

adaptTo()

APACHE SLING & FRIENDS TECH MEETUP
BERLIN, 25-27 SEPTEMBER 2017

TarMK: Facts and Figures
Michael Dürig / Valentin Olteanu, Adobe

Sloooooow

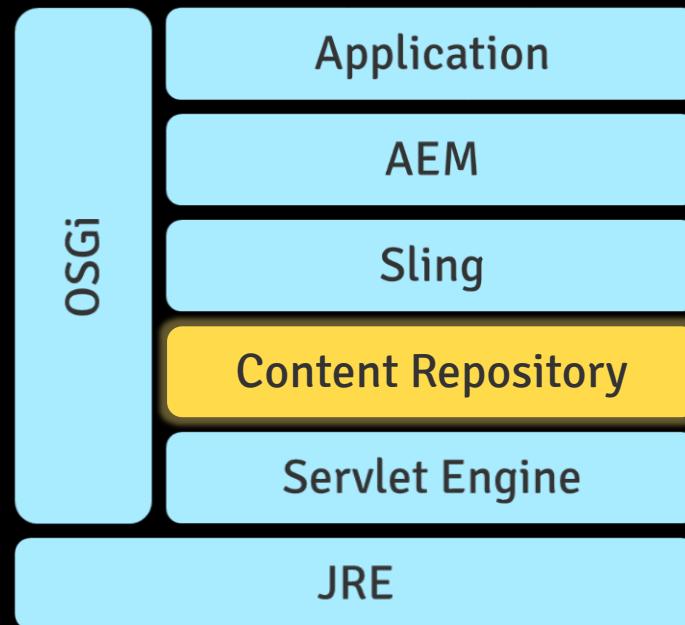


<https://www.flickr.com/photos/ionelpop/6057199614/sizes/o/>

Agenda

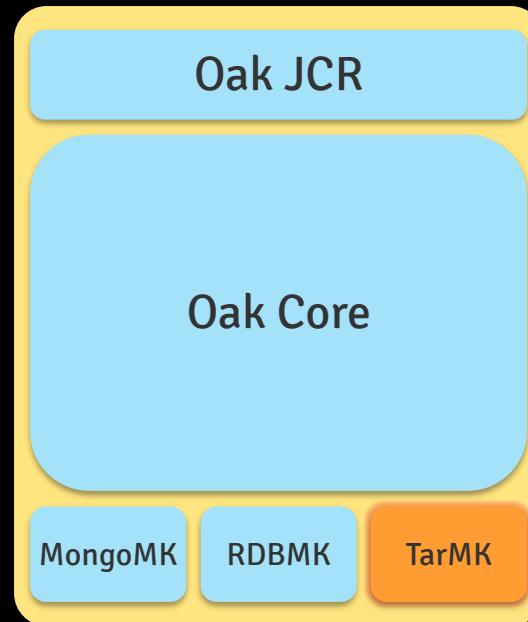
- AEM, Oak and the TarMK
- System Resources
- Problems and Symptoms
- Outlook

Introducing the TarMK



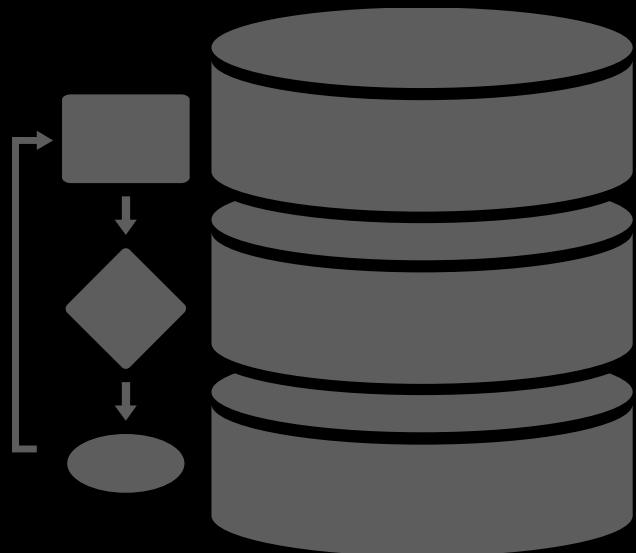


Introducing the TarMK



Features of the TarMK

- Embedded Database
 - Hierarchical
 - Fast / Small
 - Vertical scalability
 - MVCC / append only





Records and Segments





Records and Segments





Records and Segments





Records and Segments





Records and Segments





Records and Segments



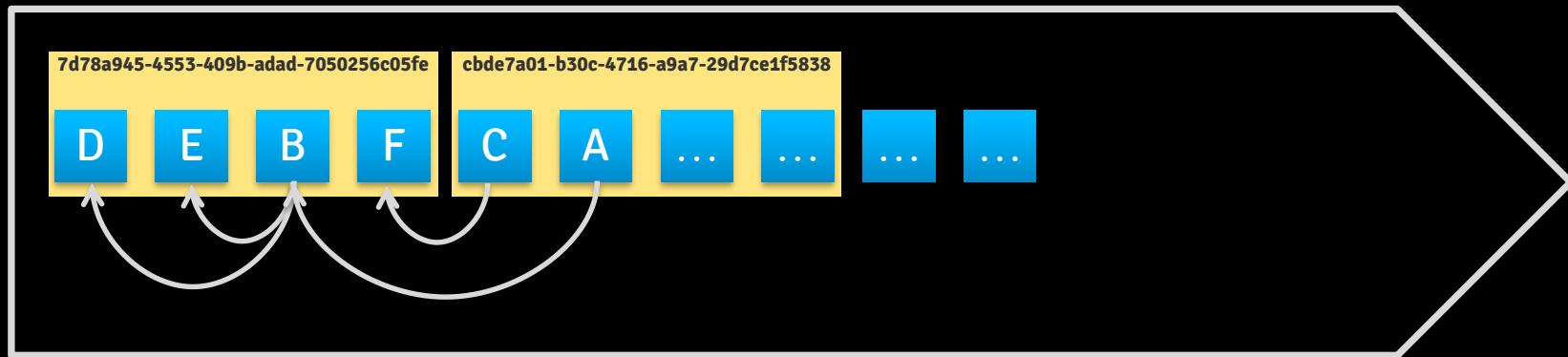


Records and Segments





Records and Segments



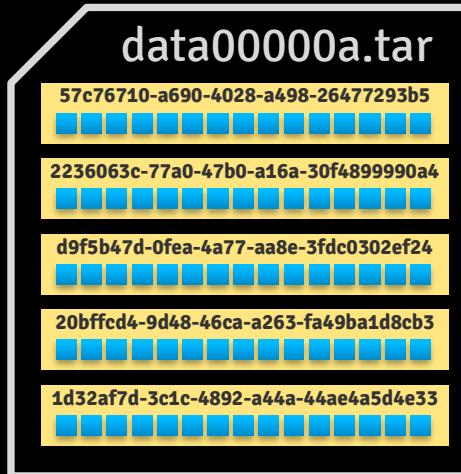


Segments and Tar Files

data00000a.tar

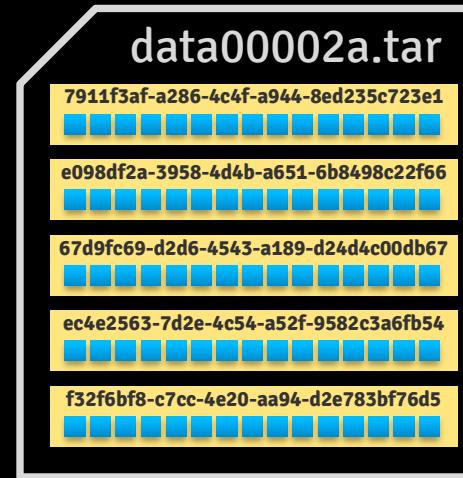
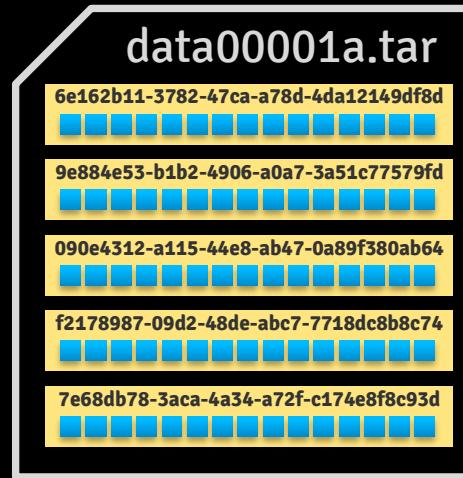
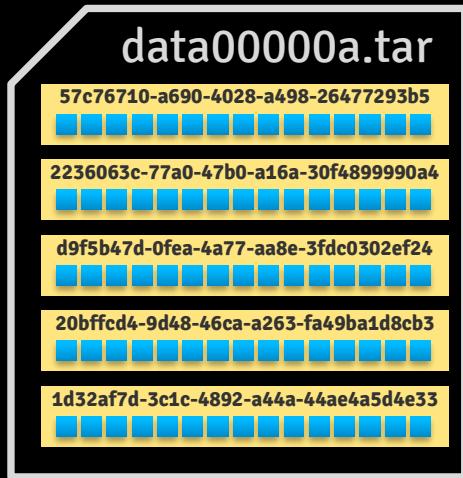


