

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***.

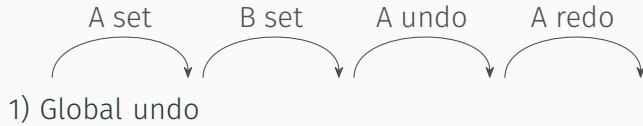


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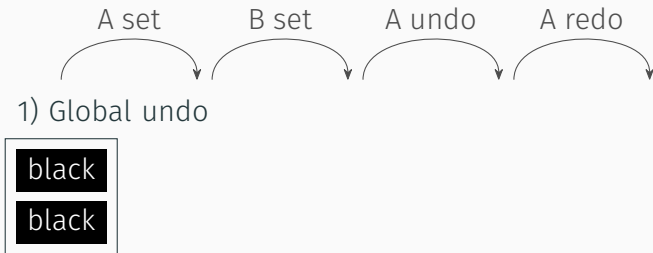


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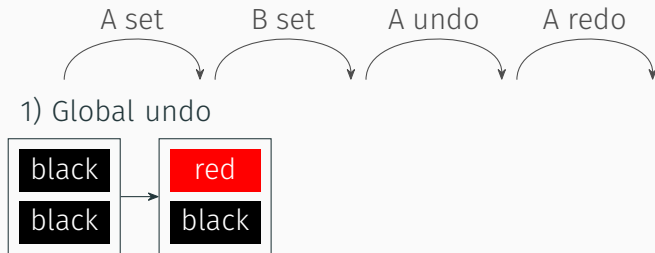


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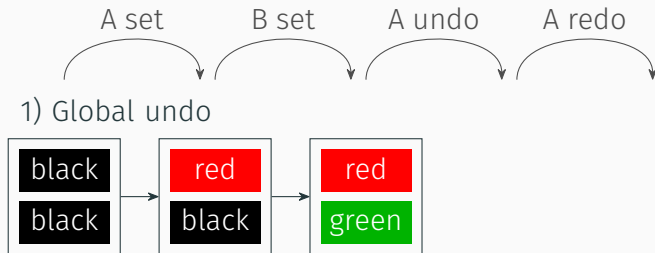


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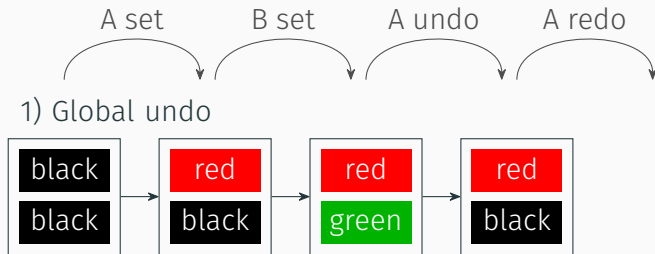


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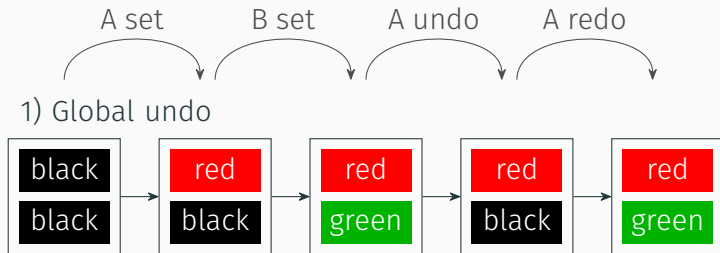


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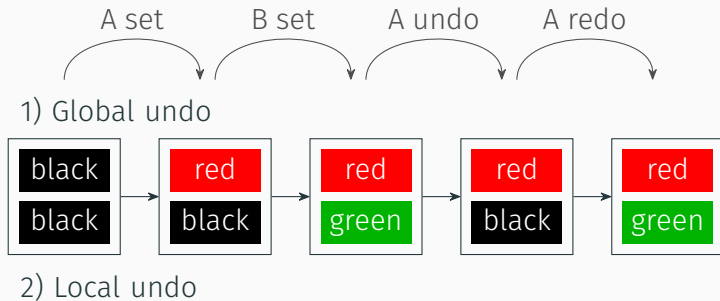


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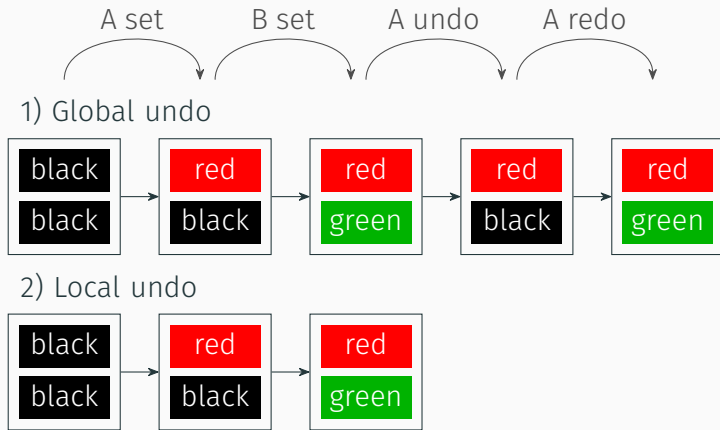


