CS186 Week 11 - Discussion Worksheet

What does it mean to use a STEAL buffer management policy? What are the risks? What are the benefits?

- STEAL means that the buffer manager is allowed to write pages containing uncommitted data to disk.
- Risks: a crash before a transaction commits could leave some of its dirty pages on disk, breaking atomicity
- Benefits: buffer manager can write data to disk during the transaction--better performance, and faster commits.

Consider the schedule of transaction operations shown below. Do they conform to a STEAL or NO STEAL buffer management policy? FORCE or NO FORCE? Explain your choices.

- STEAL: buffer manager writes pages to disk before txn commits
- FORCE: buffer manager writes all pages to disk before txn commits

Timestamp	Operation
10	XID 102 updates p6 (in memory)
20	XID 102 updates p7 (in memory)
30	Buffer manager flushes p6 to disk
40	XID 102 updates p8 (in memory)
50	Buffer manager flushes p7 to disk
60	Buffer manager flushes p8 to disk
70	XID 102 commits

Assume we're using write-ahead logging during transaction 102's execution. What log records would be generated by the trace above? By what time must each record be on disk?

On Disk By	LSN	Log	PrevLSN
< 30	1	T102 START	null
< 30	2	T102 Updates p6	1
< 50	3	T102 Updates p7	2
< 60	4	T102 Updates p8	3
< 70	5	T102 COMMIT	4
> 70	6	T102 END	5

What if at timestamp 70, transaction 102 aborted instead of committing? What would the log look like then?

On Disk By	LSN	Log	PrevLSN
< 30	1	T102 START	null
< 30	2	T102 Updates p6	1
< 50	3	T102 Updates p7	2
< 60	4	T102 Updates p8	3
< 70	5	T102 ABORT	4
< 70	6	T102: CLR: Undo 4, undoNextLSN = 3	5
< 70	7	T102: CLR: Undo 3, undoNextLSN = 2	6
< 70	8	T102: CLR: Undo 2, undoNextLSN = null	7
> 70	9	T102 END	8

Why do we need the dirty page table? Why do you think we store the <u>first</u> update that dirtied a page in the recLSN, instead of the most recent?

- We need the DPT to remember where in the log each dirty page in the buffer pool became dirty, so we can redo updates to those pages after a crash (to make sure they appear on disk).
- recLSN tracks the first update because we have to redo updates from old to new.