Segments and Tar Files





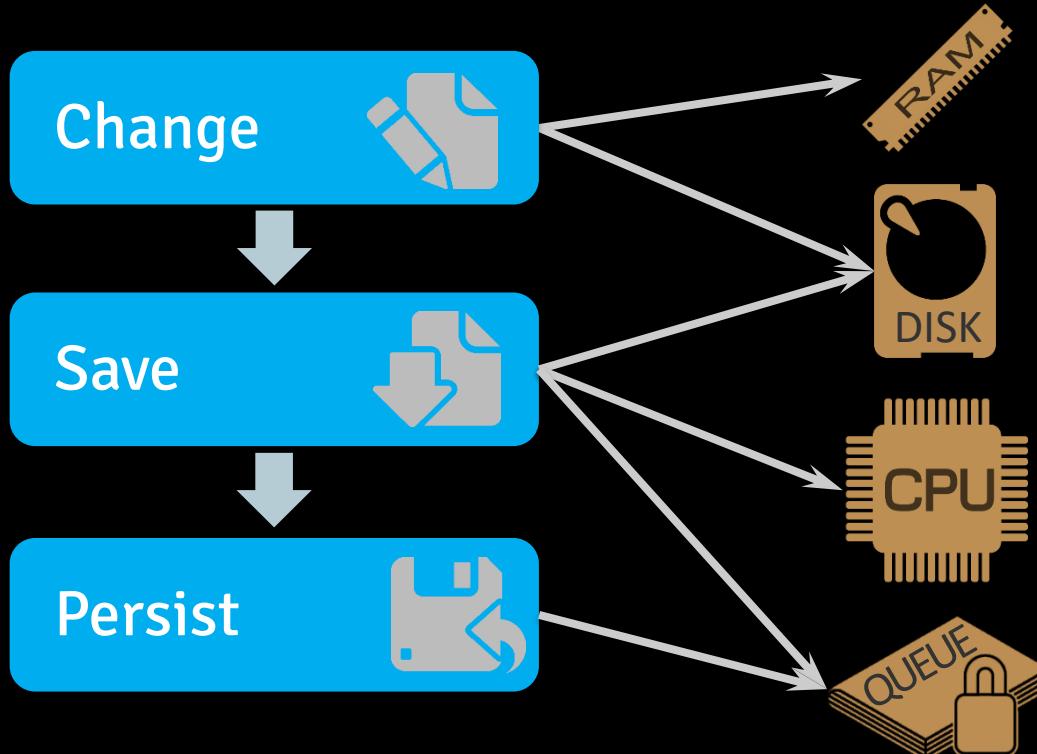
Segments and Tar Files





System Resources

Write Operation



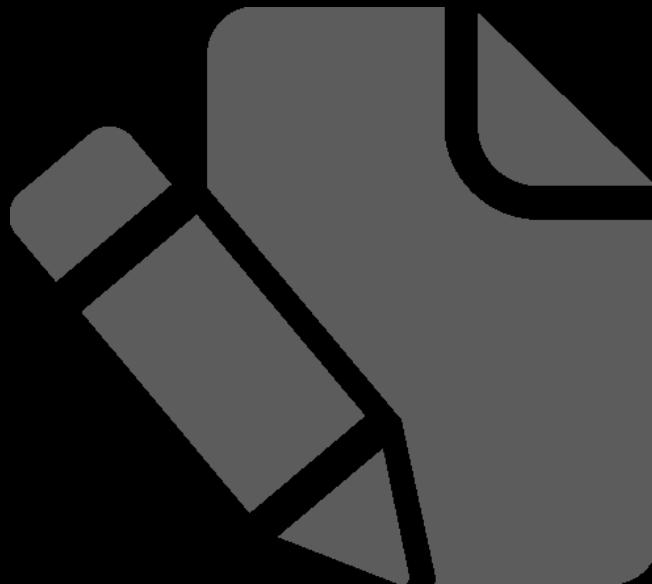
Change

- Transient on heap
 - Heap fragmentation
 - JVM garbage collection
- Overflowed to disk
 - Write ahead
 - Segment fragmentation



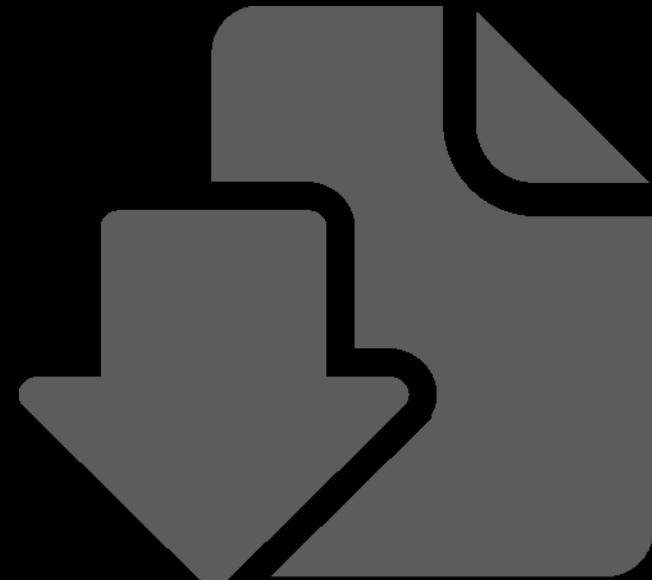
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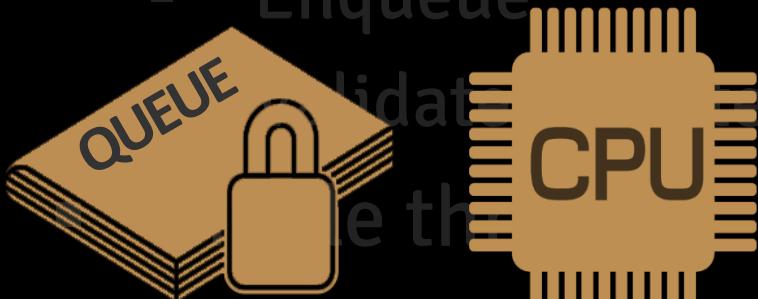
Save

- Process Changes
 - Enqueue
 - Validate, update
- Single thread
 - Process each change, $O(n)$
 - Discarded sessions cause segment fragmentation



- Process Changes

- Enqueue

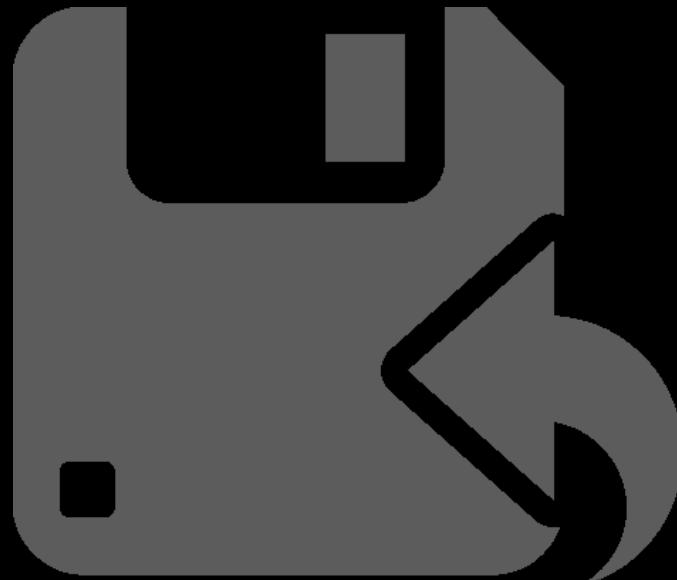


- Process each change, $O(n)$
 - Discarded sessions cause segment fragmentation



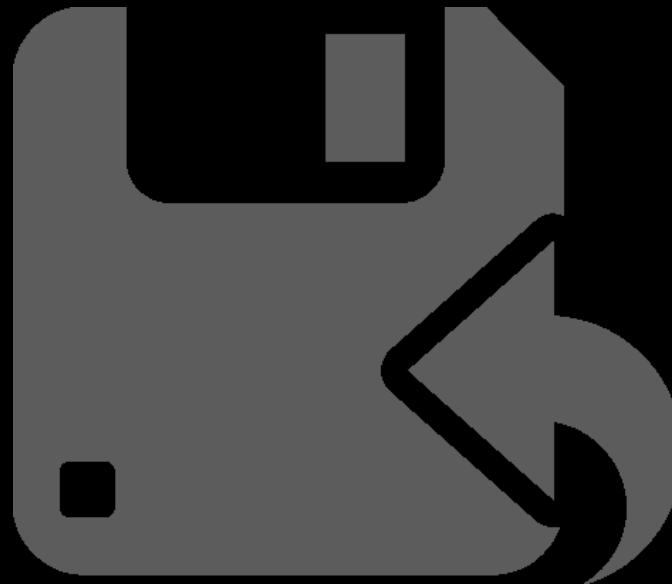
Persist

- Persist
 - Update journal
 - Dequeue
- Fan-out
 - Asynchronous indexes
 - Workflows, Assets, Rendition
 - Replication