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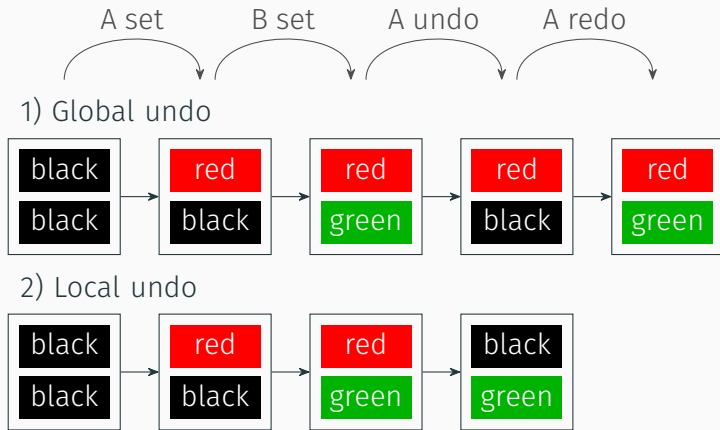


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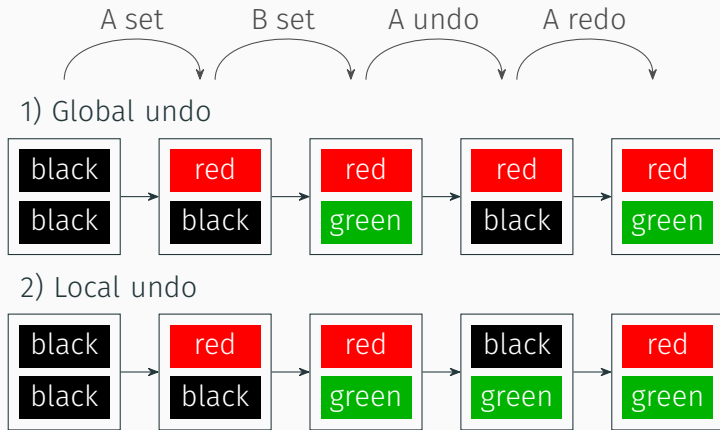


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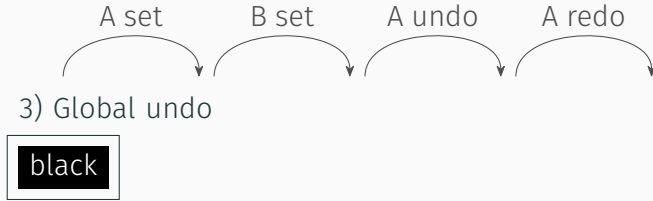


Figure 2: Users *A* and *B* collaboratively edit *one* register.

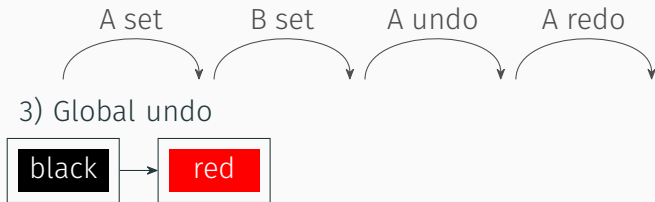


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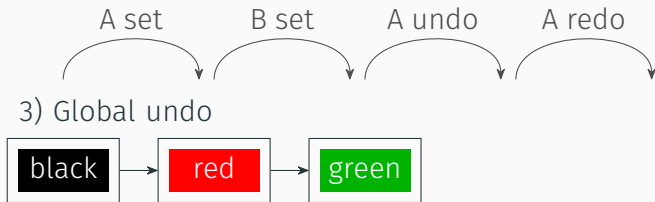


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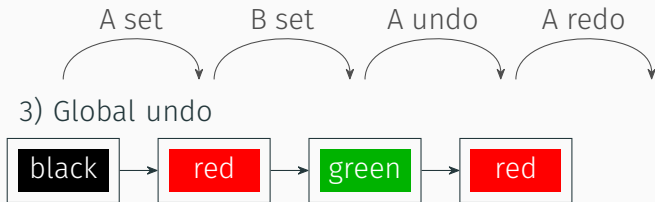


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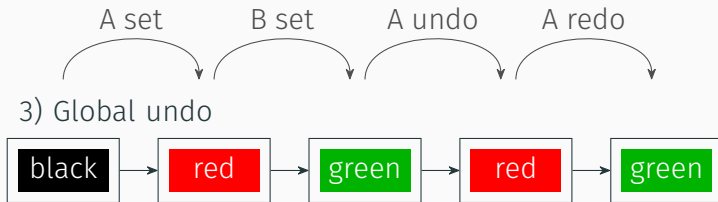


