

Homework 4

- T: $x = \text{read}(j)$; $y = \text{read}(i)$; $\text{write}(j, 44)$; $\text{write}(i, 33)$
- U: $x = \text{read}(k)$; $\text{write}(i, 55)$; $y = \text{read}(j)$; $\text{write}(k, 66)$

Strict execution:

Transaction T:	Transaction U:
$x = \text{read}(j)$ $y = \text{read}(i)$	$x = \text{read}(k)$
$\text{write}(j, 44)$ $\text{write}(i, 33)$ commit	$\text{write}(i, 55)$ $y = \text{read}(j)$ $\text{write}(k, 66)$

Not strict but no dirty reads:

Transaction T:	Transaction U:
$x = \text{read}(j)$ $y = \text{read}(i)$	$x = \text{read}(k)$
$\text{write}(j, 44)$ $\text{write}(i, 33)$ commit	$\text{write}(i, 55)$ $y = \text{read}(j)$ $\text{write}(k, 66)$

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With dirty reads:

Transaction <i>T</i> :	Transaction <i>U</i> :	Transaction <i>T</i> :	Transaction <i>U</i> :
<i>x = read(j)</i> <i>y = read(i)</i>	<i>x = read(k)</i>	<i>x = read(j)</i>	<i>x = read(k)</i>
<i>write(j, 44)</i> <i>write(i, 33)</i>	<i>write(i, 55)</i> <i>y = read(j)</i>	<i>y = read(i)</i>	<i>write(i, 55)</i>
<i>commit</i>	<i>write(k, 66)</i>	<i>write(j, 44)</i> <i>write(i, 33)</i>	<i>y = read(j)</i> <i>write(k, 66)</i> <i>commit</i>

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- *T*: $x = \text{read}(i)$; $\text{write}(j, 44)$;
- *U*: $\text{write}(i, 55)$; $\text{write}(j, 66)$.

<i>T</i>	<i>T's locks</i>	<i>U</i>	<i>U's locks</i>
	<i>lock i</i>		
$x = \text{read}(i)$			
	<i>unlock i</i>		
			<i>lock i</i>
		$\text{write}(i, 55)$	
			<i>lock j</i>
		$\text{write}(j, 66)$	
		<i>commit</i>	<i>unlock i, j</i>
	<i>lock j</i>		
$\text{write}(j, 44)$			
<i>commit</i>	<i>unlock j</i>		

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- In 2PC: the 'uncertain' period occurs because a worker has voted *yes* but has not yet been told the outcome. Such a participant cannot decide unilaterally what to do next and its resource cannot be released for use by other transactions.
- In 3PC: the workers 'uncertain' period lasts from when the worker votes *yes* until it receives the *PreCommit* request. At this stage, no other participant can have committed. Therefore, if a group of workers discover that they are all 'uncertain' and the coordinator cannot be contacted, they can decide unilaterally to abort.