Faculty of Science

Hindsight: A Prototype for a Flexible, Secure and Crash-safe Backup System

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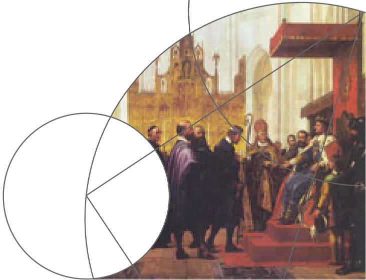
Institute of Computer Science, University of Copenhagen



March 9, 2012

Program

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- Goals:
    - Flexible (front-end, back-end)
    - Efficient (time usage, space usage)
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- Demo!
- Questions?

Background

Who are we, and what is this?

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- Personal computer
- No sharing between systems
- Remote storage, over the Internet
- Hostile environment/user
- (At least) daily backup

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    - Total log data
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    - Search and checkout

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System design

Overview

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- Idempotent key insertion and crash safety;
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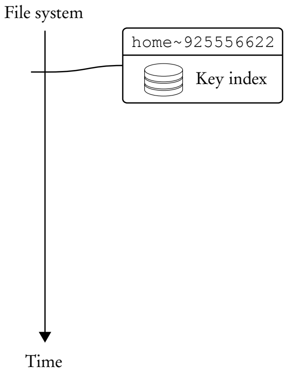
  - $\rightarrow$ QuickCheck'ed. . . of course.

System design

Hindsight system overview...

System design

Overview



System design

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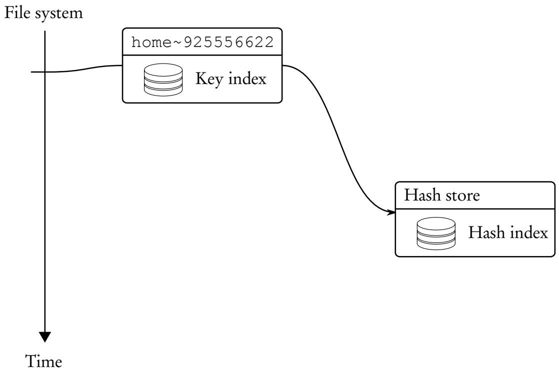

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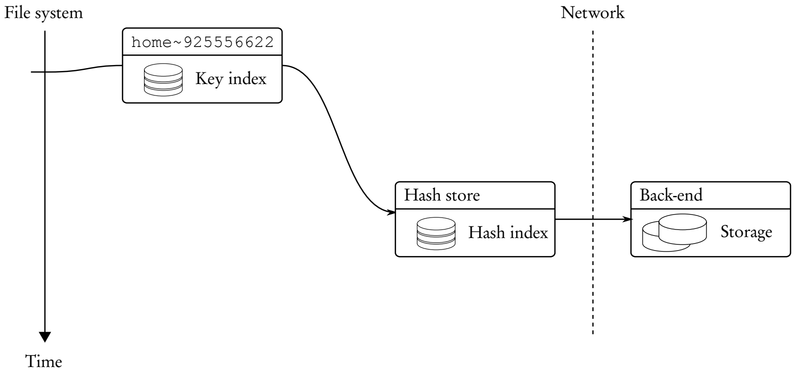

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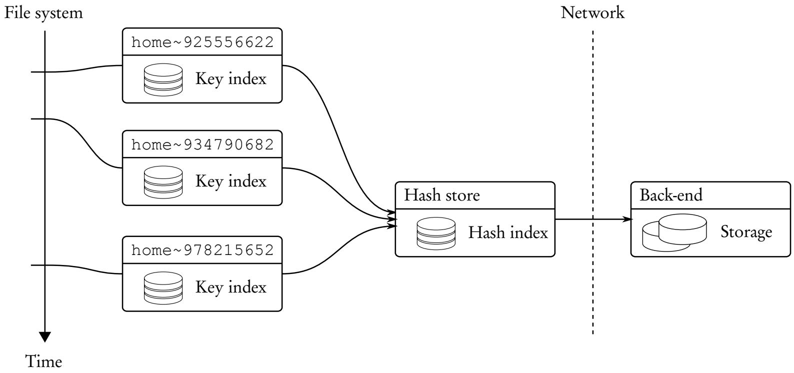