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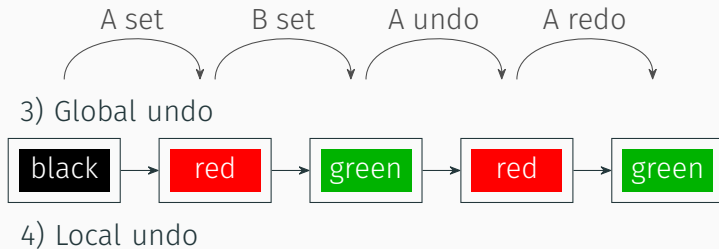


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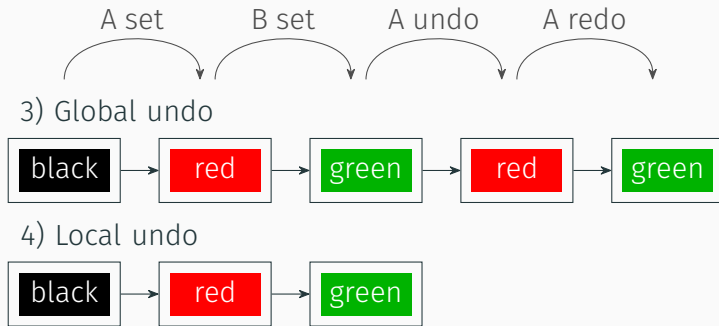


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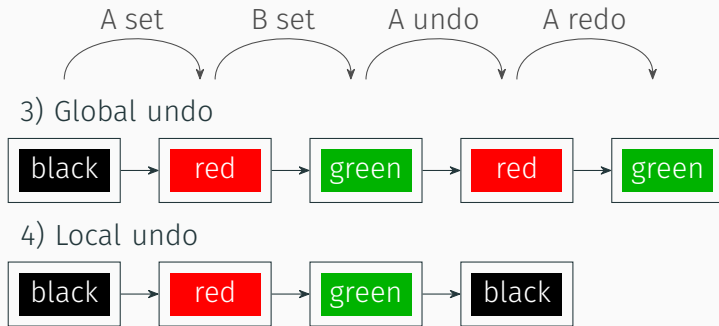


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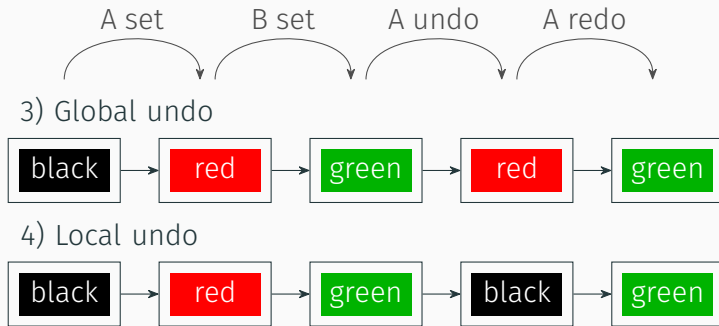


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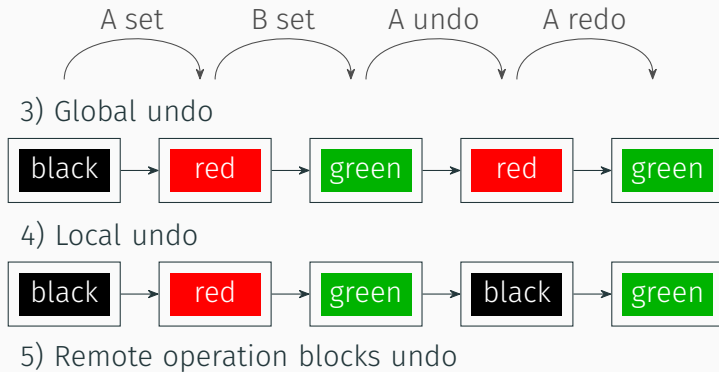


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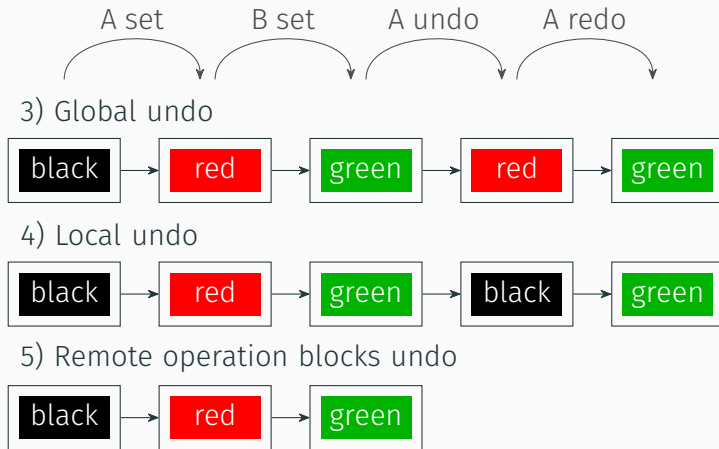


