Undo and Redo Support for Replicated Registers

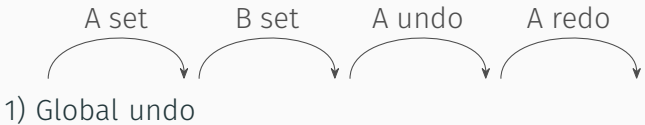
PaPoC ’24, Athens

Leo Stewen and Martin Kleppmann

April, 2024

Part I: Undo Semantics in a Collaborative Setting

Figure 1: Users *A* and *B* collaboratively edit ***two*** *registers*.



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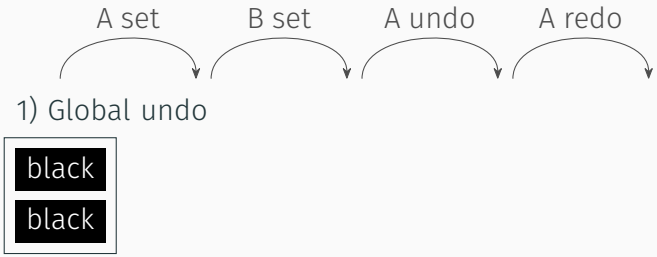

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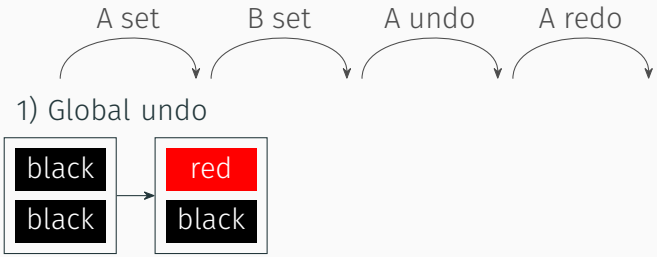

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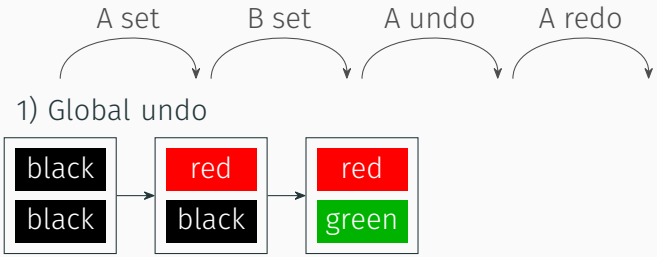

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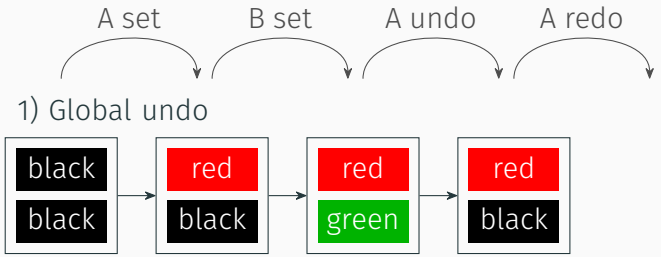

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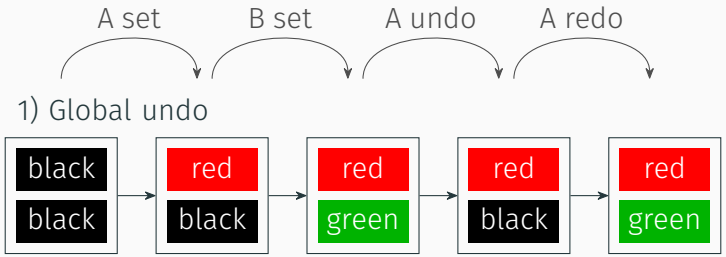

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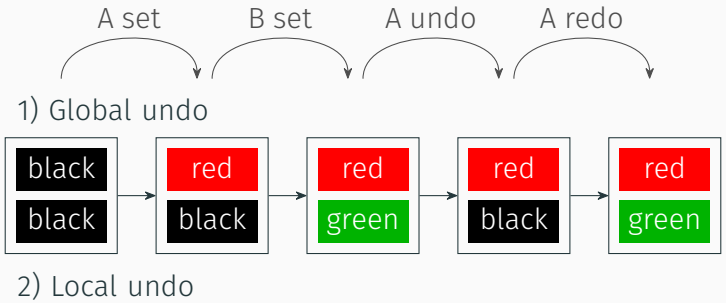