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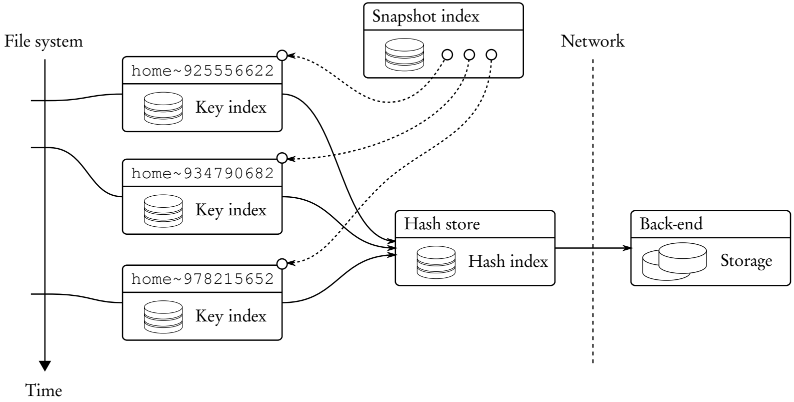
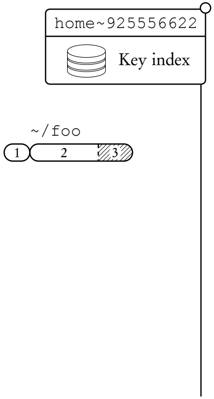


System design

How we store files...

System design

Insertion



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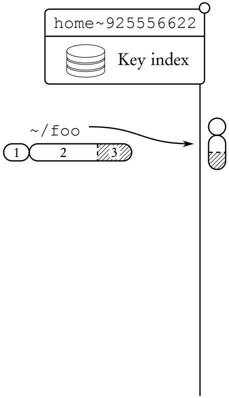

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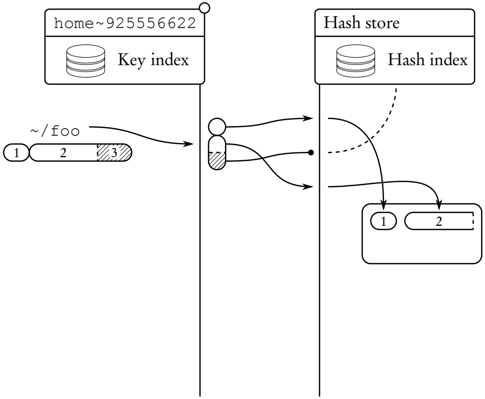

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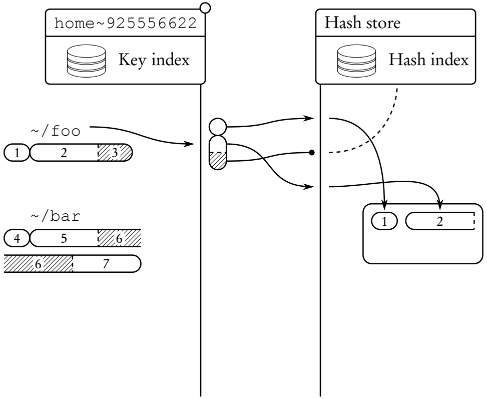

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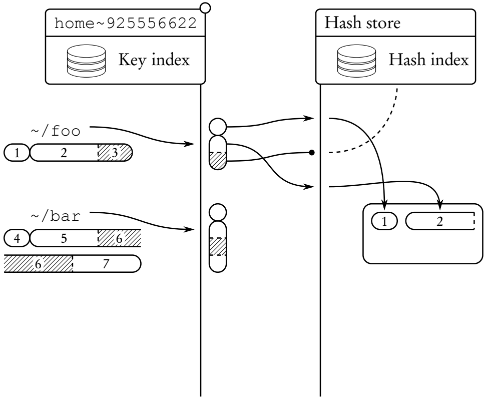

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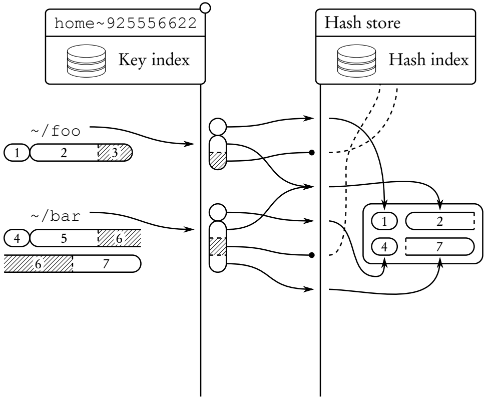