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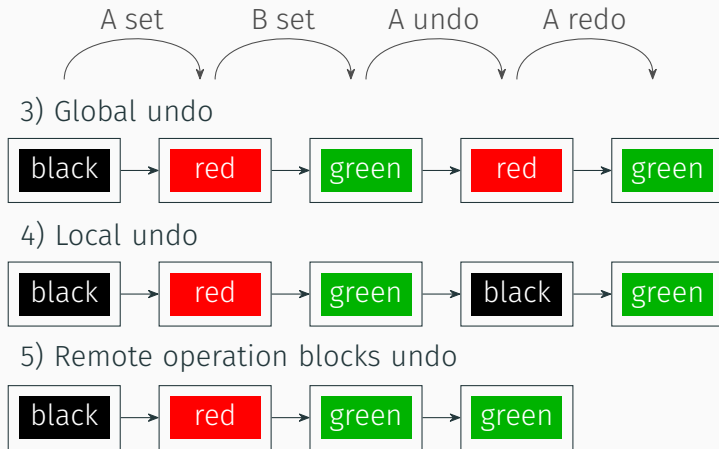


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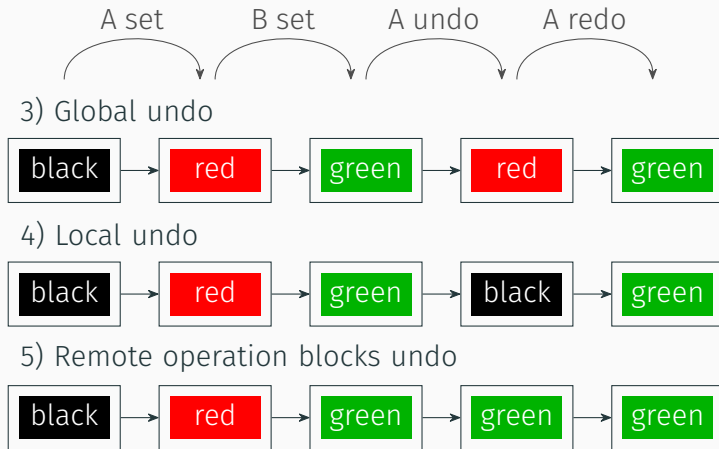


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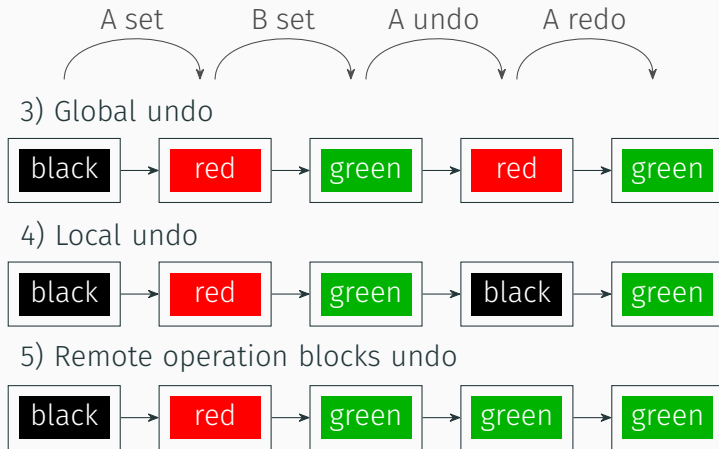


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Part II: An Algorithm for (Local) Undo

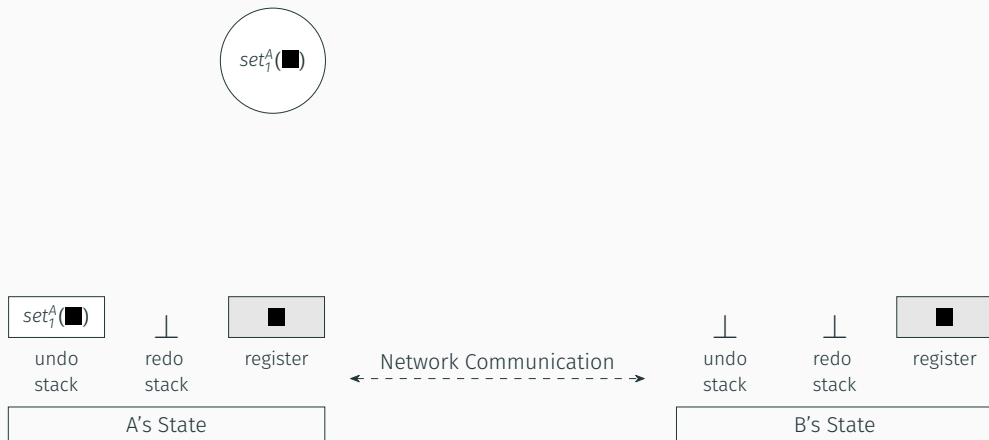


Figure 3: The algorithm applied on a small operation history.