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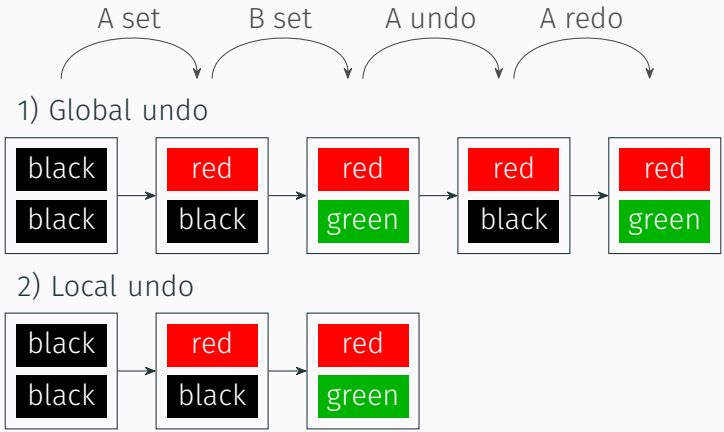

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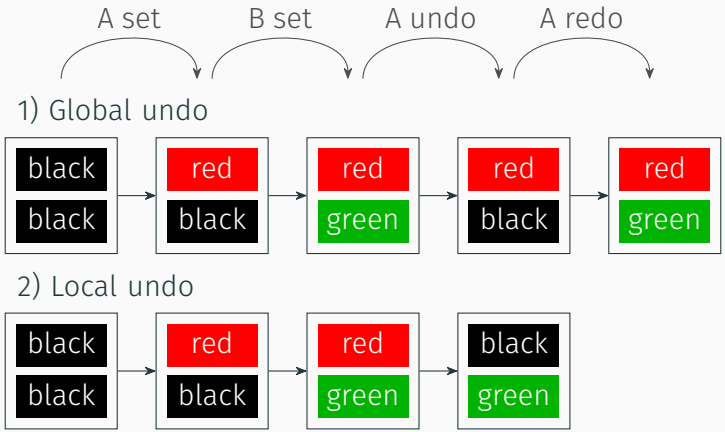

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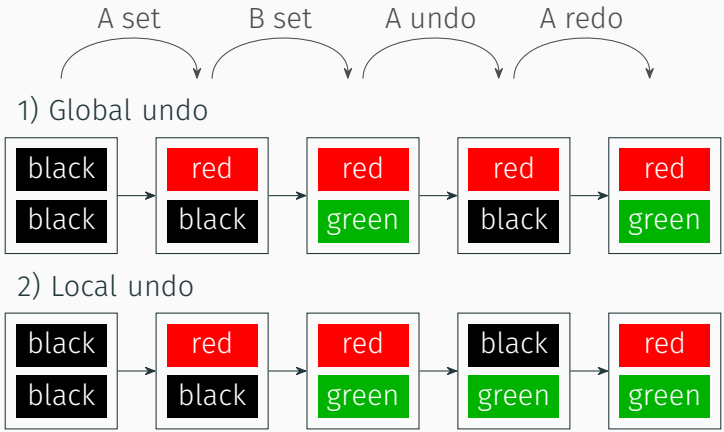

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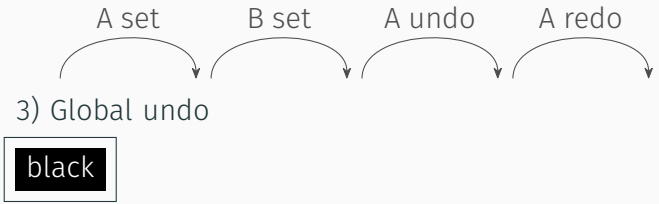
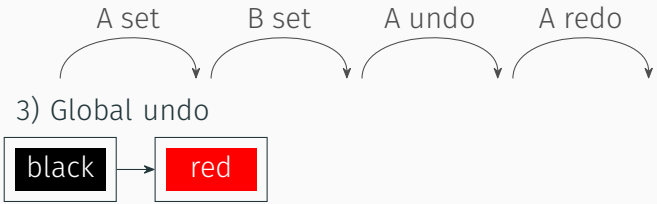


Figure 2: Users *A* and *B* collaboratively edit ***one*** *register*.



