Databases Autumn 2025

Hand-In Exercise 6

December 21, 2025

Aiysha Frutiger
Jannick Seper
Luis Tritschler

Total Points	

Task	**Points**

Aiysha Frutiger
Jannick Seper
Luis Tritschler

Task 1

a) S_1:

Conflicting operations:

- $w_1(a)$ before $w_2(a)$ on item a
- $w_3(b)$ before $w_1(b)$ on item b

Dependency graph S_1:

$T^3 \longrightarrow T^1 \longrightarrow T^2$

i) Acyclic dependency graph ⇒ conflict-serializable.
Equivalent serial schedule: $T^3 \to T^1 \to T^2$.

b) S_2:

Conflicting operations:

- $w_3(y)$ before $r_4(y)$ on item y

Dependency graph S_2:

$T^3 \longrightarrow T^4$

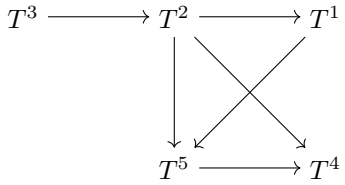
i) Acyclic dependency graph ⇒ conflict-serializable.
Equivalent serial schedule: $T^1 \to T^2 \to T^3 \to T^4$.

c) S_3:

Conflicting operations:

- $r_2(w)$ before $w_1(w)$ on item w
- $w_3(x)$ before $w_2(x)$ on item x
- $w_2(x)$ before $w_4(x)$ on item x
- $w_2(y)$ before $w_5(y)$ on item y
- $r_1(v)$ before $w_5(v)$ on item v
- $w_5(v)$ before $w_4(v)$ on item v

Dependency graph S_3:

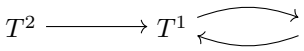


i) Acyclic dependency graph ⇒ conflict-serializable.
Equivalent serial schedule: $T^3 \to T^2 \to T^1 \to T^5 \to T^4$.

Aiysha Frutiger
Jannick Seper
Luis Tritschler

Task 2

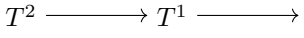
a) This is the dependency graph of this schedule:



i) **CPSR:**
Cycle in dependency graph ⇒ not conflict-serializable ⇒ $S_4 \notin$ CPSR.

ii) **OPSR and COPSR:**
COPSR $\subseteq$ OPSR $\subseteq$ CPSR ⇒ $S_4 \notin$ OPSR and $S_4 \notin$ COPSR.

b) This is the dependency graph of this schedule:

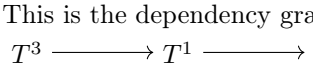


i) **CPSR:**
Acyclic dependency graph ⇒ conflict-serializable ⇒ $S_5 \in$ CPSR.

ii) **COPSR:**
Commit order is C_2 before C_1 before C_3 and dependencies $T^2 \to T^1 \to T^3$ ⇒ commit-order preserved ⇒ $S_5 \in$ COPSR.

iii) **OPSR:**
COPSR $\subseteq$ OPSR ⇒ $S_5 \in$ OPSR.

c) This is the dependency graph of this schedule:



i) **CPSR:**
Acyclic dependency graph ⇒ conflict-serializable ⇒ $S_6 \in$ CPSR.

ii) **COPSR:**
Dependency $T^1 \to T^2$ exists but commit order is C_2 before C_1 ⇒ commit-order violation ⇒ $S_6 \notin$ COPSR.

iii) **OPSR:**
Serial order enforced by graph is T^3 before T^1 before T^2 but the real-time order is T^2 before T^3 ⇒ order mismatch ⇒ $S_6 \notin$ OPSR.

Task 3