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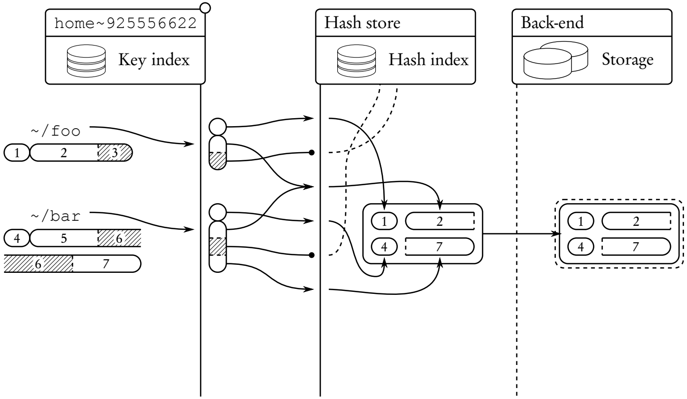

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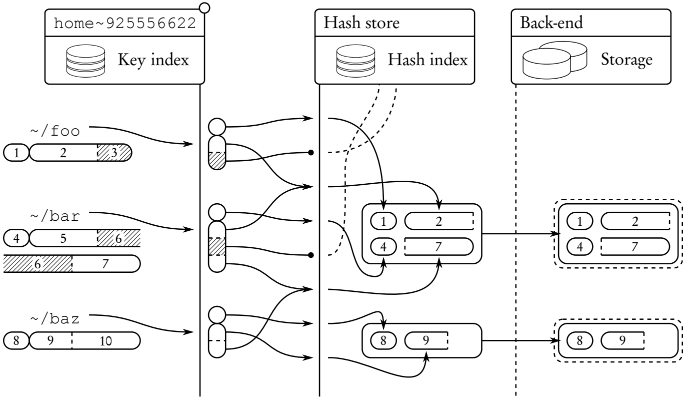

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System design

Log data

- Now we just have the log data to take care of.
  - → Much smaller than the data we backed up;
  - → Multiple files with redundant data across snapshots;
- Example: 10,278 files, 14 GB
  - → key index: 64 files, 1.2 MB
  - → hash index: 157 files, 1.3 MB

System design

I wish we had some system for backing up files. . .

System design

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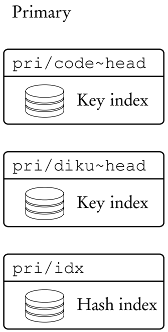

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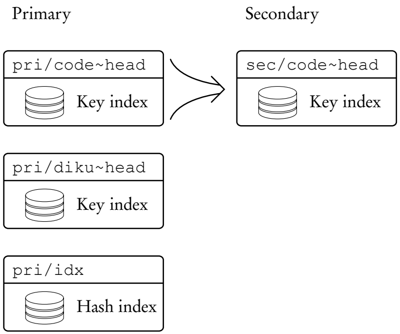

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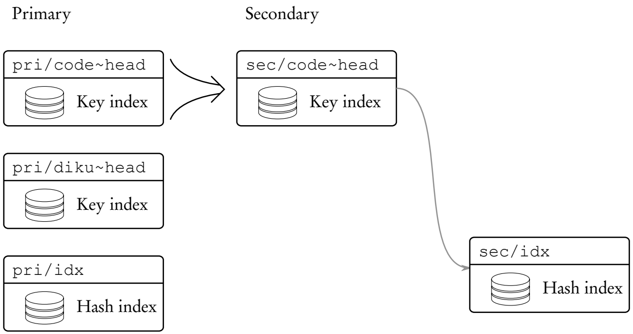

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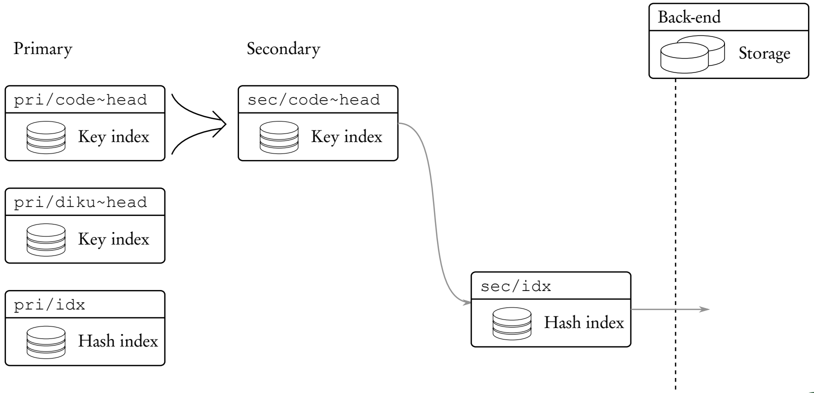

