CSC343 Worksheet 2 Solution

June 11, 2020

1. **Exercise 2.4.1:**

   a) $\sigma_{speed \geq 3.0}(\text{Movies})$

   Models 1005, 1006, 1013 have speed greater than 3.0

model	*speed*	*ram*	*hd*	*price*
1001	2.66	1024	250	2114
1002	2.10	512	250	995
1003	1.42	512	80	478
1004	2.80	1024	250	649
→ 1005	3.20	512	250	630
→ 1006	3.20	1024	320	1049
1007	2.20	1024	200	510
1008	2.20	2048	250	770
1009	2.00	1024	250	650
1010	2.80	2048	300	770
1011	1.86	2048	160	959
1012	2.80	1024	160	649
→ 1013	3.06	512	80	529

Notes:

- Select
  - Is indicated by σ
  - **Syntax:** σ_{QUERY}SCHEMA_NAME
  - e.g $\sigma_{length \geq 100}$ **AND** $studioName = \text{'}Fox\text{'}$(Movies)

Relation - Movies

title	*year*	*length*	*inColor*	*studioName*	*producerC#*
Star Wars	1977	124	sciFi	Fox	12345
Galaxy Quest	1999	104	comedy	DreamWorks	67890

b) **Notes:**

- Project
  - **Syntax:** $\pi_{A_1,A_2,\cdots,A_n}(\text{Rel})$
    - $A_1, \cdots, A_n$ represents attributes
  - Picks certain columns
  - e.g

    What are the titles and years of movies made by Fox that are at least 100 minutes long?

    $$\pi_{title,year}(\sigma_{length \geq 100 \textbf{ AND } studioName=\text{`}\textbf{Fox}'}(\text{Movies})$$

- Cross-Product / Cartesian Product
  - Combines two relations
  - **Syntax:** Relation 1 $\times$ Relation 2
  - e.g. Names and GPAs of students with $HS > 1000$ who applied to CS and were rejected

    $\pi_{sName,GPA}(\sigma_{Student.sID=Apply.sID \textbf{ AND } HS>1000 \textbf{ AND } major=\text{`}cs' \textbf{ AND } dec=\text{`}R'}(\text{Student} \times \text{Apply})$

College

cName	state	enr

Student

sID	sName	GPA	HS

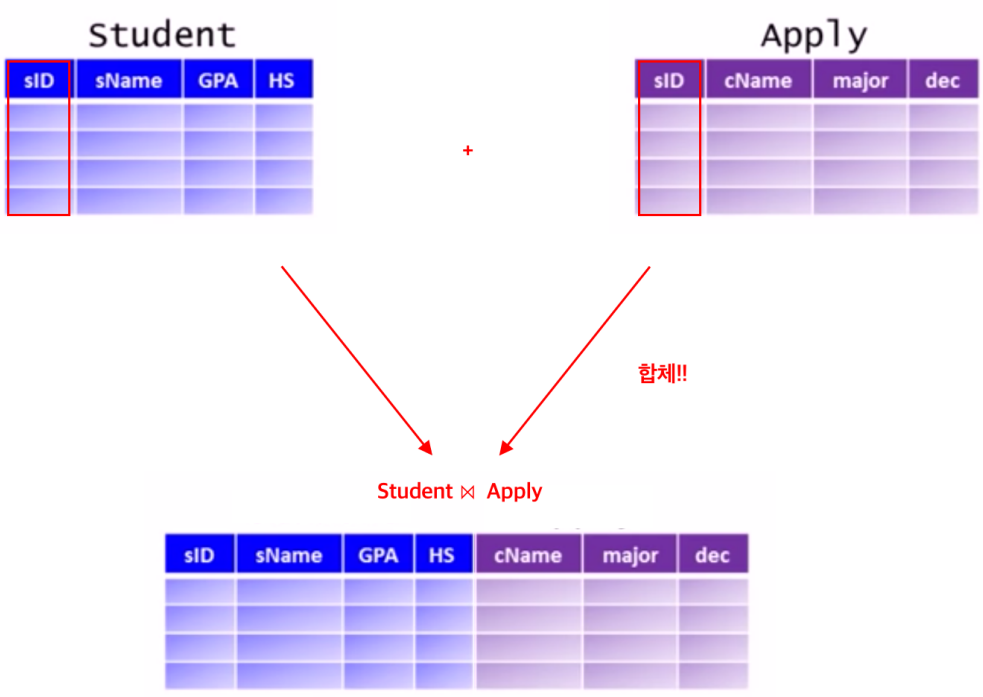
Apply

sID	cName	major	dec

- Natural Join
  - Enforce equality on all attributes with the same name
  - Eliminiate one copy of duplicate attributes
  - Is symbolized by $\bowtie$
  - **Syntax:** Relation 1 $\bowtie$ Relation 2
  - e.g.

