1: Relational Model and SQL

Consider the following relational schema:

\[ \text{Suppliers} (\text{sid}, \text{sname}, \text{address}) \]
\[ \text{Parts} (\text{pid}, \text{pname}, \text{color}) \]
\[ \text{Catalog} (\text{sid}, \text{pid}, \text{cost}) \]

The underlined attributes are keys for their relations. The \textit{Catalog} relation lists the prices charged for \textit{Parts} by \textit{Suppliers}. Write the following queries in SQL:

(a) Find the \textit{pname}s of parts for which there is some supplier.

\[ \text{(solution)} \]
\[ \text{SELECT DISTINCT P.pname} \]
\[ \text{FROM Parts P, Catalog C} \]
\[ \text{WHERE P.pid = C.pid} \]

(b) Find the \textit{sid}s of suppliers who supply only red parts.

\[ \text{(solution)} \]
\[ \text{SELECT C.sid} \]
\[ \text{FROM Catalog C} \]
\[ \text{WHERE NOT EXISTS ( SELECT *} \]
\[ \text{FROM Parts P} \]
\[ \text{WHERE P.pid = C.pid AND P.color <> \text{Red})} \]

(c) Find the \textit{sname}s of suppliers who supply every part.

\[ \text{(solution)} \]
\[ \text{SELECT S.sname} \]
\[ \text{FROM Suppliers S} \]
\[ \text{WHERE NOT EXISTS (( SELECT P.pid} \]
\[ \text{FROM Parts P} \]
\[ \text{EXCEPTS} \]
\[ \text{(SELECT C.pid} \]
\[ \text{FROM Catalog C} \]
\[ \text{WHERE C.sid = S.sid))} \]

(d) Find the \textit{sid}s of suppliers who charge more for some part than the average cost of that part (averaged over all the suppliers who supply that part).

\[ \text{(solution)} \]
\[ \text{SELECT C.sid} \]
\[ \text{FROM Catalog C} \]
\[ \text{WHERE C.cost > ( SELECT AVG (C1.cost)} \]
\[ \text{FROM Catalog C1} \]
\[ \text{WHERE C1.pid = C.pid )} \]

(e) For each part, find the \textit{sname} of the supplier who charges the most for that part.
(solution)
SELECT P.pid, S.sname
FROM Parts P, Suppliers S, Catalog C
WHERE C.pid = P.pid
AND C.sid = S.sid
AND C.cost = (SELECT MAX (C1.cost)
FROM Catalog C1
WHERE C1.pid = P.pid) )