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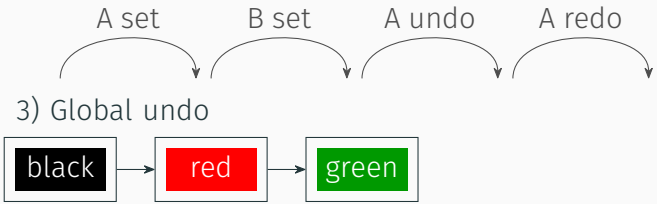

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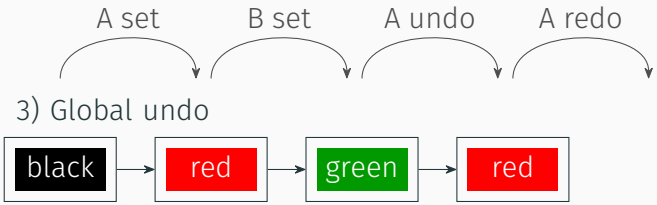

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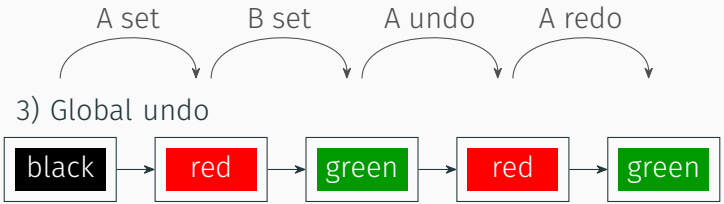

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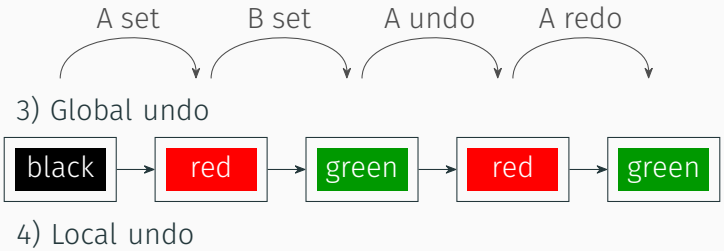

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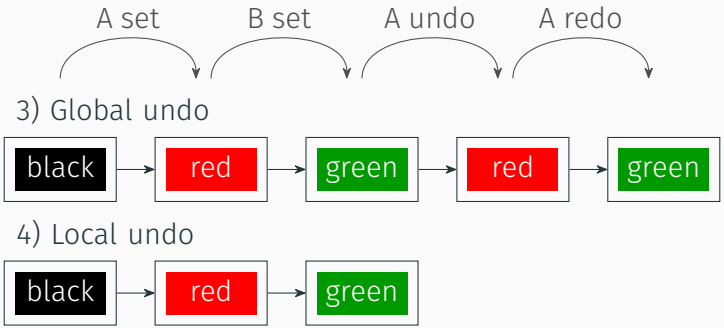

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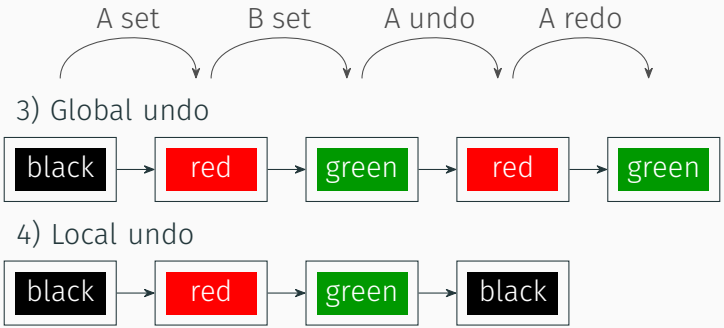

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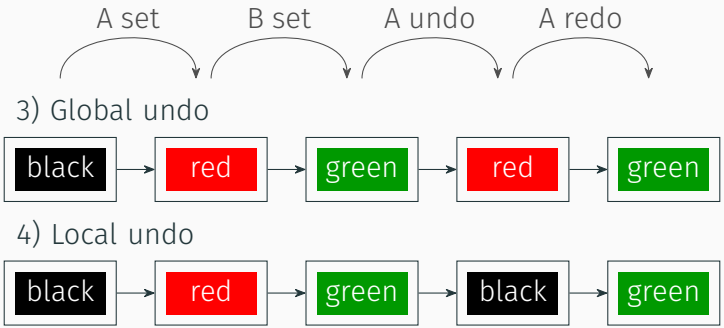

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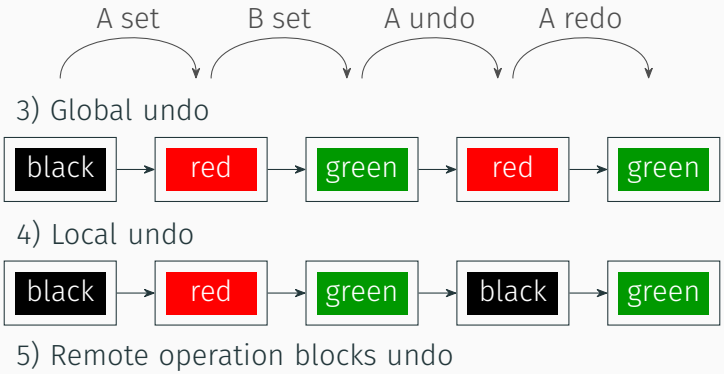