    Names and GPAs of students with $HS > 1000$ who applied to CS and were rejected.

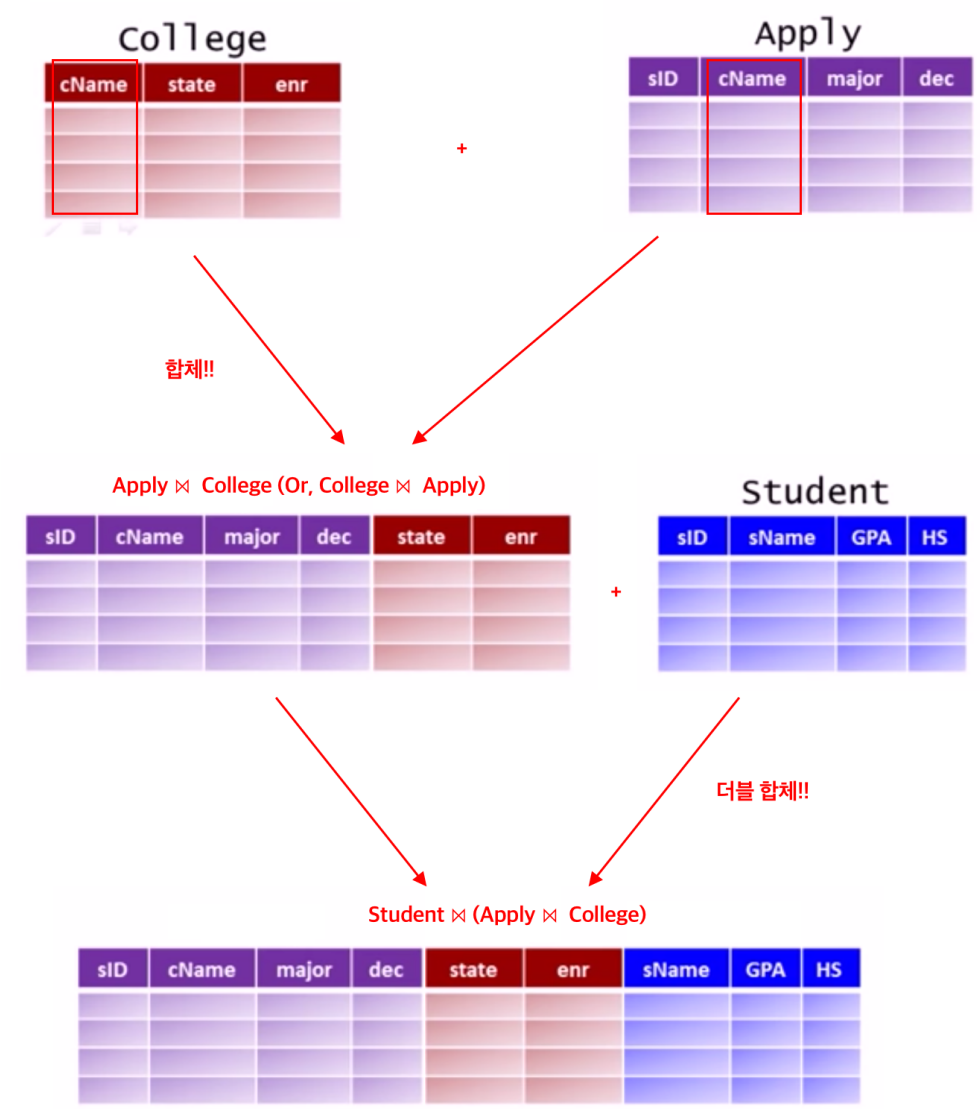
    $$\pi_{sName,GPA}(\sigma_{HS>1000 \textbf{ AND } major=\text{`}cs' \textbf{ AND } dec=\text{`}R'}(\text{Student} \bowtie \text{Apply}))$$



– e.g.2.

Names and GPAs of students with $HS > 1000$ who applied to CS at college with $enr > 20,000$ and were rejected

$\pi_{sName,GPA}($
$\sigma_{HS>1000 \textbf{ AND } enr>20000 \textbf{ AND } major=`cs' \textbf{ AND } dec=`R'}(\text{Student} \bowtie (\text{Apply} \bowtie \text{College}))$
$)$



- Union Operator
  - **Syntax** R ∪ S
  - Is the set of elements that are in R or S or both.
  - An element appears only once in the union even if it is present in both R and S.
  - Is like **UNION** keyword in SQL
  - e.g.

    List of college and student names

$$\pi_{cName}(\text{College}) \cup \pi_{sName}(\text{Student})$$