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Assignment 3

QUESTION 1

a. Find names and cities of publishers distributing red books to at least one school not located in Calgary?

R1 ← $\sigma_{(color = red)}$ (Book)

R2 ← (R1) JOIN $_{Book.ISBN = Distribute.ISBN}$ (Distribute)

R3 ← (R2) JOIN $_{(R2.SName = School.Name)}$ (School)

R4 ← $\sigma_{(city != \text{“Calgary”})}$ (R3)

R5 ← (R4) JOIN $_{(R4.pname = Publisher.name)}$ (Publisher)

FINAL_RESULT ← $\pi_{Publisher.name, Publisher.city}$ (R5)

b. Find directors of the schools located in Paris and receiving books from publishers located in located in London?

R1 ← $\sigma_{(city = \text{“Paris”})}$ (School)

R2 ← (R1) JOIN $_{(R1.name = Distribute.sname)}$ (Distribute)

R3 ← (R2) JOIN $_{(R2.pname = Publisher.name)}$ (Publisher)

R4 ← $\sigma_{(city = \text{“London”})}$(R3)

FINAL_RESULT ← $\pi_{director}$(R4)

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c. Find names of schools receiving books from publishers located in Roma and distributing books to at least one school located in Toronto?

R1 ← $\sigma_{(city = \text{“Rome”})}$(Publisher)

R2 ← (R1) JOIN $_{(R1.name = Distribute.pname)}$ (Distribute)

R3 ← (R2) JOIN $_{(R2.sname = School.name)}$ (School)

R4 ← (R3) ∩ $\sigma_{(School.city = \text{“Toronto”})}$ (R3)

FINAL_RESULT ← $\pi_{School.name}$(R4)

d. Find the title and total quantity of each book distributed only to all the schools in Calgary?

R1 ← $\sigma_{(city = \text{“Calgary”})}$(School)

R2 ← (R1) JOIN $_{(R1.name = Distribute.sname)}$(Distribute)

R3 ← $R2_{(sname)}$ / $R1_{(name)}$

R4 ← (R3) JOIN $_{(R3.ISBN = Book.ISBN)}$ (Book)

FINAL_RESULT ← $\pi_{title,\ quantity}$(R4)

e. Find the title and total quantity of each book distributed to all the schools in the publisher's city?

R1 ← (Publisher) JOIN $_{(Publisher.city = School.city)}$ (School)

R2 ← (R1) JOIN $_{(R1.Publisher.name = Distribute.pname)}$ (Distribute)

R3 ← (R2) JOIN $_{(R2.ISBN = Book.ISBN)}$ (Book)

FINAL_RESULT ← $\pi_{title,\ quantity}$(R3)

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QUESTION 2

a. Find street number of the longest street in each city in Canada?

{ s.stno | Street(s) ^ (((∃c)(∃n) (Country(c) ^ City(n) ^ c.name = “Canada” ^ c.name = n.country-name ^ n.city-name = s.city-name ^ ((∀x) Street(x) ^ x.city-name = s.city-name ----> s.city-name > x.city-name)))) }

b. Find names of persons who own at least one house in each city in Canada?

{ h.owner-name | House(h) ^ ((∀c)(City(c) ^ c.country-name = “Canada” ----> ((∃s) Street(s) ^ s.city-name = c.city-name ^ s.stno = h.stno))) }

c. Find names of persons who own more than one house outside USA and at least one inside the USA?

{ h.owner-name | House(h) ^ (((∃c)(∃s) (City(c) ^ Street(s) ^ c.country-name = “USA” ^ c.city-name = s.city-name ^ s.stno = h.stno ^ ((∃a)(∃b) House(a) ^ House(b) ^ a.hno != b.hno ^ (((∀x)(∀y) City(x) ^ Street(y) ^ x.country-name != c.country-name ^ x.city-name = y.city-name))))) }

d. Find names of countries that have border with Germany?

{ c.name | Country(c) ^ (Border(c.name, “Germany”) v Border(“Germany”, c.name)) }

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e. Find names of persons who own at least one house in each of the countries that border Spain?

{ h.owner-name | House(h) ^ ((∀c) (Country(c) ^ Border("Spain", c.name) v Border(c.name, "Spain")) ----> ((((∃n)(∃s)(∃h2) (City(n) ^ Street(s) ^ House(h2) ^ n.country-name = c.name ^ n.city-name = s.city-name ^ s.stno = h2.stno ^ h2.owner-name = h.owner-name))))) }