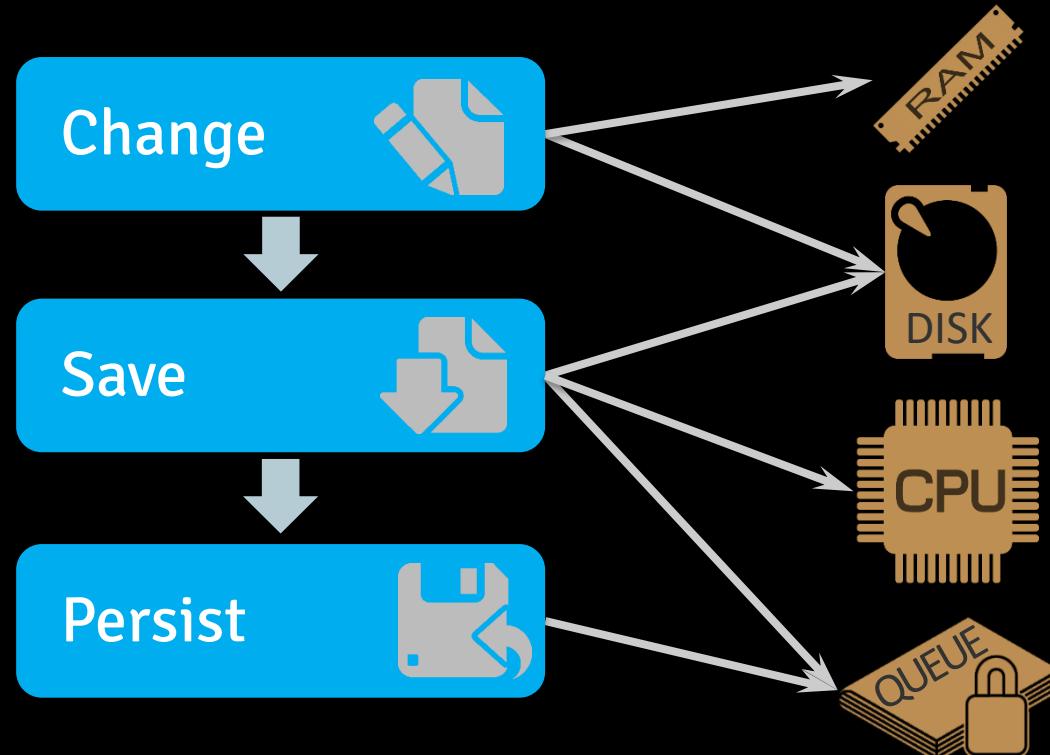


Persist

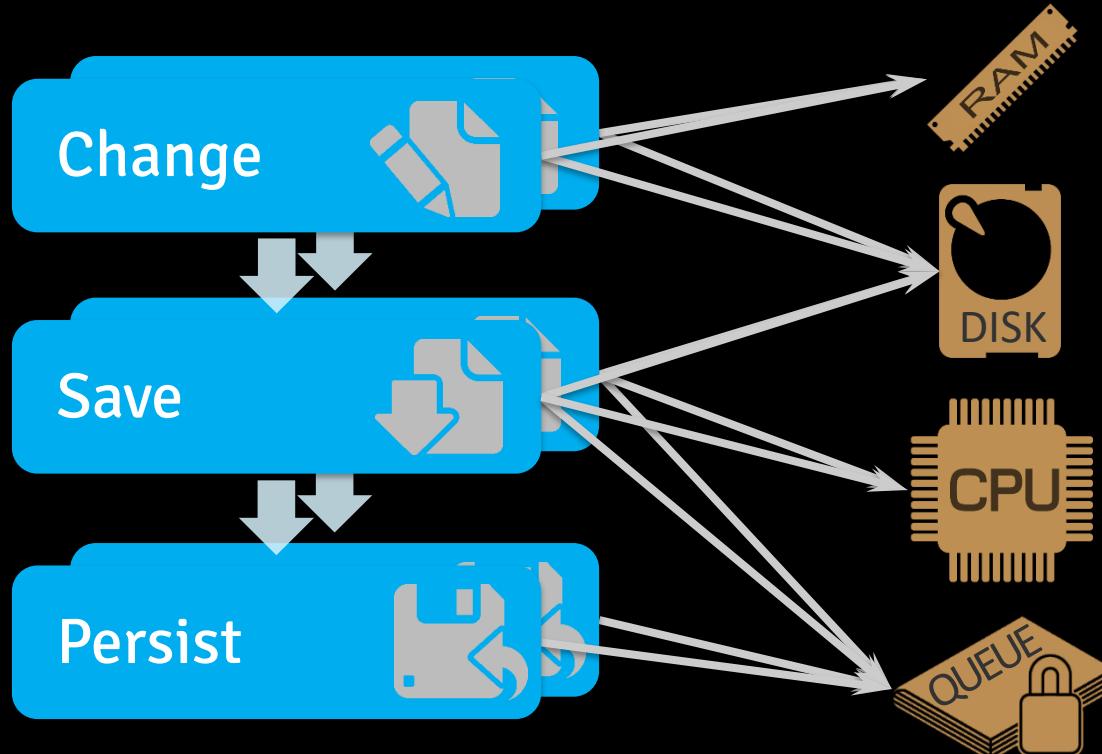
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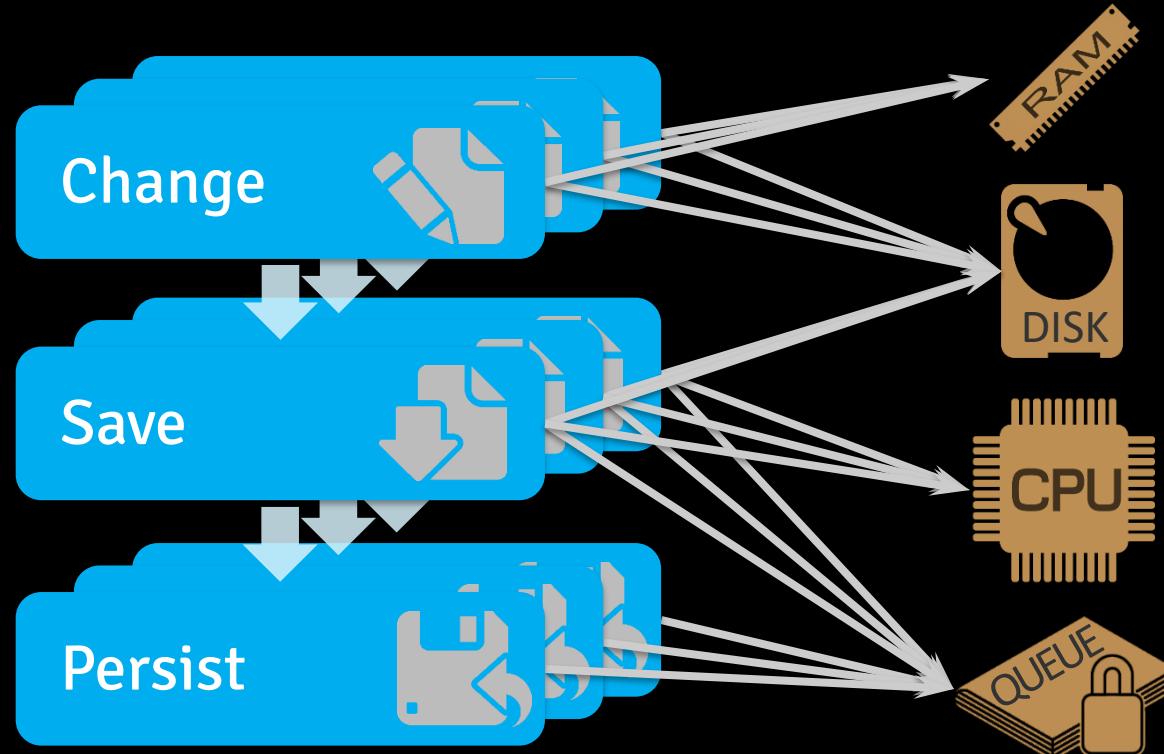
Concurrent Changes



