Course Name: **A Level (1st Sem)** Subject : **Introduction to DBMS**

Topic: **FD – Closure of Attribute Sets (Part 6)** Date: **24-Apr-2020**

Closure of Set of Functional Dependencies

Let α be set of attributes in relational schema R, **the set of all attributes functionally determined by α under a set F of functional dependencies is the closure of α under F**. It is denoted by α^+.

An algorithm to compute α^+ , the closure of α under F

1. result := α;
2. **repeat**
3. **for each** functional dependency β → γ **in** F **do**
4. **begin**
5. **if** β ⊆ result **then** result := result ∪ γ
6. **end**
7. **until** (result does not change)

Q 1. Suppose, a relational schema R (A, B, C) and FD:

F { A → B,

B → C }

Compute A^+, B^+, C^+ (closure of attribute A, B, C).

Solution 1:

A^+ =	A	result: = A (see line 1 of algo. – Initially the result is attribute (s) itself.
	A B	because of FD A → B, result includes B (See line 2-6, since A ⊆ result, therefore result := result ∪ B
	A B C	because of FD B → C, result includes C (See line 2-6, since B ⊆ result, therefore result := result ∪ C
		(now if we repeat the steps result does not change, so algo. ends here)

Therefore A^+ = (A B C)

B^+ =	B	Initially result is B itself
	B C	Because of FD B → C, C is included in the result.
		(Note: FD A → B is not considered since A is not subset of result)

Therefore B^+ = (B C)

C^+ =	C	The result is only C **(** because of FDs B → C, A → B, neither B nor C is subset of result)

Therefore C^+ = C

Q 2. Suppose, a relational schema R (A, B, C, D, E, F, G) and FD:

F { A → B,

BC → DE,

AEG → G }

Compute AC^+.

Solution 2:

AC^+ =	A C	Initially result is AC.
	A B C	because of FD A → B, result includes B
	A B C D E	because of FD BC → DE, result includes DE

Therefore AC^+ = (A B C D E)

Exercise:

1. Suppose, a relational schema R (A, B, C, G, H, I), and FD:

F { A → B,
A → C,
CG → H,
CG → I,
B → H,}

Compute AG^+ and ABH^+.