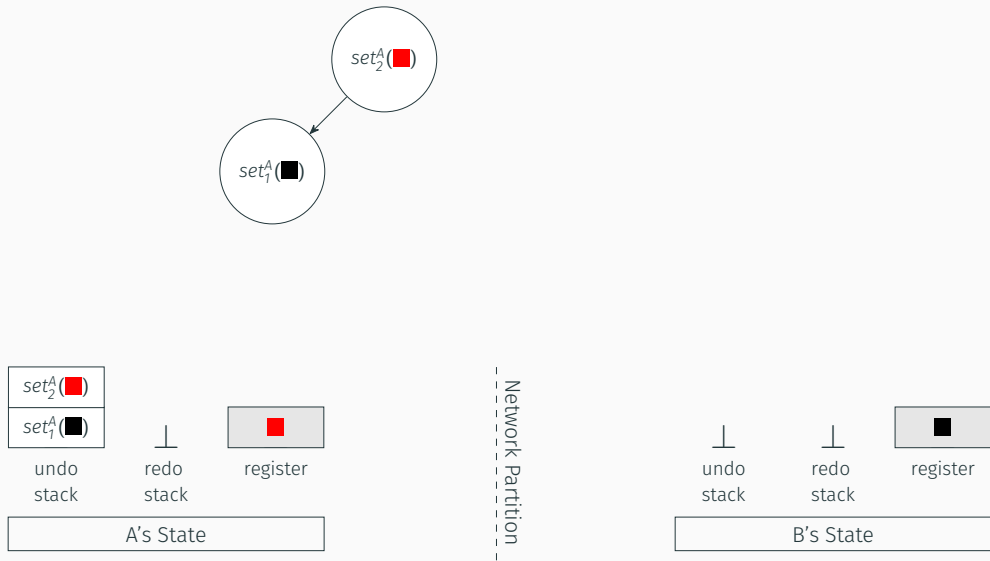


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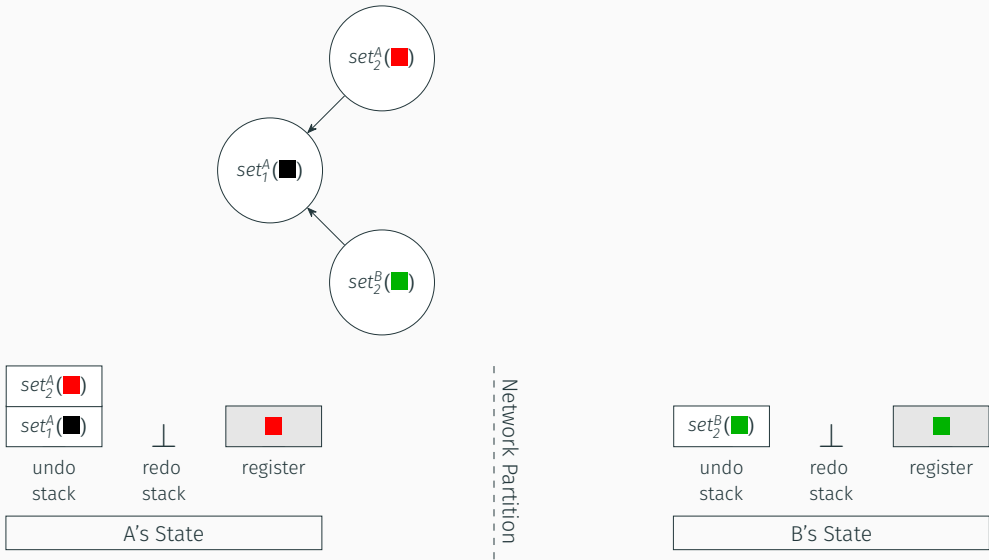


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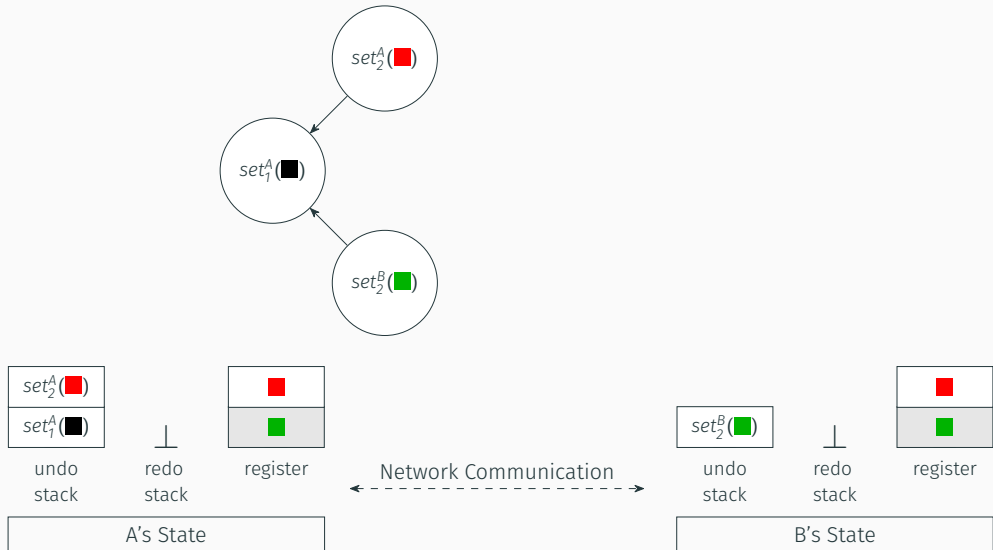


