Assignemnt 3

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Question 1

a.

$$\begin{aligned}
\texttt{RedBooks} &\leftarrow \sigma_{\texttt{(color = "red")}}(\texttt{Book}) \\
\texttt{A} &\leftarrow \texttt{RedBooks} \bowtie_{\texttt{(RedBooks.ISBN = Distribute.ISBN)}} \texttt{Distribute} \\
\texttt{Calgary} &\leftarrow \sigma_{\texttt{(sname = "Calgary")}}(\texttt{A}) \\
\texttt{Result} &\leftarrow \pi_{\texttt{(name, city)}}(\texttt{A - Calgary})
\end{aligned}$$

b.

$$\begin{aligned}
\texttt{Schools} &\leftarrow \sigma_{\texttt{(city = "Paris")}}(\texttt{School}) \\
\texttt{A} &\leftarrow \texttt{Schools} \bowtie_{\texttt{(sname = name)}} \texttt{Distribute} \\
\texttt{B} &\leftarrow \texttt{A} \bowtie_{\texttt{((pname = name) and (Publisher.city = "London"))}} \texttt{Publisher} \\
\texttt{Result} &\leftarrow \pi_{\texttt{(director)}}(\texttt{B})
\end{aligned}$$

c.

$$\begin{aligned}
\texttt{RomePublishers} &\leftarrow \sigma_{\texttt{(city = "Rome")}}(\texttt{Publisher}) \\
\texttt{A} &\leftarrow \texttt{RomePublishers} \bowtie_{\texttt{((pname = name) and (sname = "Toronto"))}} \texttt{Distribute} \\
\texttt{B} &\leftarrow \texttt{A} \bowtie_{\texttt{(sname = name)}} \texttt{School} \\
\texttt{Result} &\leftarrow \pi_{\texttt{(School.name)}}(\texttt{B})
\end{aligned}$$

d.

$$\begin{aligned}
\texttt{CalgarySchools} &\leftarrow \sigma_{\texttt{(city = "Calgary")}}(\texttt{School}) \\
\texttt{A} &\leftarrow \texttt{CalgarySchools} \bowtie_{\texttt{(sname = name)}} \texttt{Distribute} \\
\texttt{B} &\leftarrow \texttt{A} \bowtie_{\texttt{(A.ISBN = Book.ISBN)}} \texttt{Book} \\
\texttt{Result} &\leftarrow \pi_{\texttt{(name, count)}}(\texttt{title}f_{\texttt{(COUNT name)}}(\texttt{Titles}))
\end{aligned}$$

e.

$$\begin{aligned}
\texttt{A} &\leftarrow \texttt{Publisher} \bowtie_{\texttt{(name = pname)}} \texttt{Distribute} \\
\texttt{B} &\leftarrow \texttt{A} \bowtie_{\texttt{(A.city = School.city)}} \texttt{School} \\
\texttt{C} &\leftarrow \texttt{Book} \bowtie_{\texttt{(Book.ISBN = B.ISBN)}} \texttt{B} \\
\texttt{Result} &\leftarrow \pi_{\texttt{(name, count)}}(\texttt{title}f_{\texttt{(COUNT name)}}(\texttt{C}))
\end{aligned}$$

Question 2

a.

$$\{\texttt{x.stno} \mid \texttt{Street(x) and } \exists(\texttt{c})(\texttt{City(c) and } \texttt{c.country-name = "Canada" and } \forall(\texttt{s})(\texttt{Street(s) and } (\texttt{x.city-name = s.city-name}) \rightarrow (\texttt{x.length > s.length})))\}$$

b.

$$\{\texttt{x.owner-name} \mid \texttt{House(x) and } \exists(\texttt{c})\exists(\texttt{s})(\texttt{City(c) and Street(s) and } \texttt{s.city-name = c.city-name and c.country-name = "Canada" x.stno = s.stno})\}$$

c.

$$\{\texttt{x.owner-name} \mid \texttt{House(x) and } \exists(\texttt{s})\exists(\texttt{c})(\texttt{Street(s) and City(c) and } \texttt{x.stno = s.stno and not(c.country-name = "USA")}) \forall(\texttt{c})\exists(\texttt{s})(\texttt{City(c) and Street(s) and } (\texttt{c.country-name = "USA"}) \rightarrow (\texttt{s.stno = x.stno}))\}$$

d.

$$\{\texttt{x.name} \mid \texttt{Country(x) and Border(x.name, "Germany")}\}$$

e.

$$\{\texttt{x.owner-name} \mid \texttt{House(x) and } \exists(\texttt{c})\exists(\texttt{s})(\texttt{City(c) and Street(s) and Border(c.country-name, "Spain") and s.city-name = c.city-name and s.stno = x.stno})\}$$