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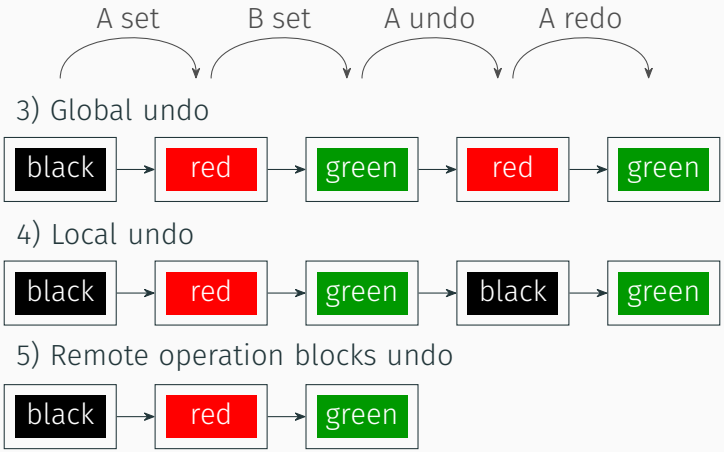

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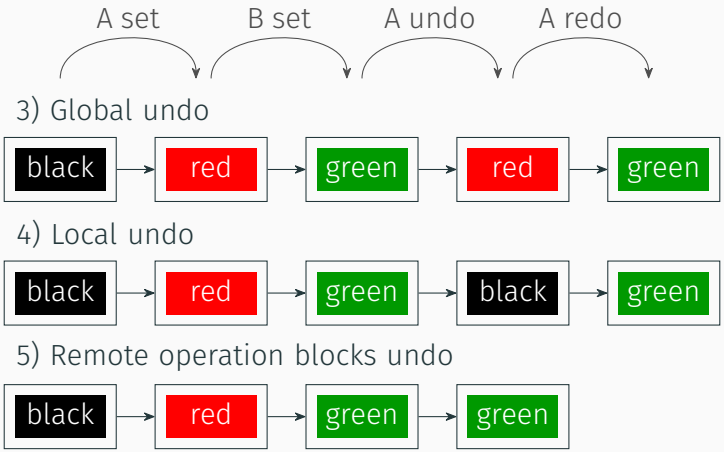

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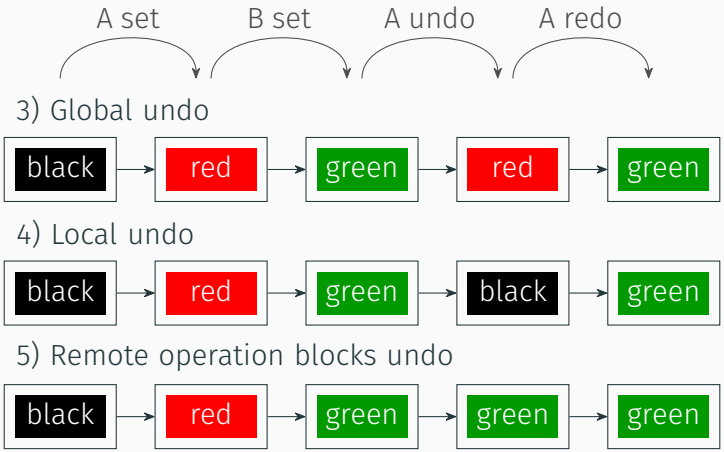

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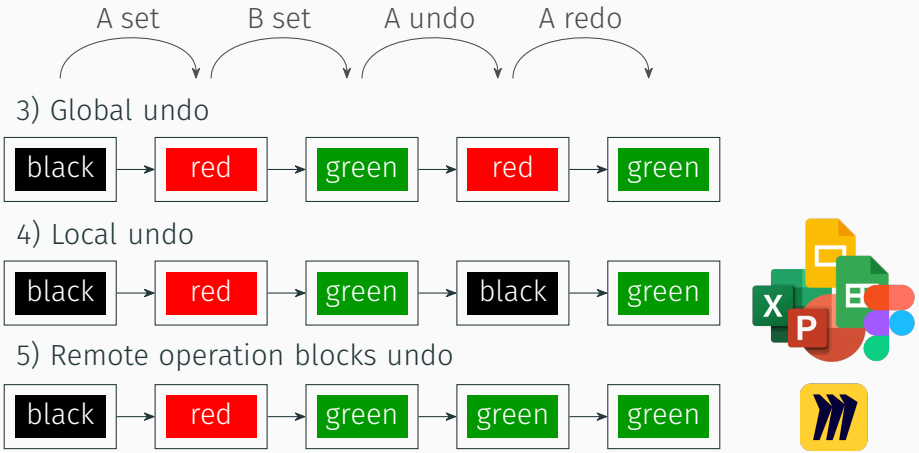

