Theory Assignment 4
CS5280

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Problem 5.2

$$m = w_0(x_0)w_0(y_0)c_0r_1(x_0)w_1(x_1)r_2(x1)w_2(y_2)w_1(y_1)w_2(x_3)$$

Conisder the following version order on the variables:

$$x_0 \ll x_1 \ll x_3, \quad y_0 \ll y_1 \ll y_2$$

Building the MVSG(m, $\ll$) we have the following edges:

- $r_1(x_0) \implies t_0 \to t_1$
- $r_2(x_1) \implies t_1 \to t_2$
- $r_2(x_1), w_3(x_3)$ and $x_2 \ll x_3 \implies t_2 \to t_3$
- $r_1(x_0), w_3(x_3)$ and $x_0 \ll x_3 \implies t_1 \to t_3$

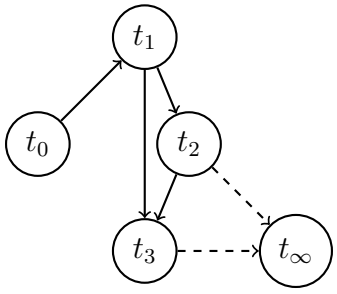

Figure 1: MVSG for m

In figure 1, we see that MVSG is acyclic. Appropriate version for t_∞ is x_3 and y_2, i.e., $r_\infty(x_3), \quad r_\infty(y_2)$.

Problem 5.6

$$m = w_1(x)c_1r_2(x)r_3(x)c_2r_4(x)w_3(x)c_4c_3$$

Figure 2 shows the execution of m under MVTO protocol.
Here $w_3(x_3)$ step is rejected because $r_4(x_1)$ has already been scheduled, such that $ts(t_1) < ts(t_3) < ts(t_4)$. Hence, transaction t_3 is aborted, as it creates a new version x_3, however transaction t_4 has already read the version x_1.

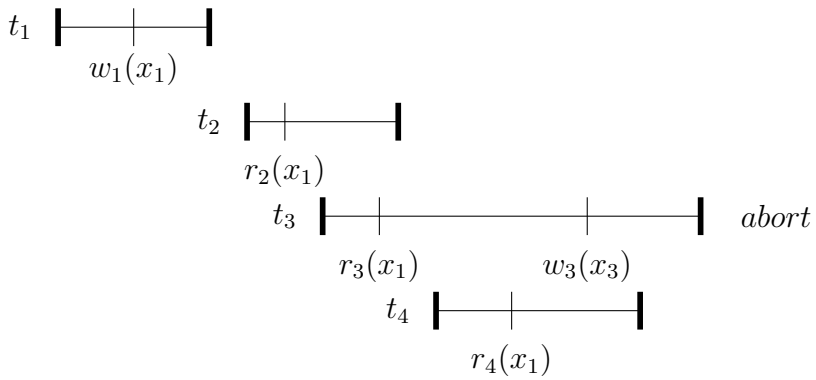

Figure 2: m execution under MVTO protocol

Problem 5.9

The proposed protocol is nor correct and does not guarantee MVSR schedules.
Consider the following schedule:

$$m = w_0(x_0)w_0(y_0)c_0r_1(x_0)r_1(y_0)r_2(x_0)r_2(y_0)w_1(x_1)c_1w_2(y_2)c_2$$

Consider the following version order on the variables: $x_0 \ll x_1, \quad y_0 \ll y_2$
Building the MVSG(m, $\ll$) we have the following edges:

- $r_1(x_0) \implies t_0 \to t_1$
- $r_2(x_0), w_1(x_1)$ and $x_0 \ll x_1 \implies t_2 \to t_1$
- $r_1(y_0), w_2(y_2)$ and $y_0 \ll y_2 \implies t_1 \to t_2$

Figure 3 shows the MVSG for m. As graph is cyclic, hence m is not in MVSR.

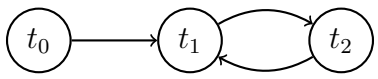

Figure 3: MVSG for m