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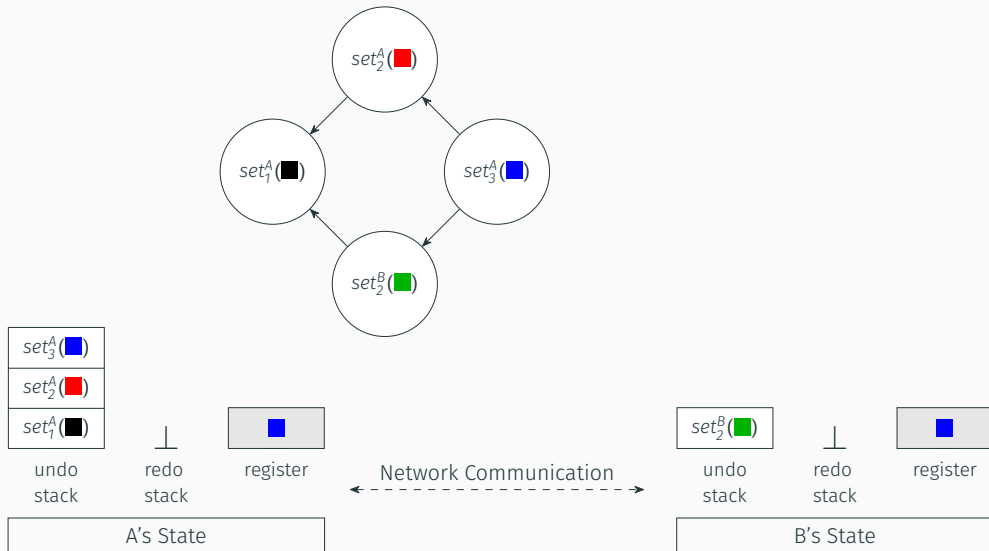


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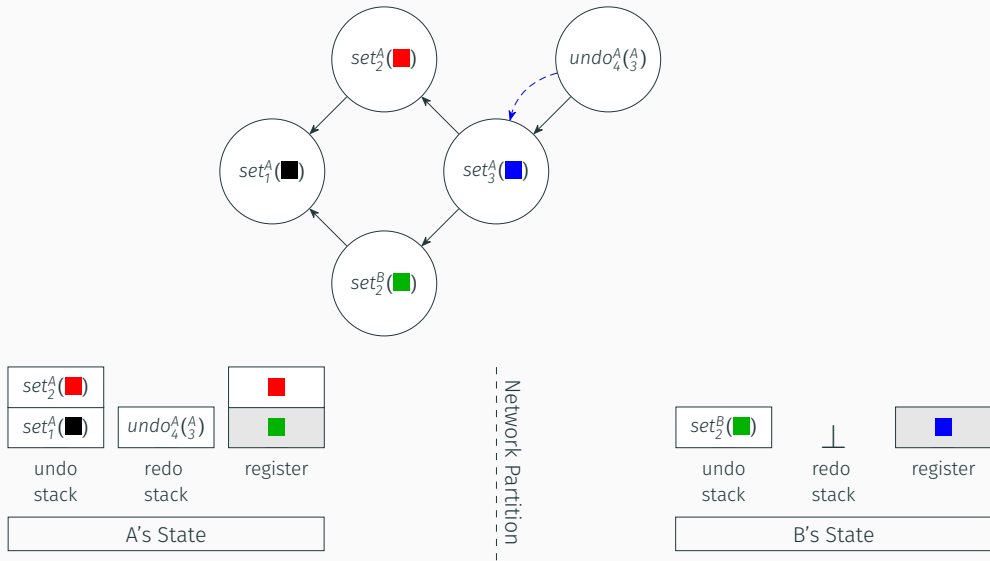


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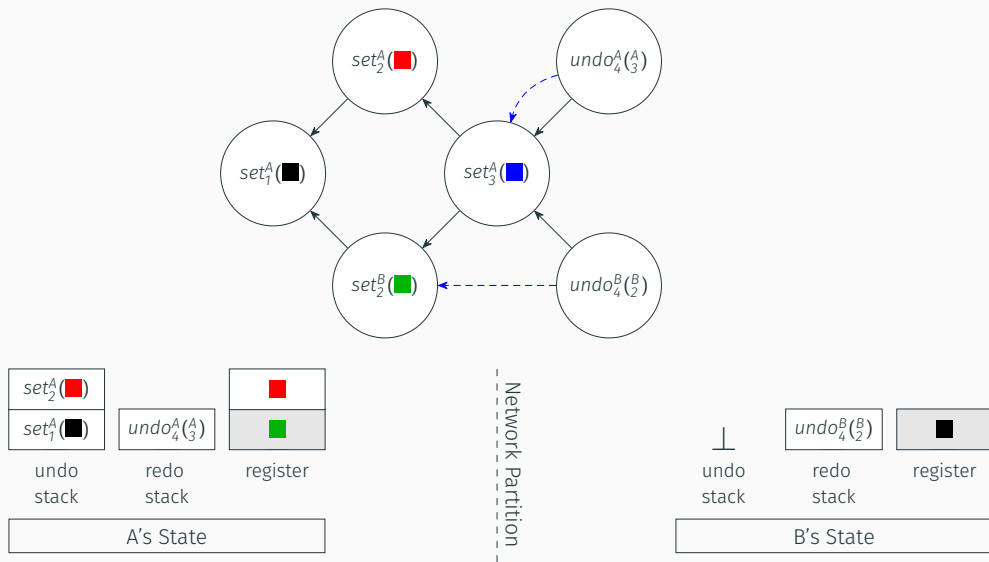