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Part II: An Algorithm for (Local) Undo

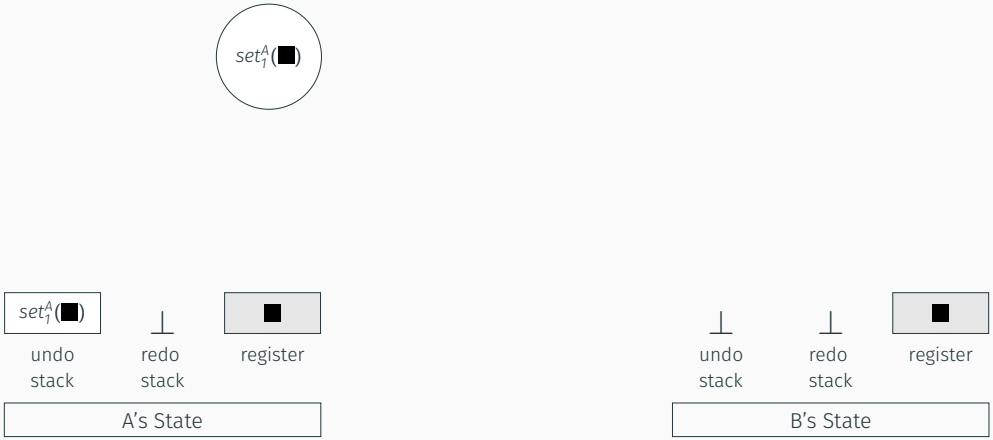
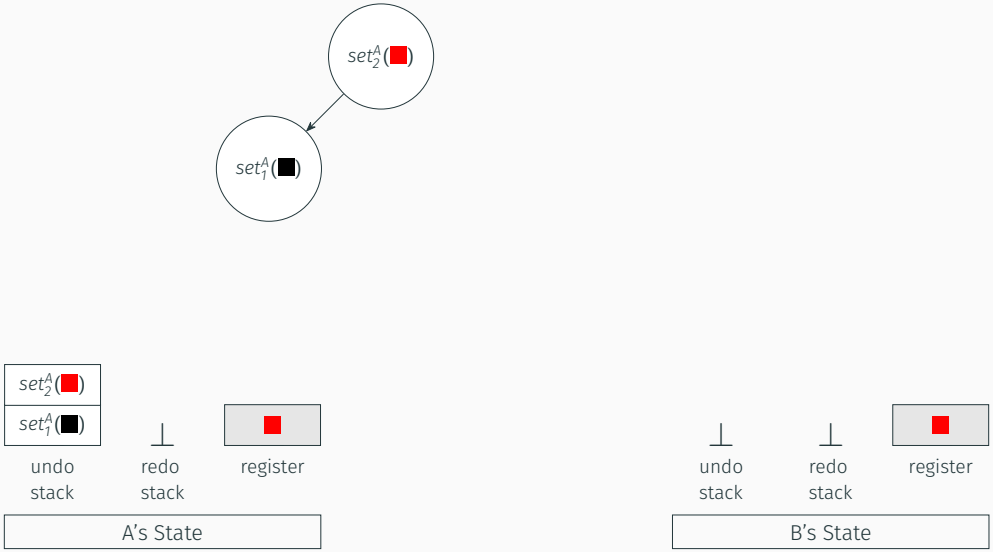


Figure 3: The algorithm applied on a small operation history.



