

# 데이터베이스

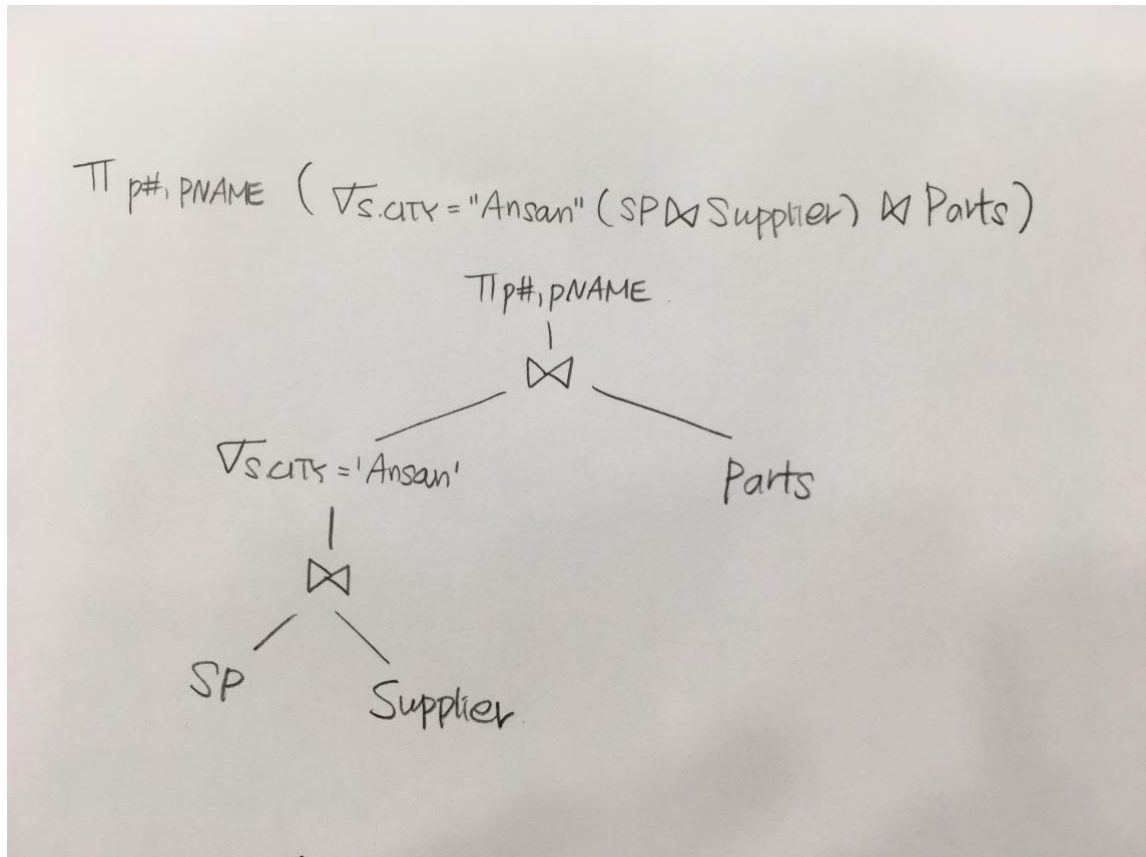
학번 : 2016003709

이름 : 윤가영

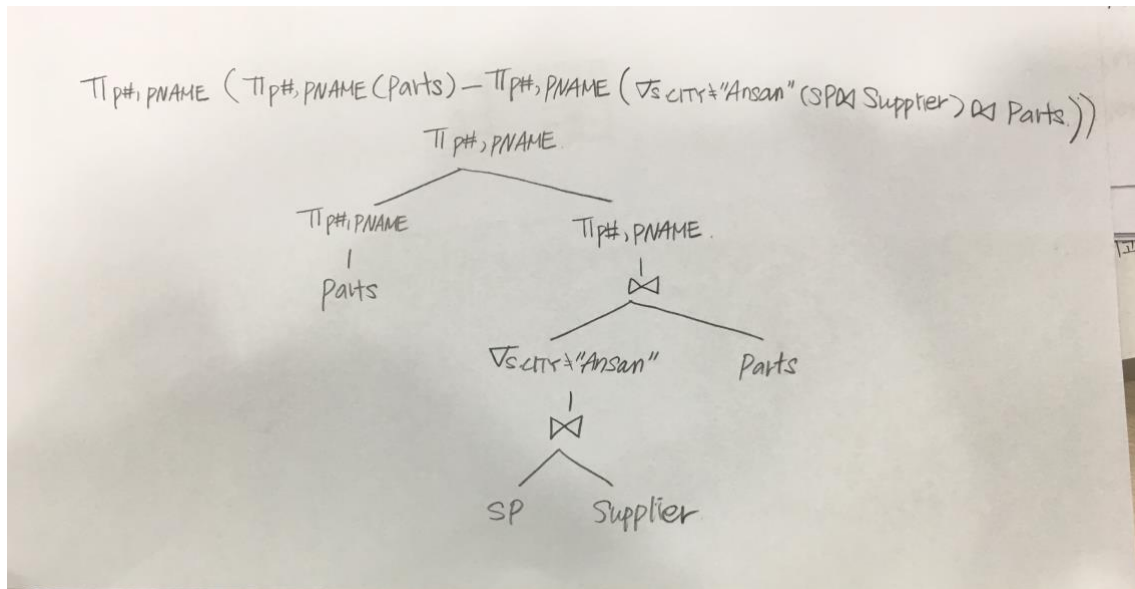
과제 : HW3

**Q1. Consider SUPPLIERS-AND-PARTS database and write each of the following queries in a relational algebra and draw the expression tree as well.**

*a) Find part number (P#) and part name (PNAME) that are supplied by (at least one) 'Ansan' supplier.*

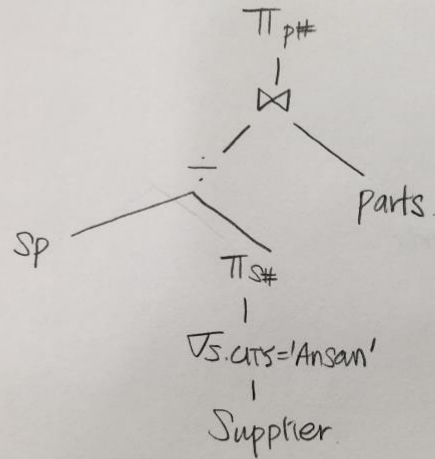


b) Find the part number (P#) and part name (PNAME) that are not supplied by 'Ansan' supplier.



c) Find the part number (P#) that is supplied by all 'Ansan' supplier. (Division 연산 사용)

$\pi_{P\#} ((SP \div \pi_{S\#} (\forall s.cits = 'Ansan' (Supplier))) \bowtie Parts)$



**Q2. Rewrite the following relational algebra queries in tuple calculus and domain calculus**

a)  $\pi_{P\#} ((\sigma_{s.city='Athen'}(Supplier) \bowtie SP) \bowtie (\pi_{P\#} (\sigma_{city='Jersey'}(Part))))$

**tuple calculus :**

$$\{t \mid \exists s \in Supplier (s[city] = 'Athen' \wedge \exists sp \in SP (sp[s\#] = s[s\#]) \\ \wedge \exists p \in Part (p[city] = 'Jersey' \wedge t[p\#] = p[p\#]) \\ \wedge p[p\#] = s[p\#]) \}$$

**domain calculus:**

$$\{ \langle s \rangle \mid \exists sn, t, ct (\langle s, sn, t, ct \rangle \in Supplier \wedge ct = 'Athen' \\ \wedge \exists q (\langle s, p, q \rangle \in SP) \\ \wedge \exists p, pw, co, we, pt (\langle p, pn, co, we, pt \rangle \in Part \\ \wedge pt = 'Jersey') ) \}$$