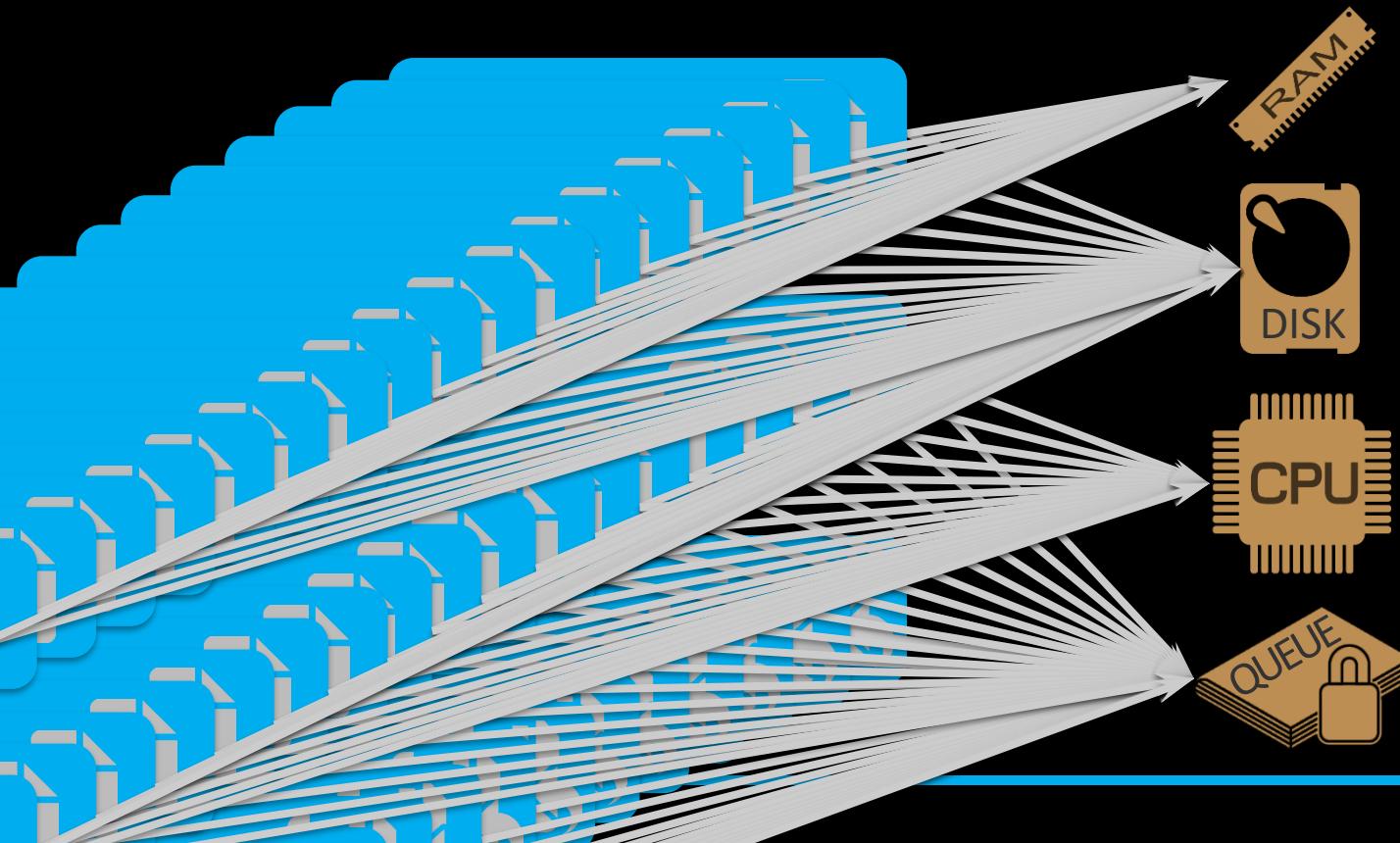
Concurrent Changes



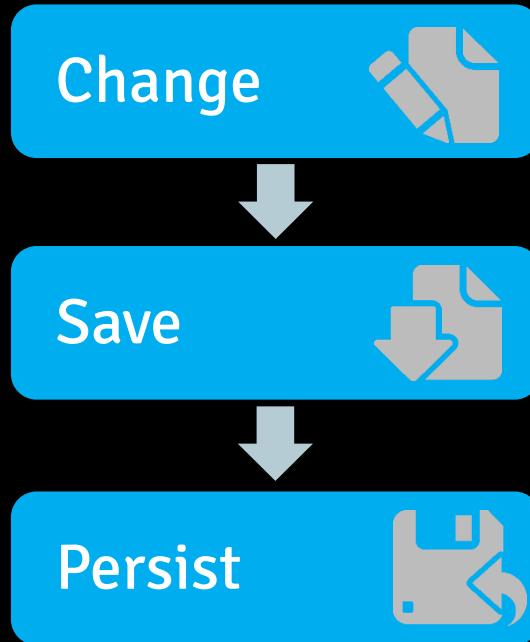
Concurrent Changes



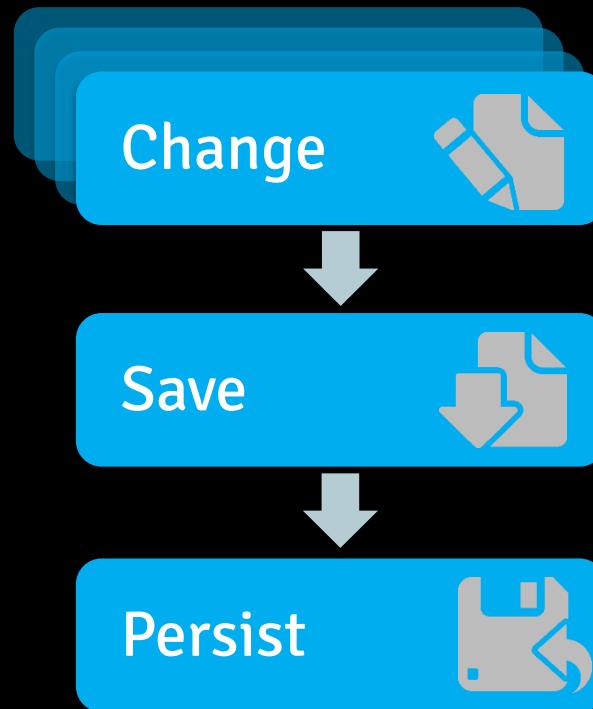
Concurrent Changes



Concurrent Changes

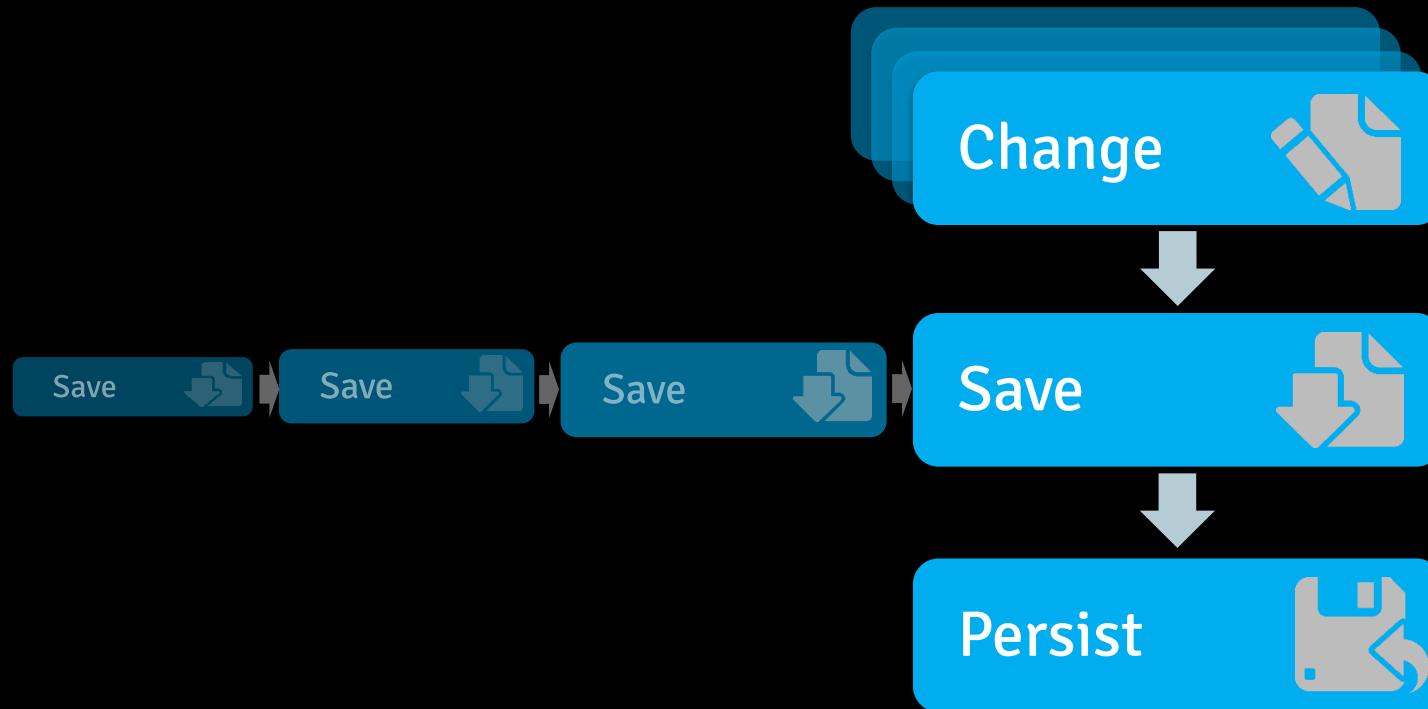


Concurrent Changes

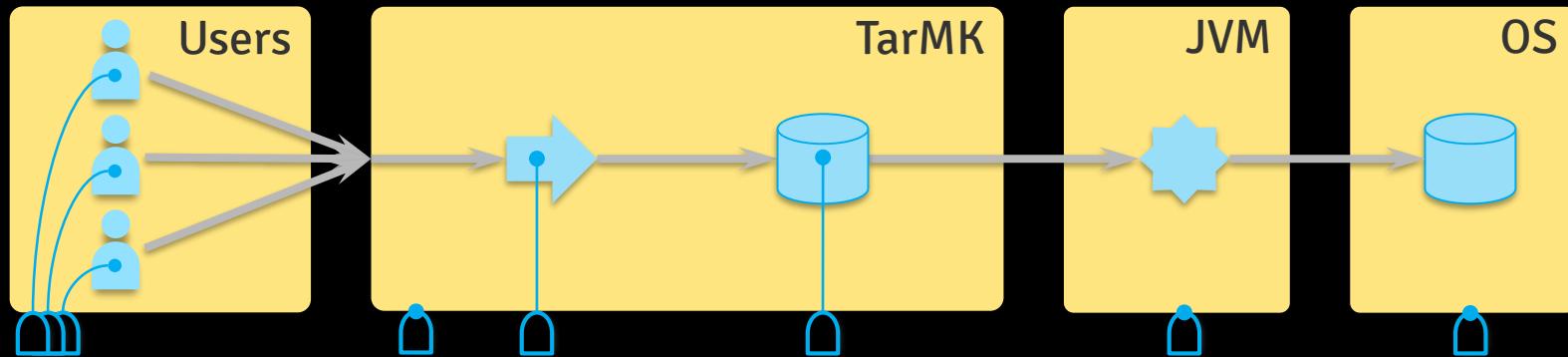




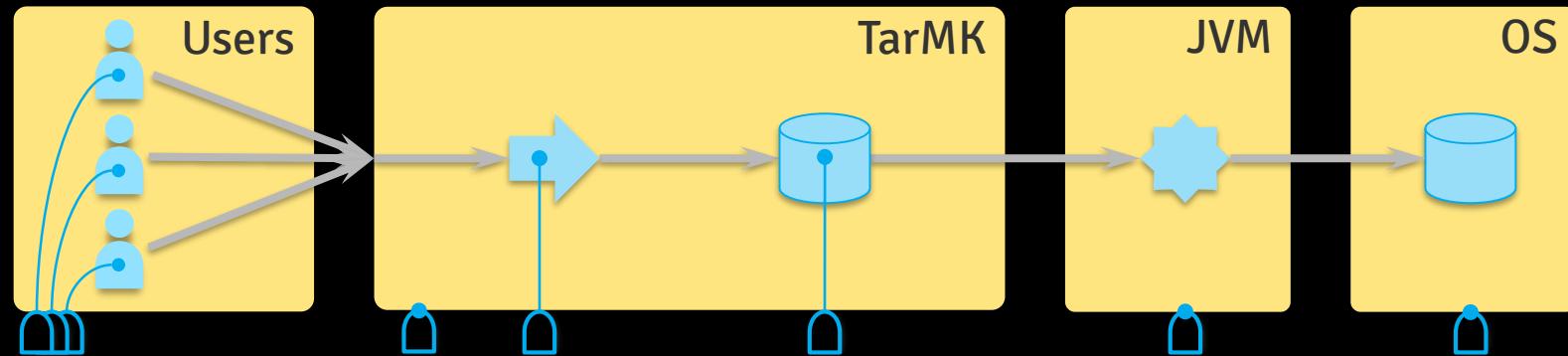
Concurrent Changes



Monitoring

