Amount(EMPLOYEE **⋈** (TRIP **⋈** (σAmount > 1000(EXPENSE))))
8. π Name, Item, Amount(EMPLOYEE **⋈** (TRIP **⋈** (σItem = ‘Entertainment’(EXPENSE))))
9. πDestinationCity, Name, JobTitle(TRIP **⋈** (σJobTitle = ‘Consultant’(EMPLOYEE)))
10. πItem, Amount, DestinationCity, Name(EXPENSE **⋈** (σ(DestinationCity = ‘Cario AND DepartureDate = ‘January 3’)(TRIP) **⋈** (σName = ‘Jones’(EMPLOYEE)))
11. πName, DeptNo, dates, amount, JobTitle(EMPLOYEE **⋈** (σDestinationCity = ‘Melbourne’(TRIP) **⋈** (σItem = ‘Service Charge’(Expense))))

6.

|  |  |  |
| --- | --- | --- |
| Relation | Minimum | Maximum |
| a. R1 ∪ R2 | N1 | N2 |
| b. R1 ∩ R2 | 1 | N1 |
| c. R1 − R2 | N1 | N2 |
| d. R1 × R2 | N2 | N2 |
| e. σ a=5(R1) | 1 | N1 |
| f. πa(R1) | 1 | N1 |
| g. R1 / R2 | N1 | N1 |