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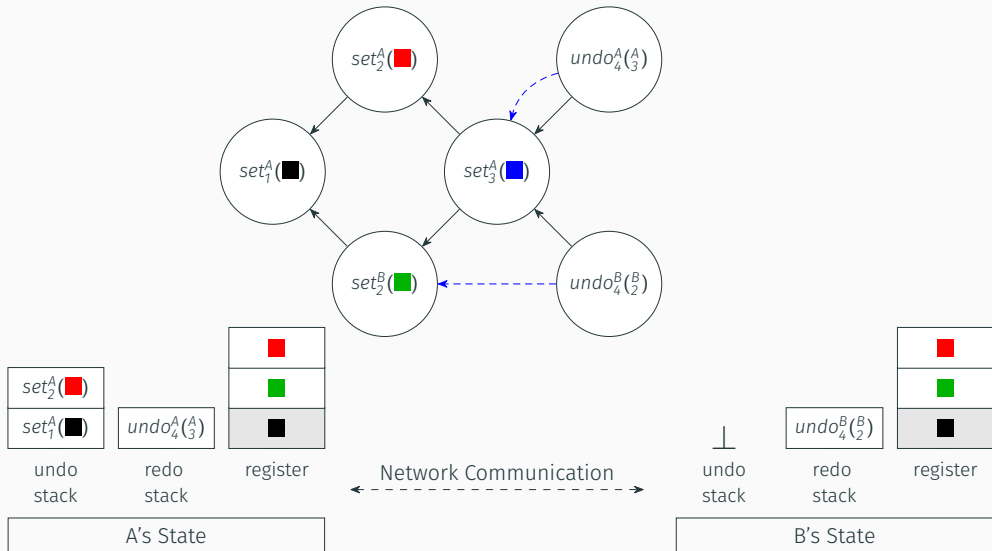


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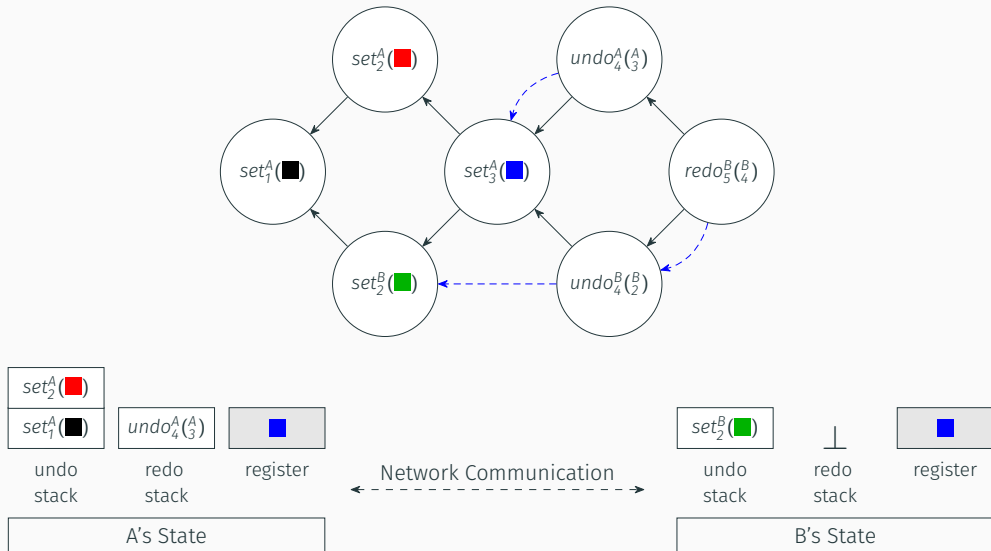


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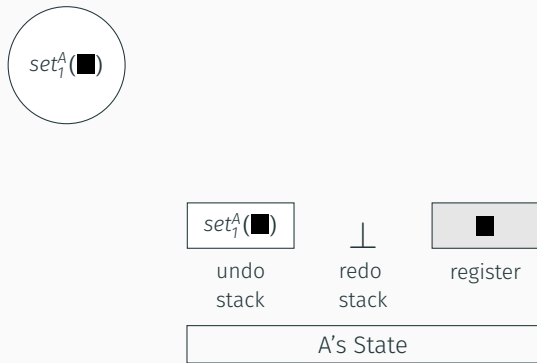


Figure 4: Sequence of alternating undo-redo operations.