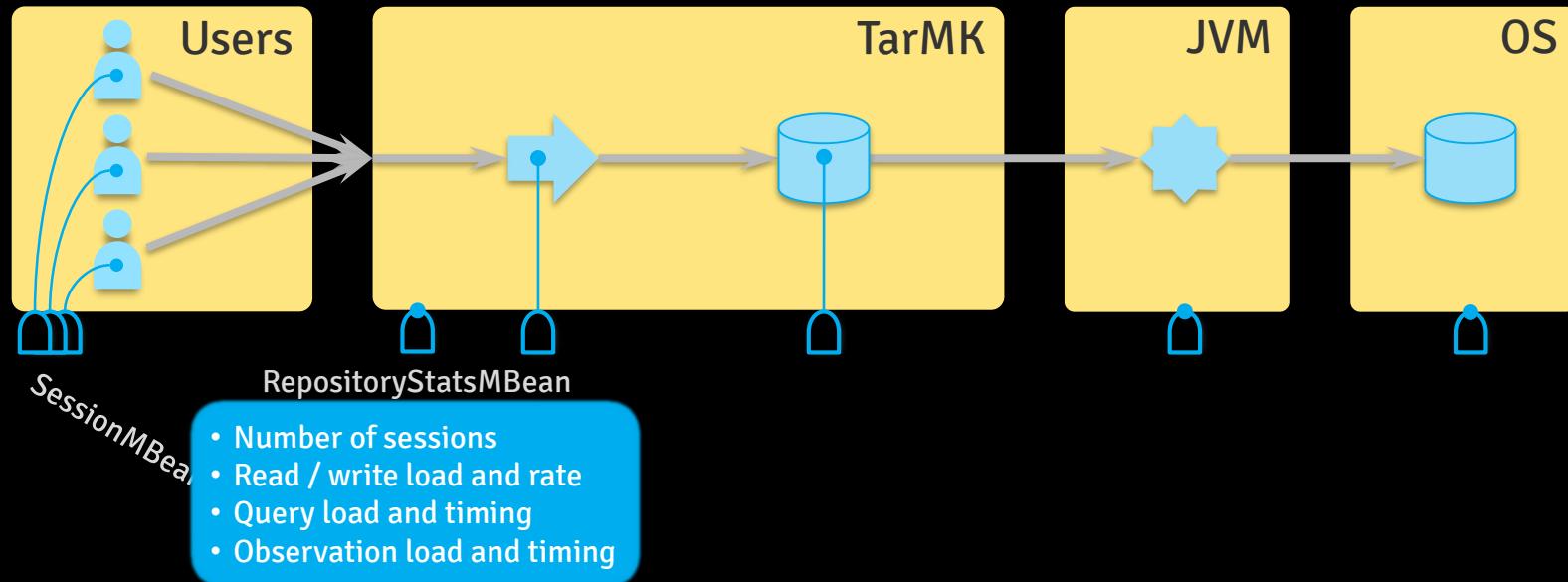


Monitoring

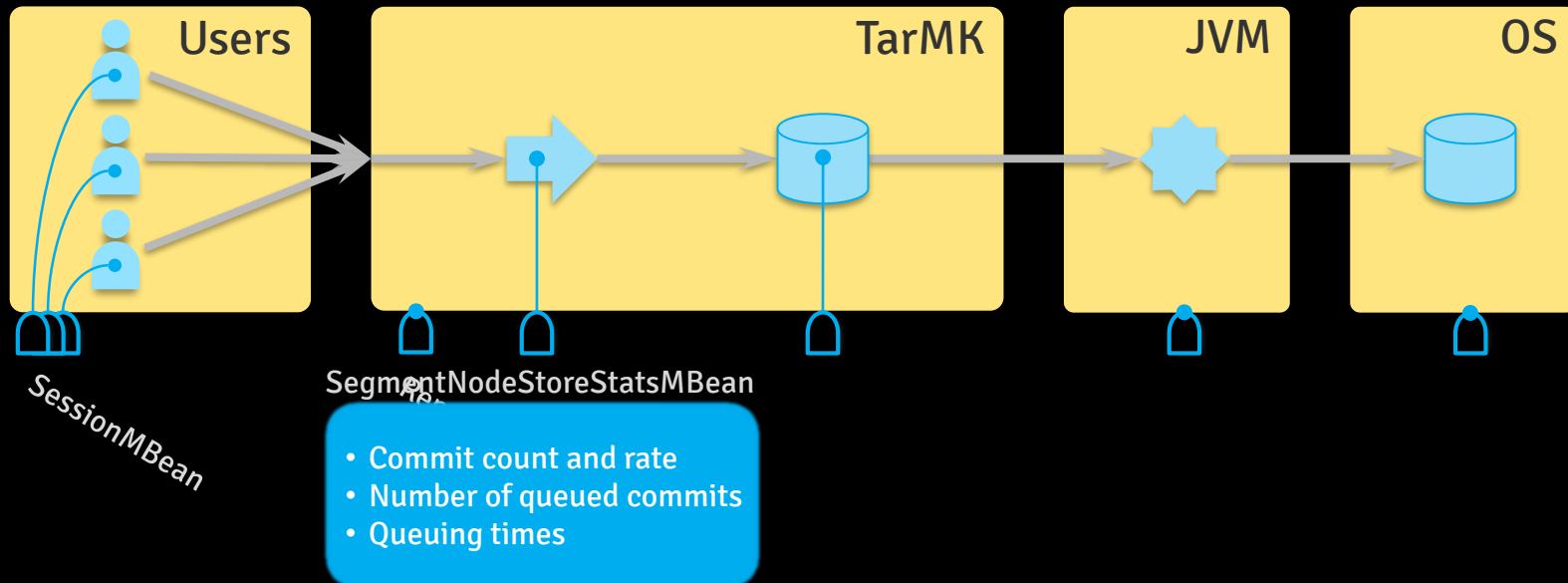


- Read count / rate
- Write count / rate
- Age

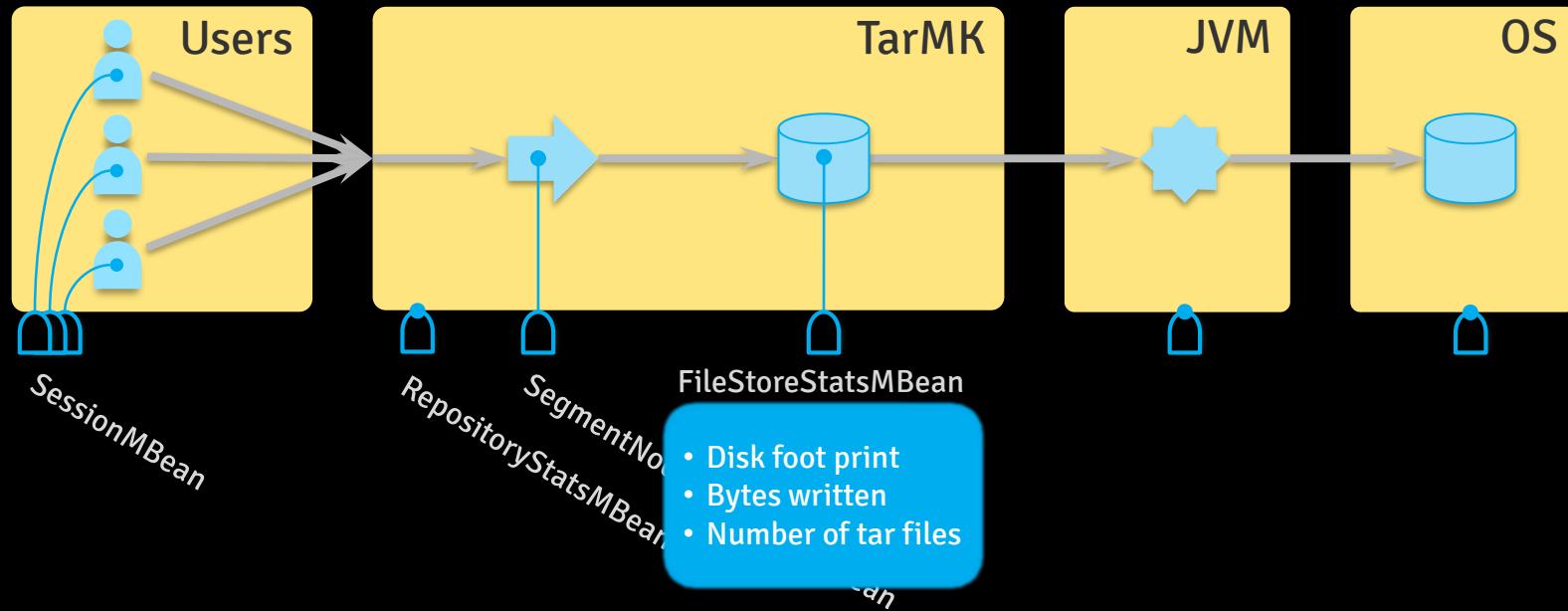
Monitoring



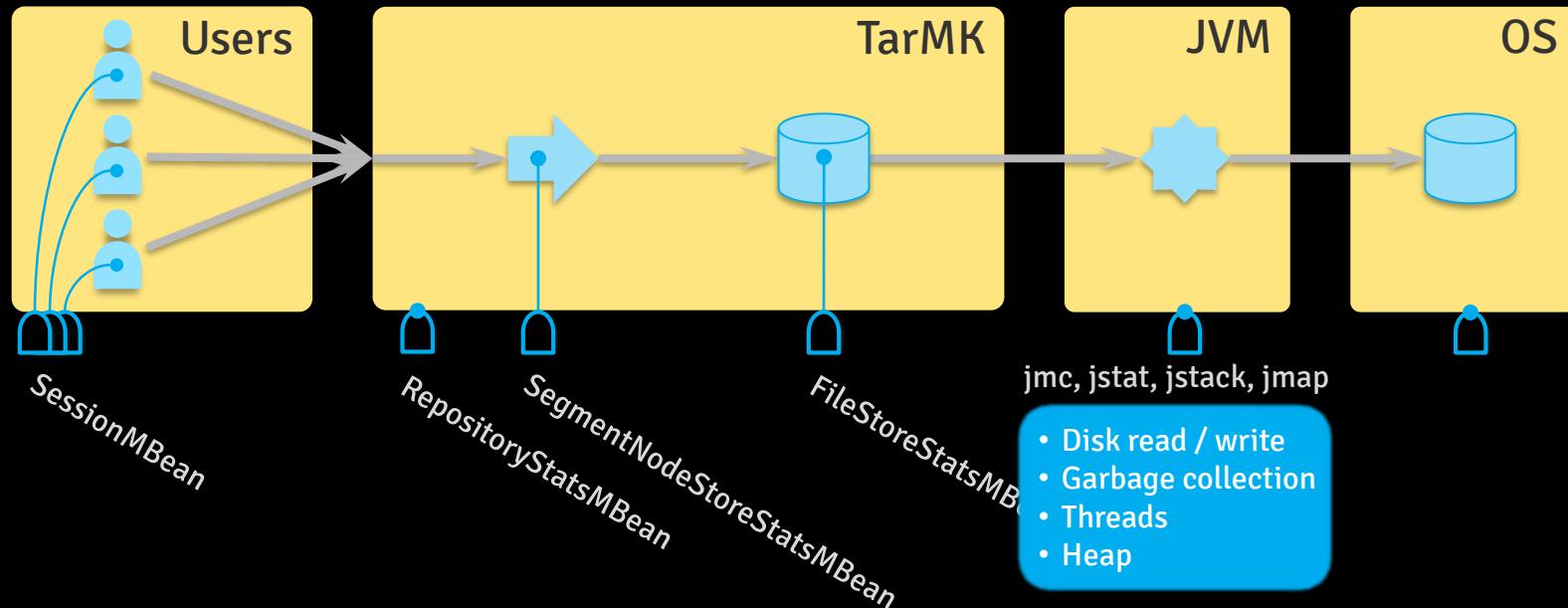
Monitoring



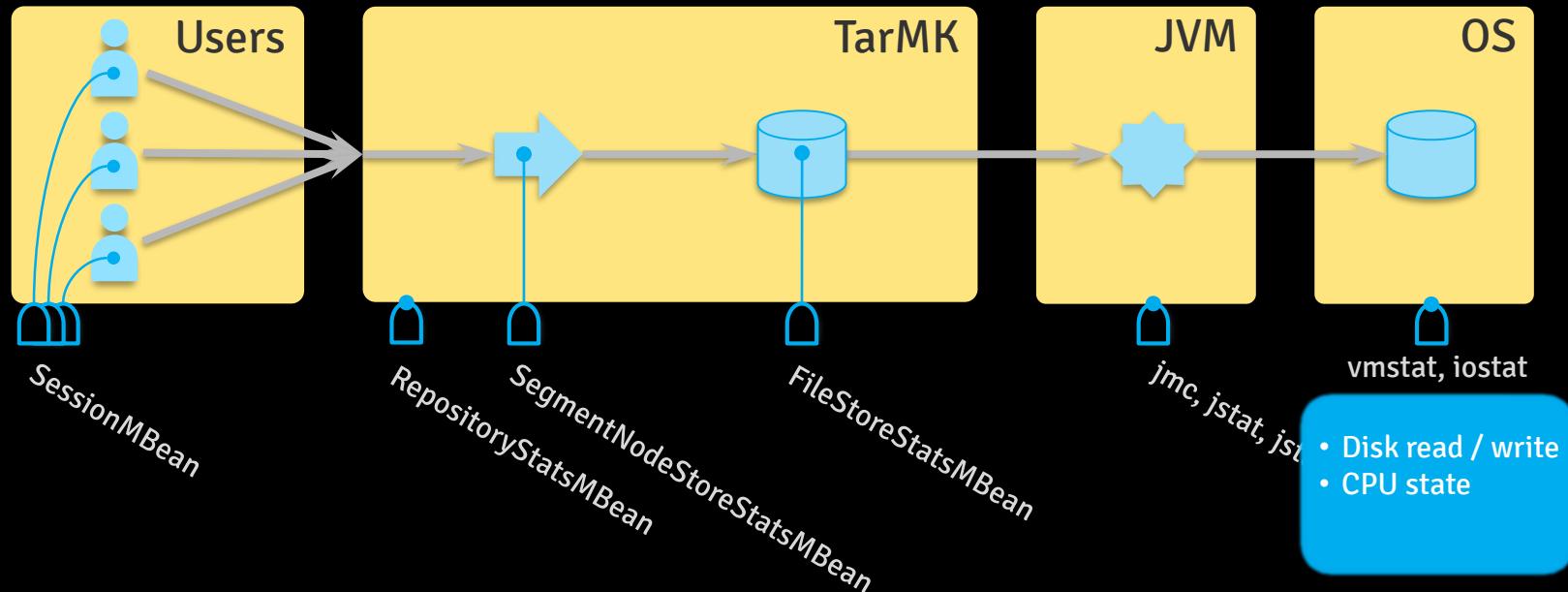
Monitoring



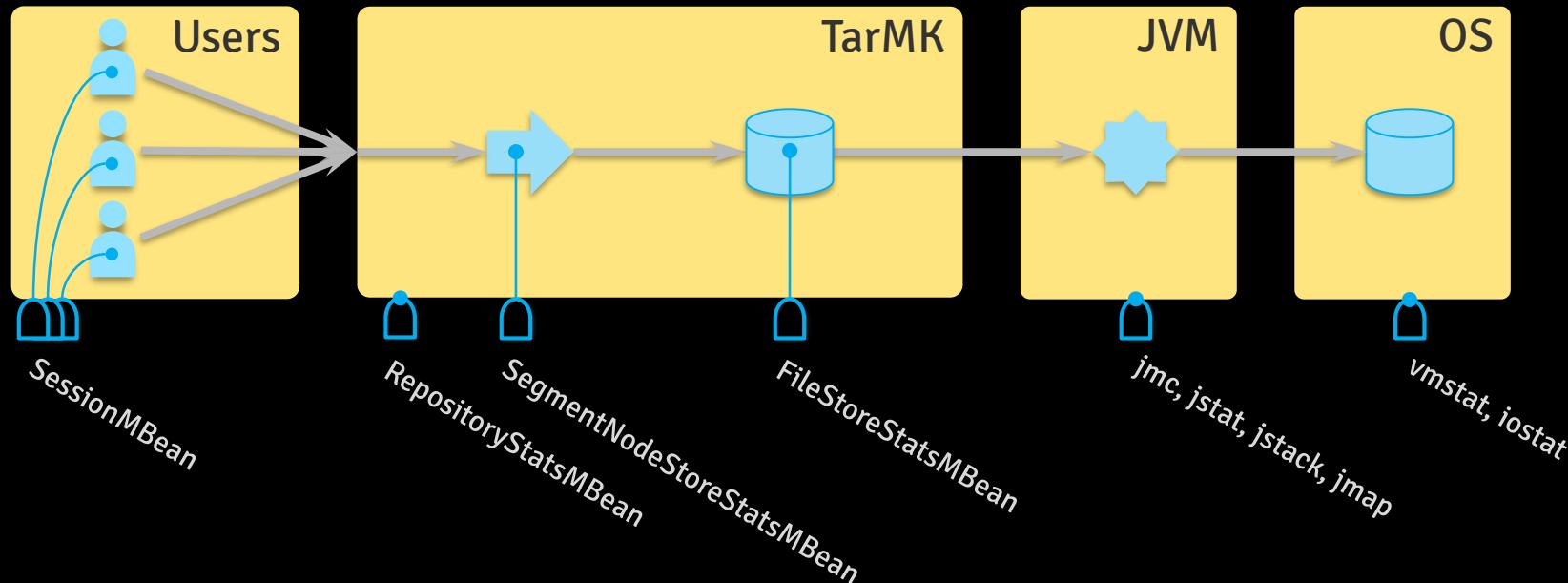
Monitoring



Monitoring



Monitoring





Case Study: Thrashing



Thrashing