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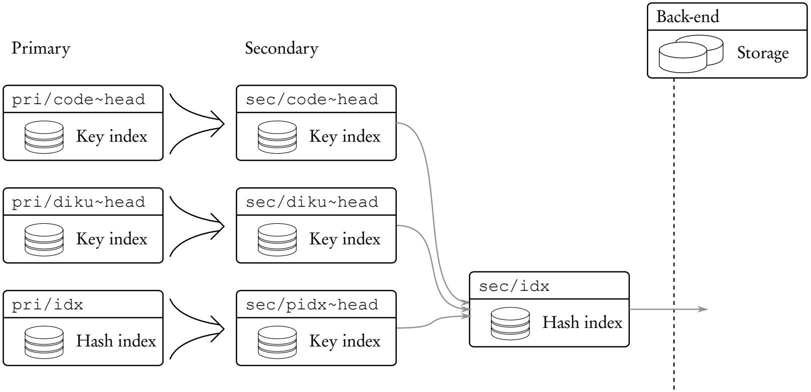

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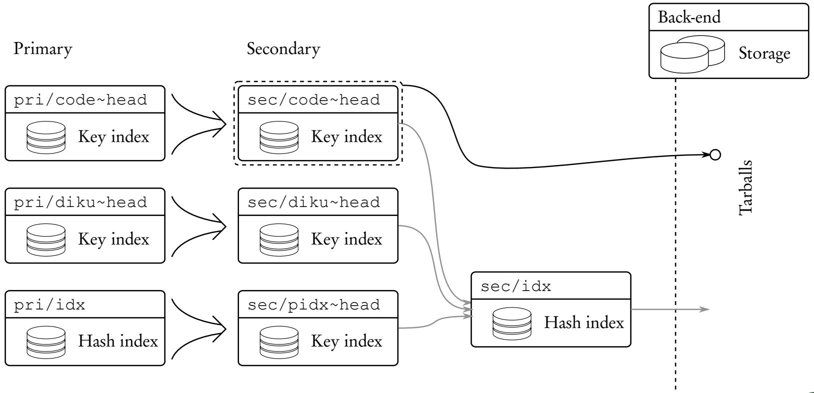

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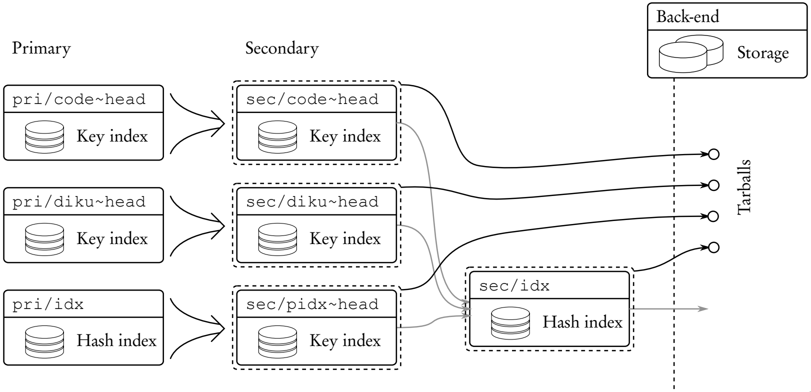

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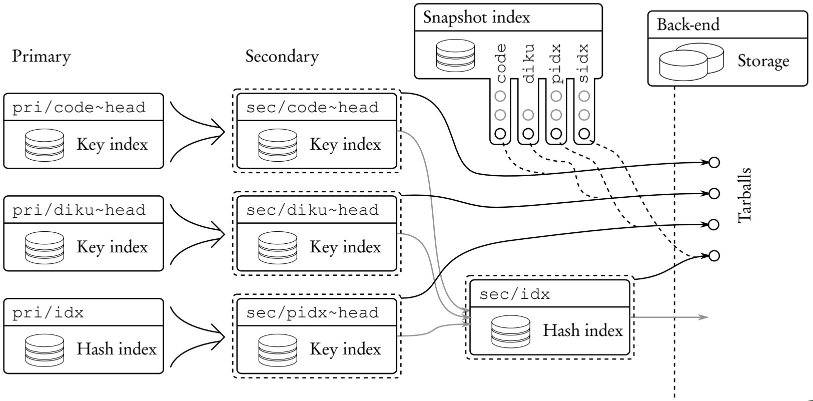