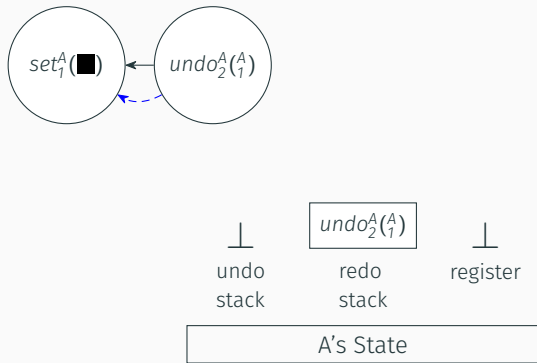


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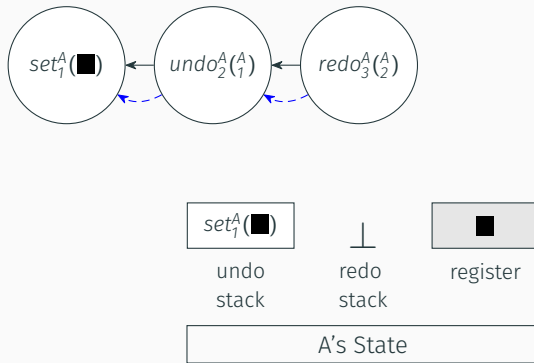


Figure 4: Sequence of alternating undo-redo operations of length 1.

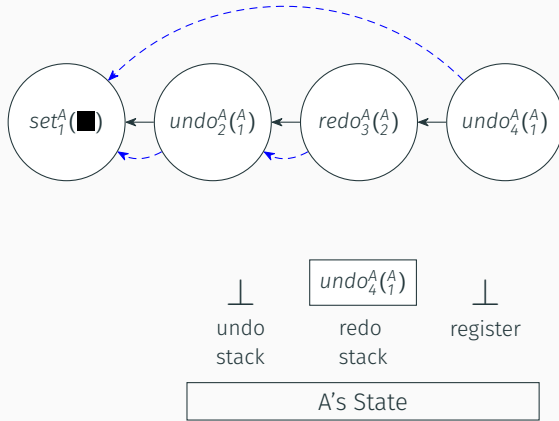


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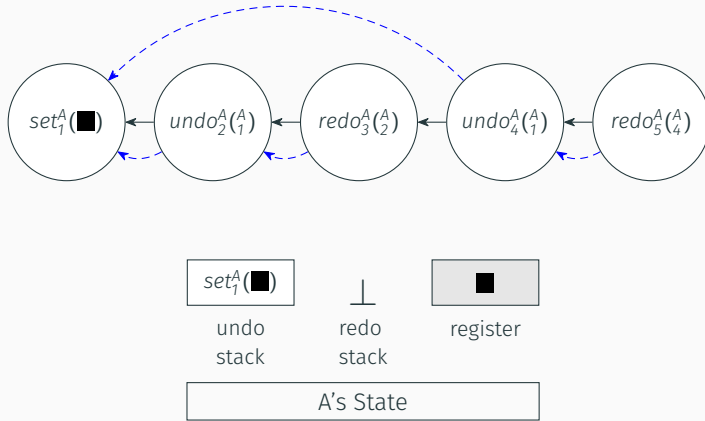


Figure 4: Sequence of alternating undo-redo operations of length 2.

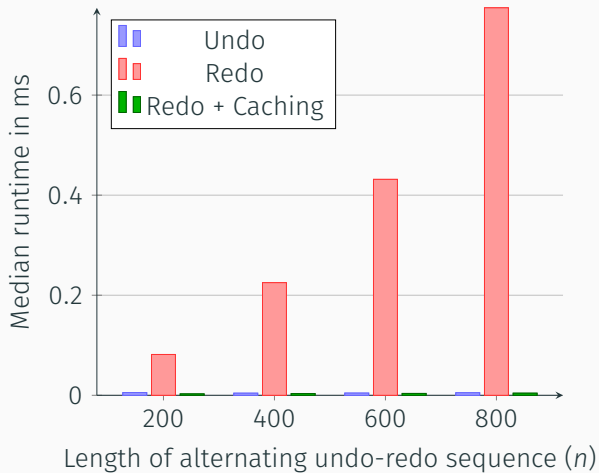


Figure 5: Runtime of resolving the head of a sequence of alternating undo-redo operations of length n .

Outlook

- foundation for undo and redo
- flexible approach: could mix different undo behaviors

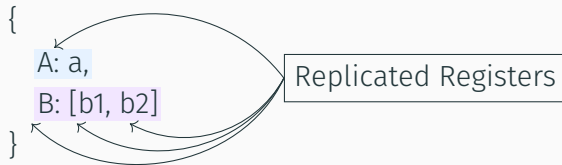
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- open question: how to extend beyond a single register?

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

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Questions? Feedback?

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