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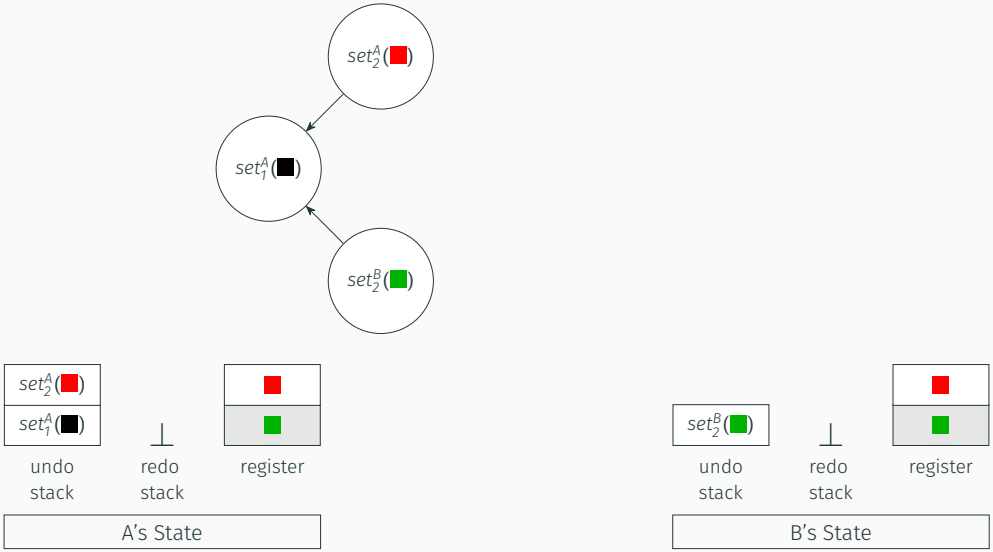

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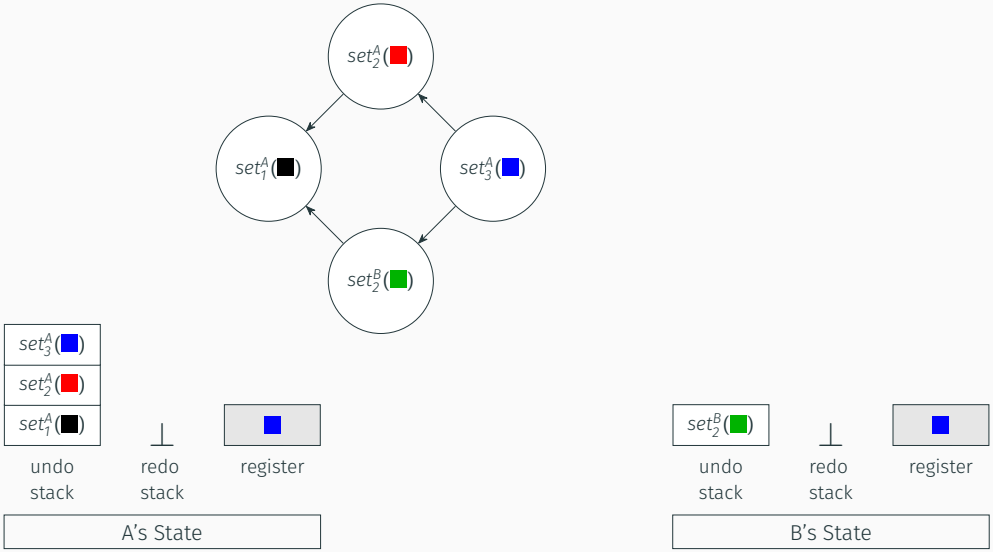

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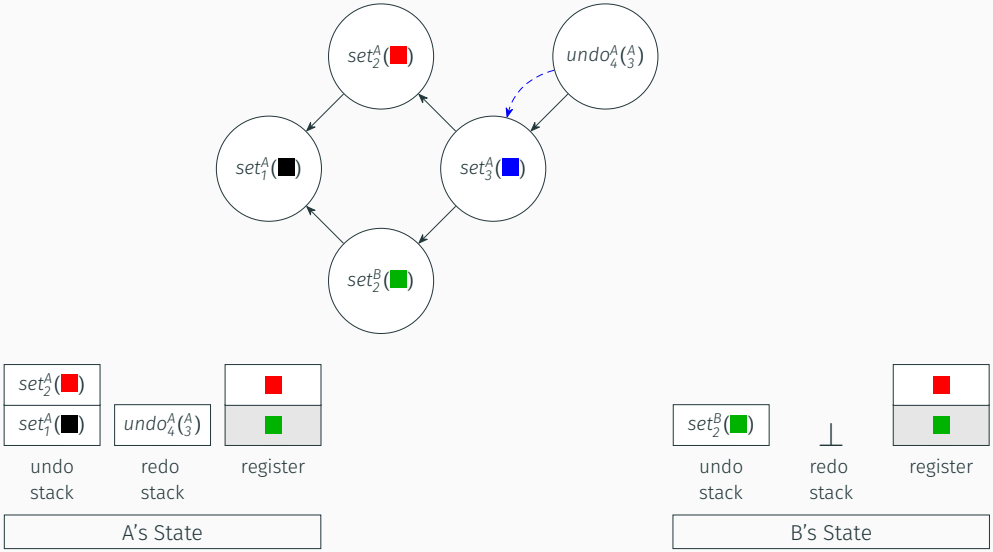