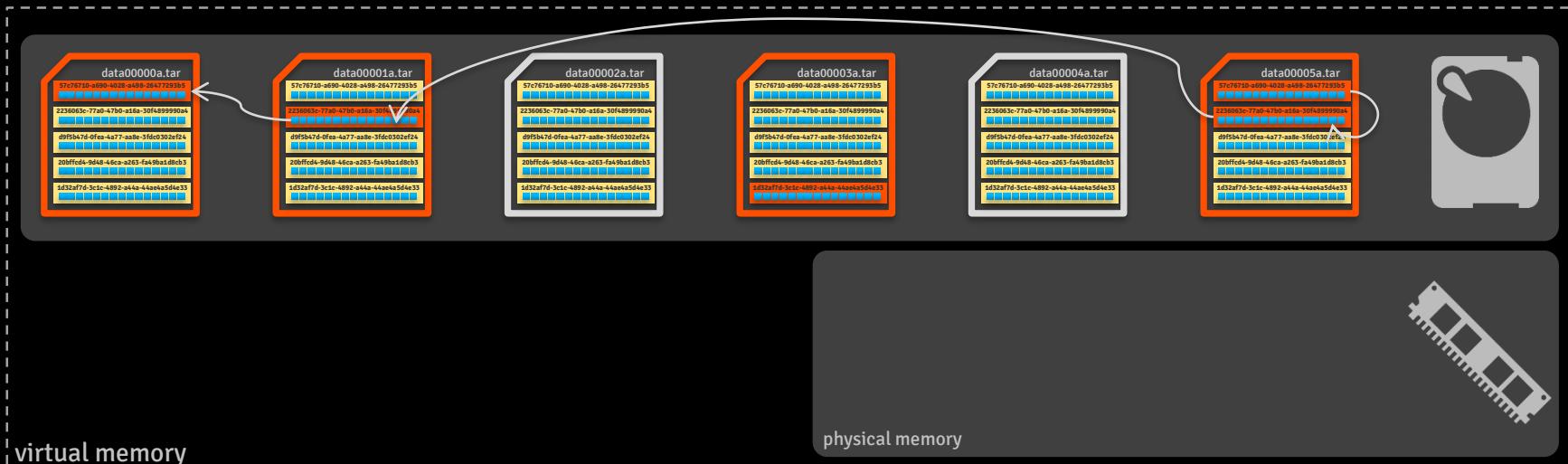
In computer science, **thrashing** occurs when a computer's virtual memory subsystem is in a **constant state of paging**, rapidly exchanging data in memory for data on disk, to the exclusion of most application-level processing. This causes the performance of the computer to **degrade or collapse**.

[*https://en.wikipedia.org/wiki/Thrashing_\(computer_science\)*](https://en.wikipedia.org/wiki/Thrashing_(computer_science))



