Twin Block

Idea: keep two versions for each block:

- old, consistent version
- new, (possibly) inconsistent version

atomic switch to indicate consistent versions
Example: Modifying Transaction T1

T1

B0_a  B0_b  B1_a  B1_b  B2_a  B2_b  B3_a  B3_b  B4_a  B4_b

pointer to consistent version
Read B1

T1

B1b

B0a B0b B1a B1b B2a B2b B3a B3b B4a B4b

pointer to consistent version
Modify B1

T1

<table>
<thead>
<tr>
<th>B0_a</th>
<th>B0_b</th>
<th>B1_a</th>
<th>B1_b</th>
<th>B2_a</th>
<th>B2_b</th>
<th>B3_a</th>
<th>B3_b</th>
<th>B4_a</th>
<th>B4_b</th>
</tr>
</thead>
</table>

pointer to consistent version
Write Back B1

T1

B0_a  B0_b  B1_a  B1_b  B2_a  B2_b  B3_a  B3_b  B4_a  B4_b

pointer to consistent version
Read B3

T1

B0a  B0b  B1a  B1b'  B2a  B2b  B3a  B3b  B4a  B4b

pointer to consistent version
Modify B3

T1

B0a B0b B1a B1b' B2a B2b B3a B3b B4a B4b

pointer to consistent version
Write Back B3

T1

B0_a B0_b B1_a B1_b' B2_a B2_b B3_a B3_b' B4_a B4_b

pointer to consistent version
Committing T1?

T1

B0_b B0_a B1_a B1_b' B2_a B2_b B3_a B3_b' B4_a B4_b

pointer to consistent version
Switch Global Pointer!

T1

B0_a  B0_b  B1_a  B1_b'  B2_a  B2_b  B3_a  B3_b'  B4_a  B4_b

pointer to consistent version
Copy b over a
Copy b over a

T1

B0_a B0_b B1_a' B1_b' B2_a B2_b B3_a' B3_b' B4_a B4_b

b

pointer to consistent version
Done.

B₀ᵃ  B₀ᵇ  B₁ᵃ  B₁ᵇ  B₂ᵃ  B₂ᵇ  B₃ᵃ  B₃ᵇ  B₄ᵃ  B₄ᵇ

pointer to consistent version
A Second Transaction T2

B1a

B0a B0b B1a B1b B2a B2b B3a B3b B4a B4b

pointer to consistent version
Abort T1?

B1_b' and B3_b' are the conflicting transactions. B1_b' is already committed, and B3_b' has not started yet.
DO NOT Switch Global Pointer!

T1

B0_a B0_b B1_a B1_b' B2_a B2_b B3_a B3_b' B4_a B4_b

pointer to consistent version
Copy a over b

B0_a  B0_b  B1_a  B1_a  B2_a  B2_b  B3_a  B3_a  B4_a  B4_b

pointer to consistent version
<table>
<thead>
<tr>
<th>B₀ᵃ</th>
<th>B₀ᵇ</th>
<th>B₁ᵃ</th>
<th>B₁ᵇ</th>
<th>B₂ᵃ</th>
<th>B₂ᵇ</th>
<th>B₃ᵃ</th>
<th>B₃ᵇ</th>
<th>B₄ᵃ</th>
<th>B₄ᵇ</th>
</tr>
</thead>
</table>

pointer to consistent version
A Second Transaction T2

T2

B0_a B0_b B1_a B1_b B2_a B2_b B3_a B3_b B4_a B4_b

pointer to consistent version

B1_b
Discussion

Advantages:

- no extra help data structures
- undo of changes easy
- no fragmentation
Discussion

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Disadvantages:

Doubles storage for all blocks