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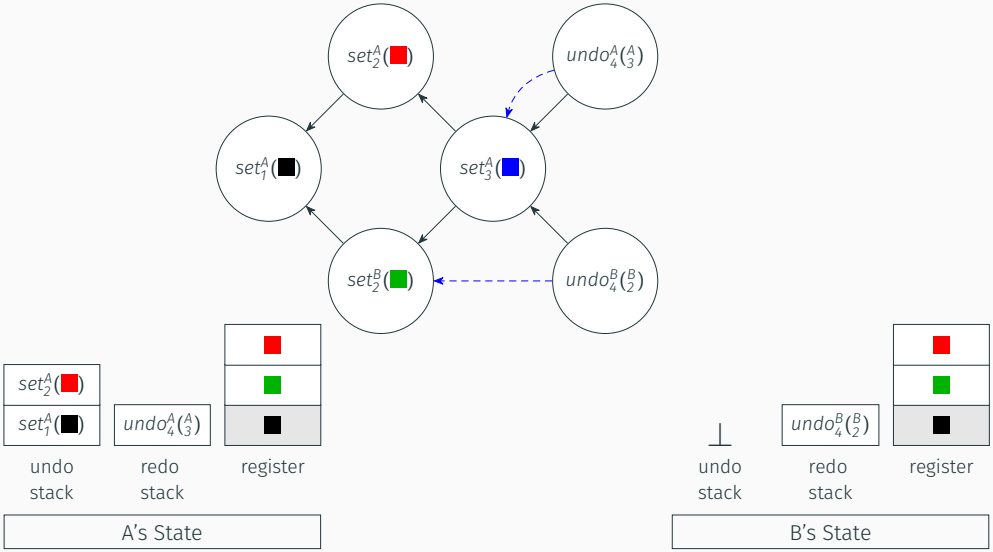

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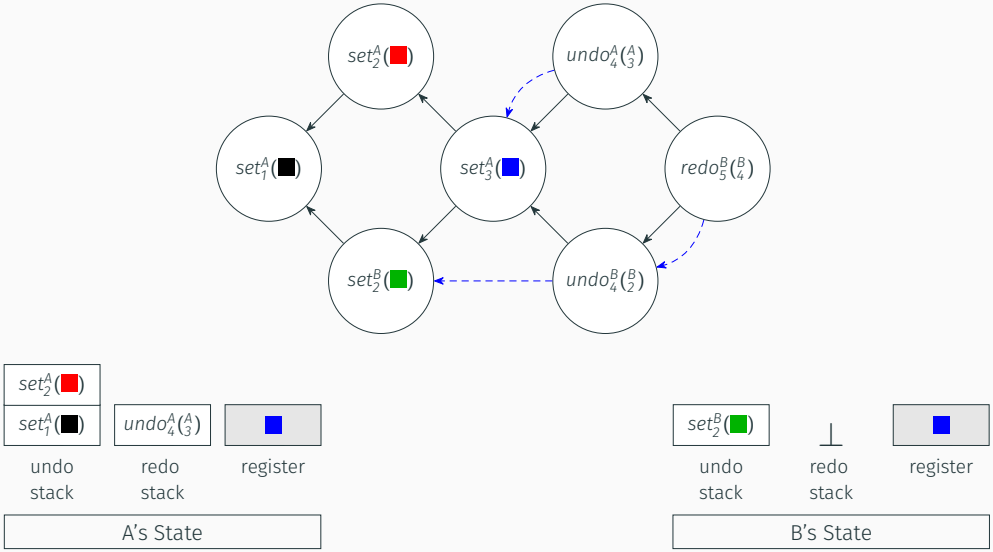

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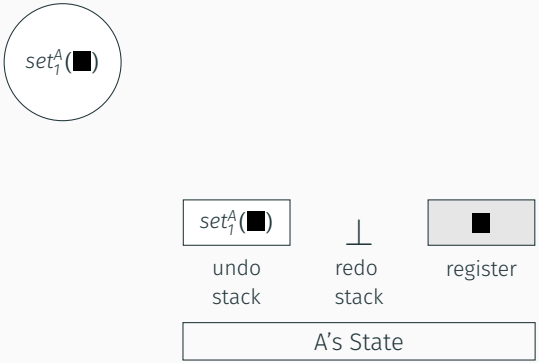
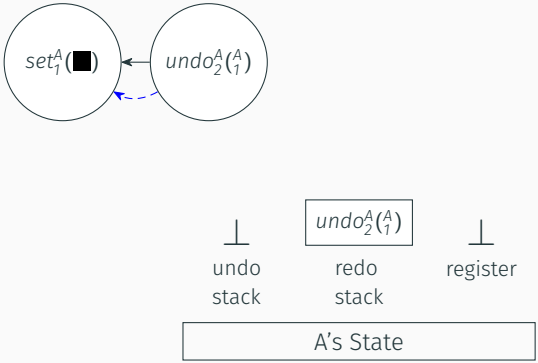


Figure 4: Sequence of alternating undo-redo operations.