Thrashing in the TarMK

In the TarMK, **thrashing** occurs when the working set of tar files does not fit into system **memory**, so every repository operation leads to **disk access**.

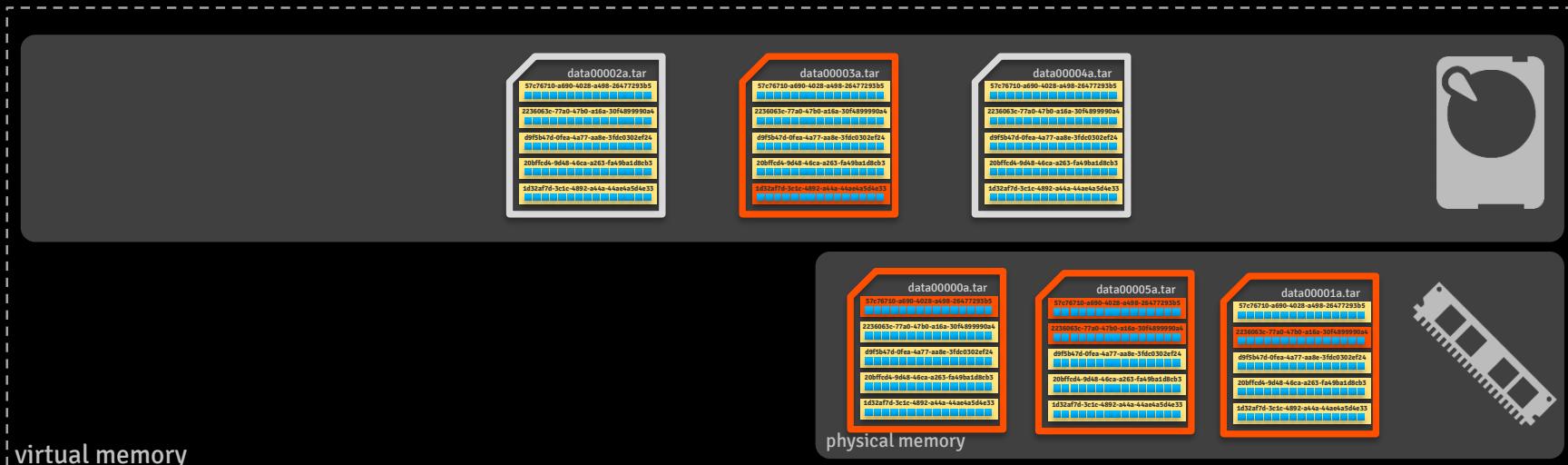


■ working set



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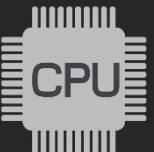
■ working set