b)  $\pi_{SNAME} ((\pi_{S\#}(Supplier) - \pi_{S\#}(\sigma_{P\#='P2'}(SP) \bowtie Supplier)) \bowtie Supplier)$

**tuple calculus :**

$$\{t \mid \exists s \in Supplier (t[sname] = s[sname]) \\ \wedge \exists ss \in Supplier (s[s\#] = ss[s\#]) \\ \wedge \exists sss \in Supplier (s[s\#] = sss[s\#]) \\ \wedge \exists sp \in SP (sp[s\#] = sss[s\#]) \\ \wedge sp[p\#] = 'P2') \}$$

**Domain calculus :**

$$\{ \langle sn \rangle \mid \exists s, t, ct (\langle s, sn, t, ct \rangle \in Supplier \wedge \exists s, t, ct (\langle s, sn, t, ct \rangle \in Supplier \\ \wedge \neg \exists s, t, ct (\langle s, sn, t, ct \rangle \in Supplier \wedge \exists p, q (\langle s, p, q \rangle \in sp \wedge p = 'P2')))) \}$$

**Q3. Construct an E-R diagram as a design for a banking system (Be sure to list any assumptions you deem appropriate.)**

In our banking system, an account (ACCOUNT-NO) can be held by a customer (SOCIALSECURITY- NO). An account has a balance together with the date when it is accessed (withdraw, deposit ...) by the holder. The bank requires details including name, address of customers when they open accounts. An account is associated with a branch (BRANCH-NO) that has location, its name and total asset. Each branch is managed by an employee (EMPLOYEE-NO). Each employee is working on some loan (LOAN-NO) held by a customer. Associated with a loan are also an amount and an interest rate.

