Graduate Tools And Models

Homework 1

- Aditi Balaji

Given:-

DRINKS (person, coffee)
HAS_BEAN (coffee, bean_name)
BEAN (Bean_name, from_location)

(1) Relational Algebra

(a) Which location grow both "Catuai" & "Catimor"

$L1 \leftarrow \Pi_{FL}(\sigma_{BN = \text{"Catuai"}}(BEAN))$

$L2 \leftarrow \Pi_{FL}(\sigma_{BN = \text{"Catimor"}}(BEAN))$

Result $\leftarrow L_1 \cap L_2$ { Set join }

(b) Merged $\leftarrow$ DRINKS $\times$ HAS_BEANS $\times$ BEAN (Natural Join)

$D_B = \Pi_P(\sigma_{FL = \text{"Brazil"}}(\text{merged}))$

$D_P = \Pi_P(\sigma_{FL = \text{"Peru"}}(\text{merged}))$

Result $\leftarrow D_B \cup D_P$ { Set Join }

(c) All countries producing all beans of coffee "BD"

$BEAN\_BD = \Pi_B(\sigma_{C = \text{"BD"}}(HAS\_BEAN))$

$ALL\_COMB = BEAN\_BD \times \Pi_{FL}(BEAN)$

$ALL\_NOT = ALL\_COMB - BEAN$ } All tuple that don't produce all of Bean.

$Result = \Pi_{FL}(BEAN) - \Pi_{FL}(ALL\_NOT)$

(2) Relational Calculus.

(a) Loc which kind bean for c consumed by "Hub"

$$\{ b.FL \mid BEAN(b) \wedge \exists (d)(DRINKS(d) \wedge d.PERSON = \text{"Chris"} \wedge \exists (hb)(HAS\_BEAN(hb) \wedge d.COFFEE = hb.COFFEE \wedge b.BEAN = hb.BEAN)) \}$$

(b) People that don't drink any coffee that chris drinks

$$\{ d.PERSON \mid DRINKS(d) \wedge \forall (d_2)(DRINKS(d_2)) \wedge d_2.PERSON = d.PERSON \wedge \neg \exists (d_3)(Drinks(d_3) \wedge d_3.COFFEE = d_2.COFFEE \wedge d_3.PERSON = \text{'Chris'}) \}$$

(c) People that drink set of coffe together contain all beans from Hawaii

$$\{ d.PERSON \mid DRINKS(d) \wedge \forall (b)(BEANS(b) \wedge (b.FL = \text{"Hawaii"}) \longrightarrow \exists (hb)(HAS\_BEAN(hb) \wedge hb.COFFEE = d.COFFEE \wedge b.BN = hb.BN)) \}$$