Class 25: Recovery Examples

Memory
- Active Xact Table
  - XID, lastLSN, status
  - running/committing/aborting
- Dirty Page Table
  - pageID, recLSN
- flushedLSN [flushedLSN ≥ pageLSN; to write page i to the disk]
To undo oldest LSN of all active XACTs:

- Find the earliest change in DPT.
- Use the smallest index in DPT that is greater than the last checkpoint.
- Use the transaction's LSN to undo the changes.

**Transactions and DPT:**

<table>
<thead>
<tr>
<th>Transaction</th>
<th>DPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1, 10, running</td>
<td>P5, 10</td>
</tr>
<tr>
<td>T2, 20, running</td>
<td>P3, 20</td>
</tr>
<tr>
<td>T3, 50, running</td>
<td>P1, 50</td>
</tr>
</tbody>
</table>

**Events:**

- LSN 00: Begin checkpoint
- LSN 05: End checkpoint
- LSN 10: Update T1 on P5
- LSN 20: Update T2 on P3
- LSN 30: T1 abort
- LSN 40: CLR undo T1 LSN 10, undo next = NULL
- LSN 45: T1 end
- LSN 50: Update T3 on P1
- LSN 60: Update T2 on P5

**Crashes:**

- CRASH 1: LSN 70
- CRASH 2: LSN 90

**After Analysis:**

- Redo transactions from earlier LSN from DPT to 20
- Redo undo T2 LSN 20

**After Redo:**

- Undo T2 LSN 20
- Undo T2 LSN 20
- Undo T2 LSN 20
- Undo T2 LSN 20
- Undo T2 LSN 20
- Undo T2 LSN 20
- Undo T2 LSN 20