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CS 348

Homework 3

1. Nesting & Un-nesting
    a. SELECT ename, C.child, Address.city as addr_city, Address.state as addr_state, Address.zipcode as addr_zip, S.skill
    FROM emp as E, unnest(E.childrenSet) as C (child), unnest(E.skillsSet) as S (skill);

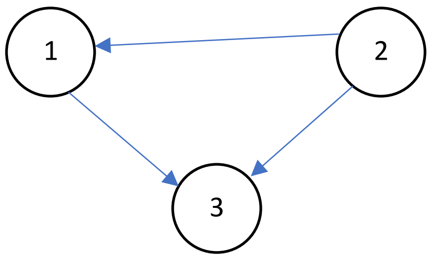
    b. SELECT ename, collect(child) as childrenSet, Address (addr_city, addr_state, addr_zip), skill
    FROM flat-emp
    GROUP BY ename, skill, Address;

    c. SELECT ename, child, Address (addr_city, addr_state, addr_zip) as Address, collect(skill) as skillsSet
    FROM flat-emp
    GROUP BY ename, child, Address;

    d. SELECT ename, collect(child) as childrenSet, Address (addr_city, addr_state, addr_zip) as Address, collect(skill) as skillsSet
    FROM flat-emp
    GROUP BY ename, Address;

2.
S1 =R1(X); R2(Y); W1(Y); W2(Z); R3(Z); W3(X)

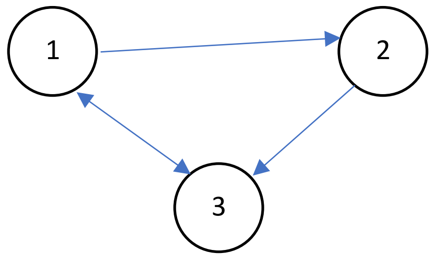
a)


$$\begin{tikzcd}
1 \arrow[dr] & & 2 \arrow[ll] \arrow[dl] \\
& 3 &
\end{tikzcd}$$

b) **Yes**, it is serializable.
c) The serial schedule is: 2 – 1 – 3

S2 =R1(A); R3(B); W1(A); R2(C); R2(A); W3(B); W2(A); R3(A); R1(B); W2(C); W1(B)

a)



b) **No**, it is not serializable.
c) This is not serializable because there are multiple conflicts that lead to a cycle in the precedence graph.

3.

a) There is a **dirty read problem** in this schedule. In T1 the value of A is initially read, modified (+100) and written. In T2 immediately after, A is also read modified (-50) and then written. However, since there is a failure and rollback at the end of T1 it is never commit to the database whilst T2 updated and used the now invalidated value in variable A.
b) There is a **lost update problem** in this schedule. In T1 A is read initially and then there is 100 added to it, however the write statement is not until T=5. In T=3 and T=4, there is a read and update in T2 that changes the original value of A to A – 50. This causes the modifications of T2 to be saved to the database, overwriting the changes T1 wanted to do initially.

4.

i.

a)	2PL:	Yes, this is allowed.
	Strict 2PL:	No, there is no proper unlocking of Y before the end.
b)	2PL:	Yes, this is allowed.
	Strict 2PL:	Yes, there is proper unlocking of transaction and timestamps.
c)	2PL:	Yes, this is allowed.
	Strict 2PL:	Yes, there is proper unlocking of transaction and timestamps.

ii.

a)	2PL:	Yes to all.
	Strict 2PL:	Yes to all. Strict locking ensures we obtain locks before writing. The hold and no shares provide recoverability and avoidance of rollback.
b)	2PL:	Yes to serializability, no to recoverability and avoidance
	Strict 2PL:	Yes to serializability, no to recoverability and avoidance

c) | |
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 | 2PL: | Yes to all.
 | Strict 2PL: | Yes to all.