

Assignment 2

Question 2 (4 marks)

1) (2 marks)

Step 1 Reduce Right Side:

$F' = \{AB \rightarrow C, AB \rightarrow D, E \rightarrow D, ABC \rightarrow D, ABC \rightarrow E, E \rightarrow A, E \rightarrow B, D \rightarrow A, D \rightarrow G, ACD \rightarrow B, ACD \rightarrow E\}$

Step 2 Reduce Left Side:

For $ABC \rightarrow D$, $\{AB\}^+ = \{A, B, C, D, E, G\}$. Thus $AB \rightarrow D$ is inferred by F' . Hence, $ABC \rightarrow D$ is replaced by $AB \rightarrow D$.

Similarly, we can replace $ABC \rightarrow E$ with $AB \rightarrow E$, $ACD \rightarrow B$ with $CD \rightarrow B$, $ACD \rightarrow E$ with $CD \rightarrow E$.

Step 3 Reduce Redundancy:

$\{E\}^+|_{F' - \{E \rightarrow D\}} = \{A, B, C, D, E, G\}$, so $E \rightarrow D$ is redundant. Thus, we remove it from F' .

Similarly, we can remove $AB \rightarrow E$ and $CD \rightarrow B$.

Thus, $F_m = \{AB \rightarrow C, D \rightarrow A, D \rightarrow G, E \rightarrow B, AB \rightarrow D, E \rightarrow A, CD \rightarrow E\}$

This is a sample solution.

2) (2 marks)

For $F_m = \{AB \rightarrow C, D \rightarrow A, D \rightarrow G, E \rightarrow B, AB \rightarrow D, E \rightarrow A, CD \rightarrow E\}$:

From $AB \rightarrow C, AB \rightarrow D$, derive $R_1\{A, B, C, D\}$

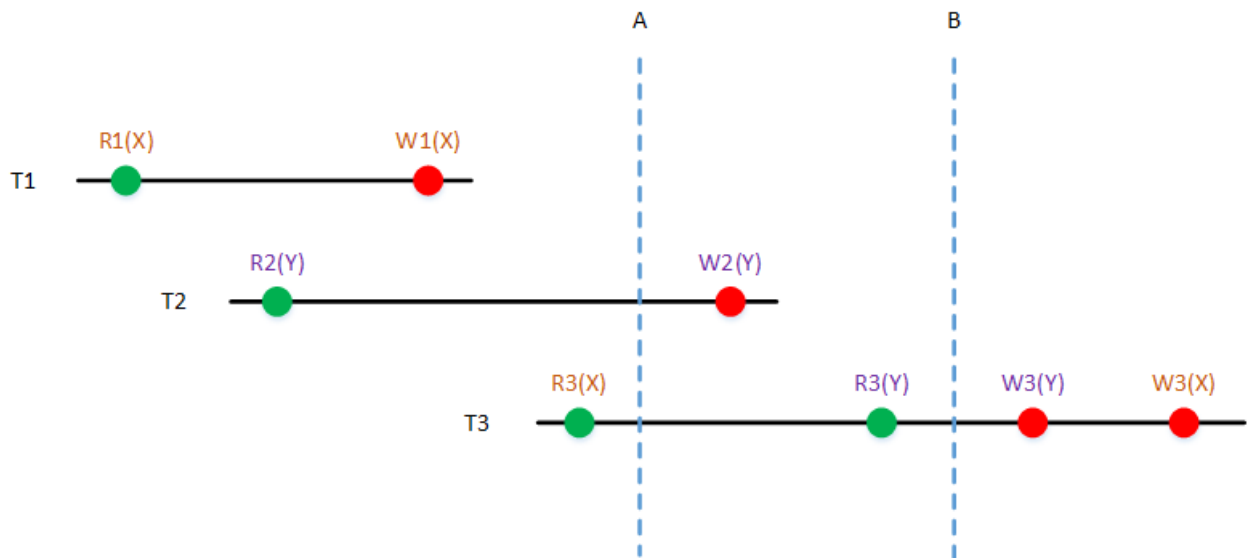
From $D \rightarrow A, D \rightarrow G$, derive $R_2\{A, D, G\}$

From $E \rightarrow B, E \rightarrow A$, derive $R_3\{A, B, E\}$

From $CD \rightarrow E$, derive $R_4\{C, D, E\}$

None of the relation schemas contains a key of R , add one relation schema $R_5\{E, H\}$

Question 3 (8 marks)



1) (2 mark)

T1, T2: redo

T3: undo

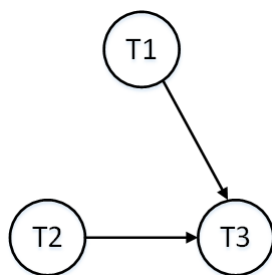
2) (2 mark)

T2: redo

T3: undo

3) (2 marks)

Yes. There is no cycle in its schedule graph:



4) (2 marks)

There is no way to construct a schedule whose wait-for graph contains cycles.

We have T1 and T3 read and write on X, we have potential to make T1 wait-for T3 or T3 wait-for T1.

We have T2 and T3 read and write on Y, we have potential to make T2 wait-for T3 or T3 wait-for T2.

If we make T1 wait-for T3, we cannot make T3 wait-for T1 directly or through T2.

If we make T3 wait-for T1, we cannot make T1 wait-for T3 directly or through T2.

If we make T2 wait-for T3, we cannot make T3 wait-for T2 directly or through T1.

If we make T3 wait-for T2, we cannot make T2 wait-for T3 directly or through T1.