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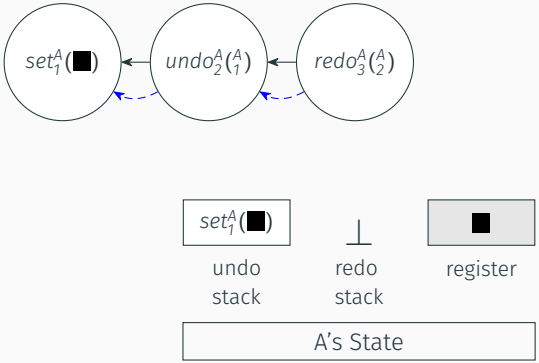
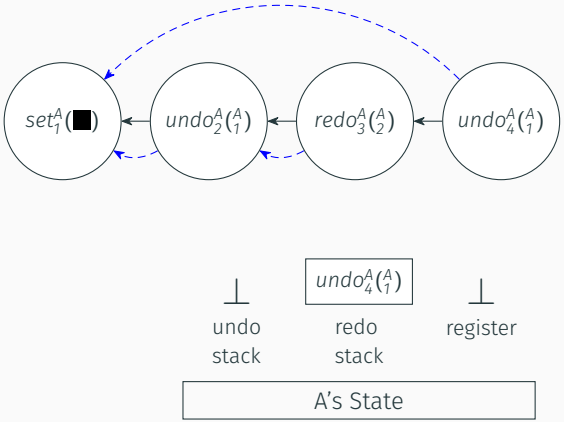


Figure 4: Sequence of alternating undo-redo operations of length 1.



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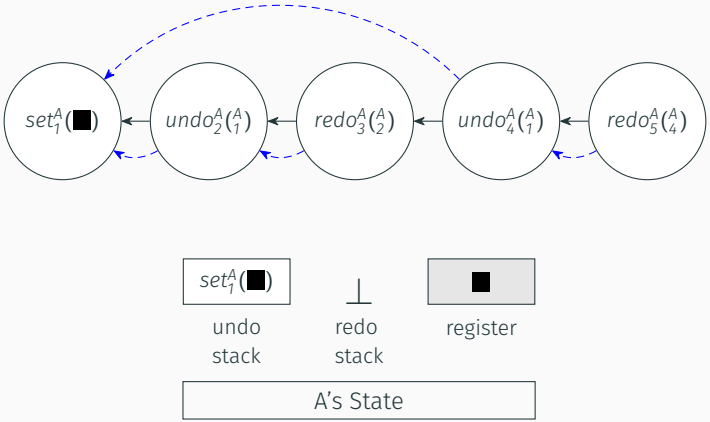

Figure 4: Sequence of alternating undo-redo operations of length 2.

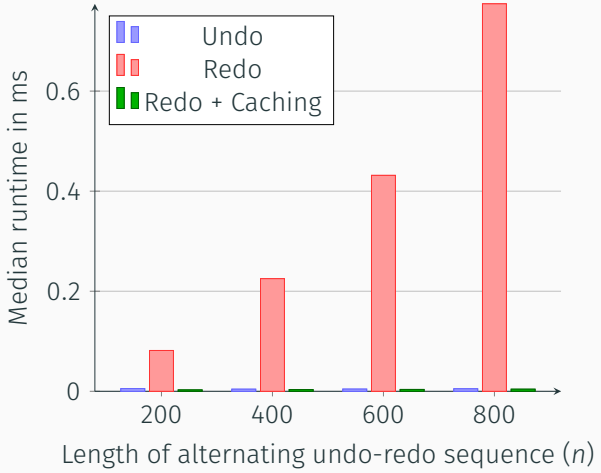

Figure 5: Runtime of resolving the head of a sequence of alternating undo-redo operations of length n.

Outlook

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- flexible approach: could mix different undo behaviors

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```
{
  A: a,
  B: [b1, b2]
}
```

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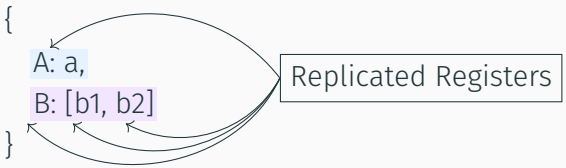

Questions? Feedback?

Reach us at
lstwn@mailbox.org
martin@kleppmann.com