Database system

Implimentation 1 Task 1 Solution

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1 Highest Normal form

$R = (P, Q, R, S, T, U, V, W)$

Fd: $RW \rightarrow V$

$P \rightarrow QR$

$T \rightarrow P$

$U \rightarrow TV$

Step 1: Find the minimal super key.

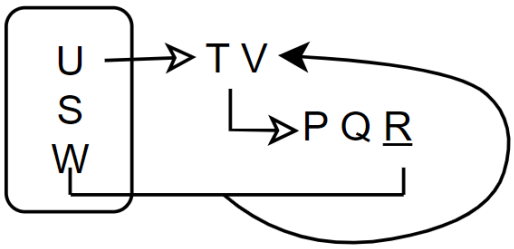
$\{T\}^+ = \{TPQR\}$, P→QR and T→P =T→PQR

$\{U\}^+ = \{U\}$
$= \{UTV\}$(Using U→TV)
$= \{UTVP\}$ (Using T→P)
$= \{UTVPQR\}$ (Using P→QR)

U→TVPQR is valid Functional dependency
S→S is trival Functional dependency
W→W is trvial Functional dependency

Through using composite inference rule, we have,$\{USW\}^+ = \{UTVPQRSW\}$
Hence, the minimal super key is USW.

Step 2: Find the highest Normal Form



Since(USW) is the minimal super key, there exist a partial Functional dependency, U→TV. Which violates 2NF requirements.

Ans: Hence, the relational schema R is in 1NF

2 Decompose the relational schema R into BCNF

Since there exist a partial dependency in the relational schema R, to transform the relational schema to BCNF, we need to remove the partial dependency, **U→TV**, and split it into three relational shcemas **R1=(USW), R2=(UTVPQR) and R3= (RWV)**

In relational schema R1=(UWS),
the minimal super key is (UWS), and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R1=PUWS) is in BCNF.

In relational schema R2=(UTVPQ),
the minimal super key is (U), and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R2=(**UTVPQ**) is in BCNF.

In relational schema R3=(RWV),
the minimal super key is (RW), and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R3=(RWV) is in BCNF.