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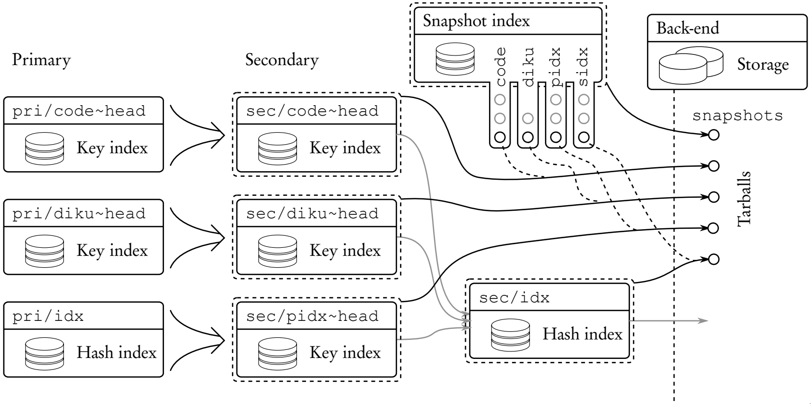

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jos@laptux ~ > time hindsight listdir diku:speciale | wc -l
10
real    0m19.56s
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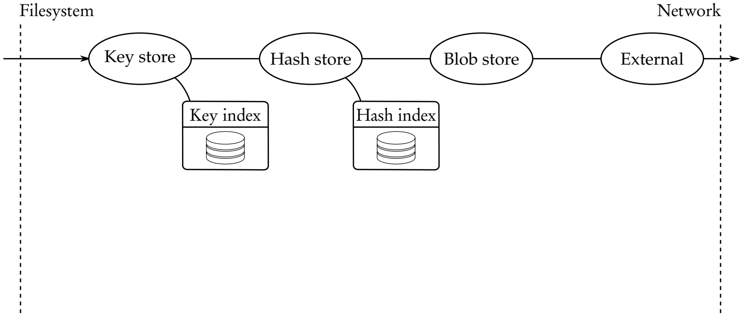
  - → Keep track of all references, not just the count.
  - → Idempotent operations (insert / remove).
  - → Tests say the space overhead is acceptable.

System design

Implementation:
Haskell alá Erlang: Processes and message passing.

System design



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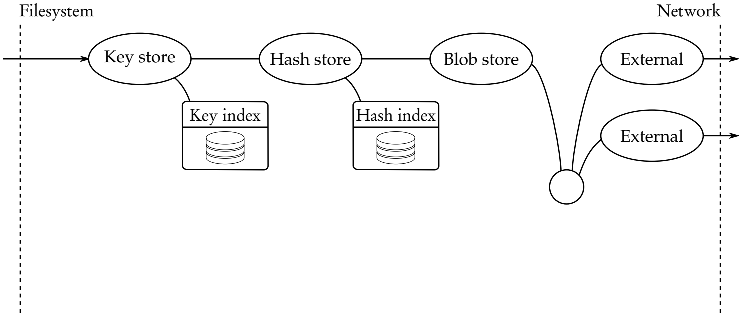

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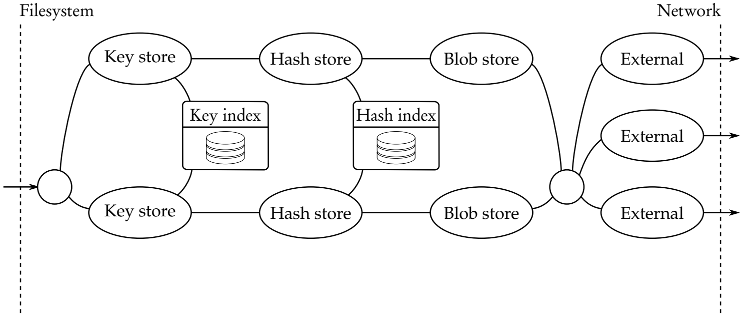

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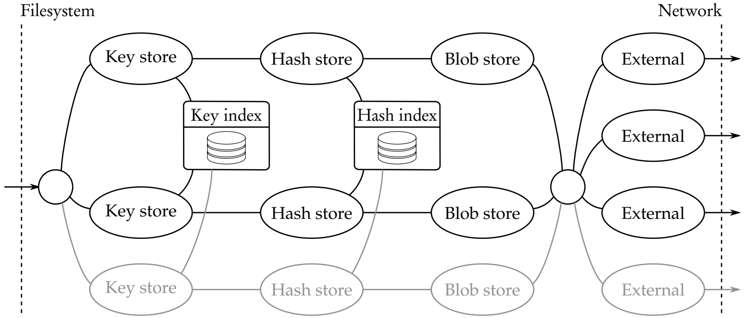

Demo!

Initiate kill-test now!

Questions?