virtual memory



Test Setup

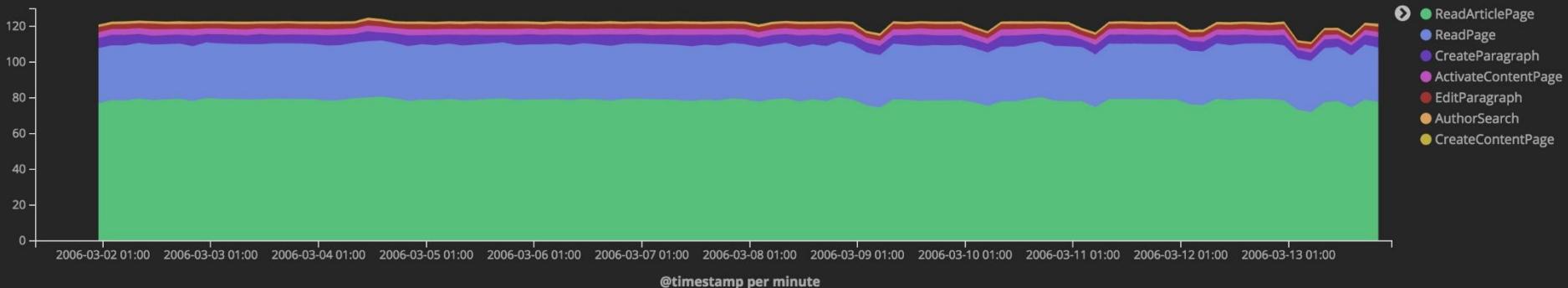
Hardware specs

 2 vCPUs

 8 GB (4GB Heap)

 500 GB Magnetic Disk (EBS)

Requests throughput

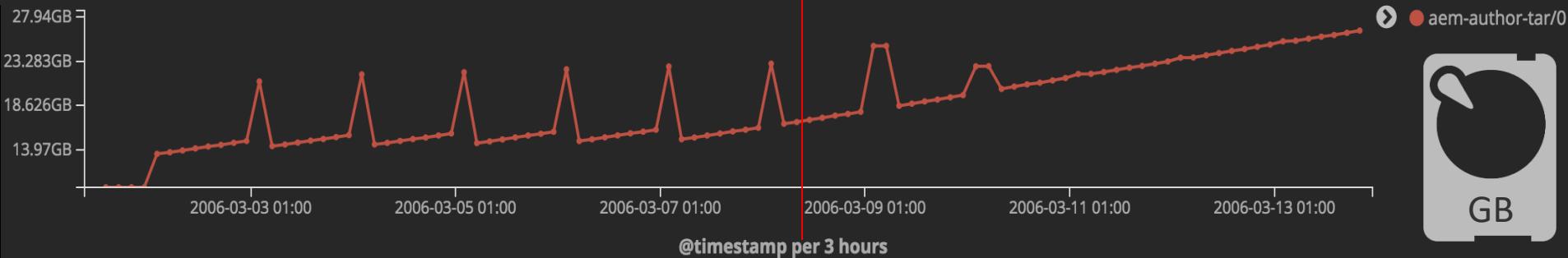




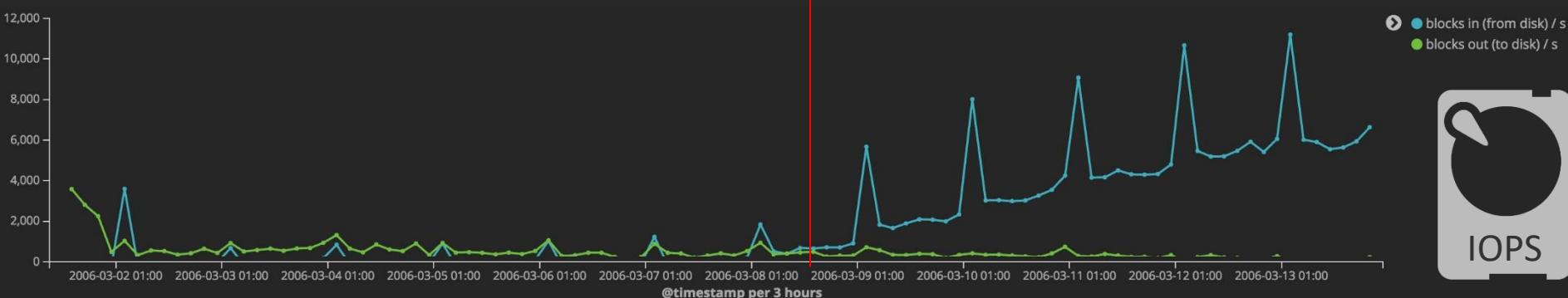
Disk

adaptTo()

Size on disk



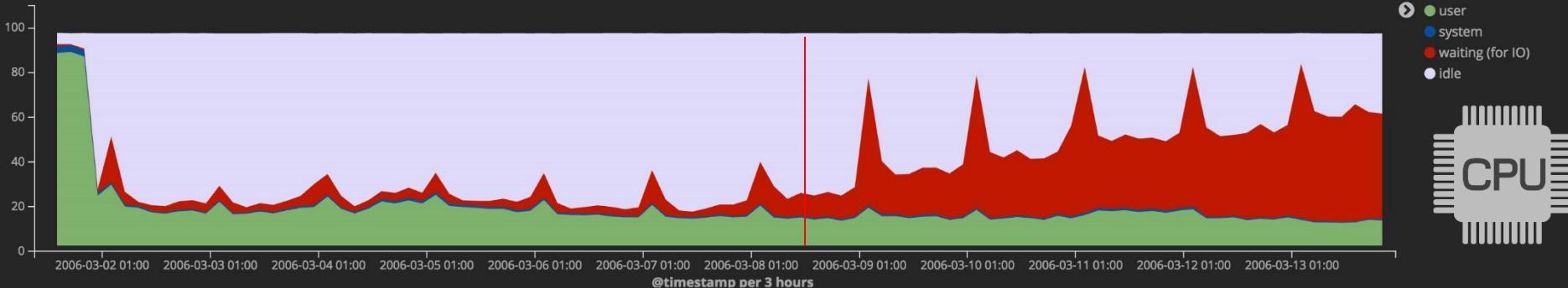
Disk IO



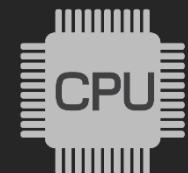


CPU and Commits

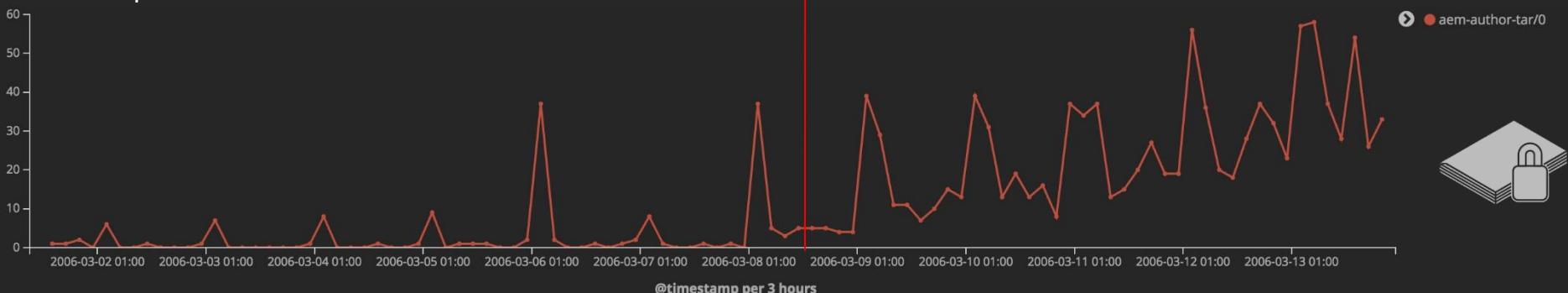
CPU



- user
- system
- waiting (for IO)
- idle



Commit queue



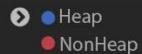
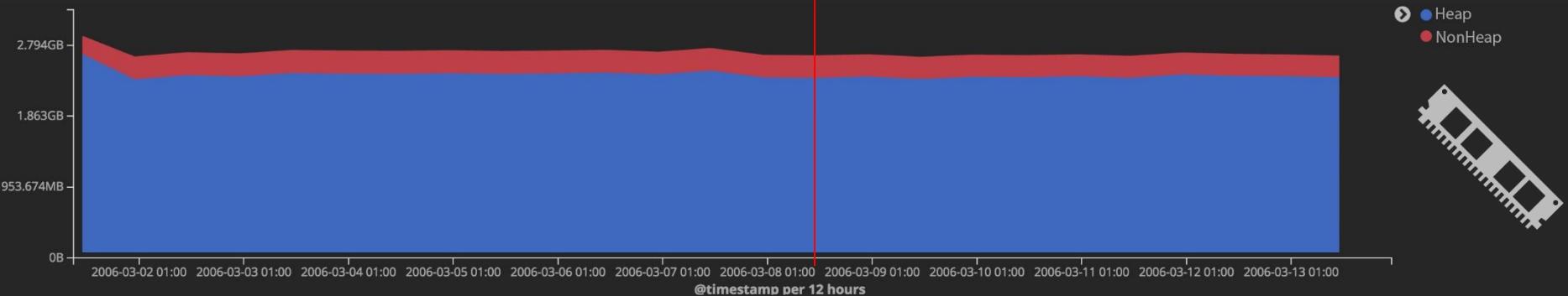
- aem-author-tar/0



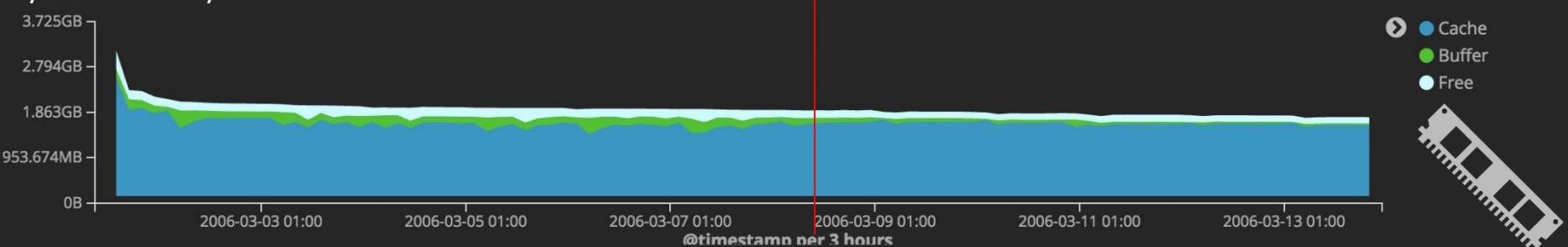


Memory

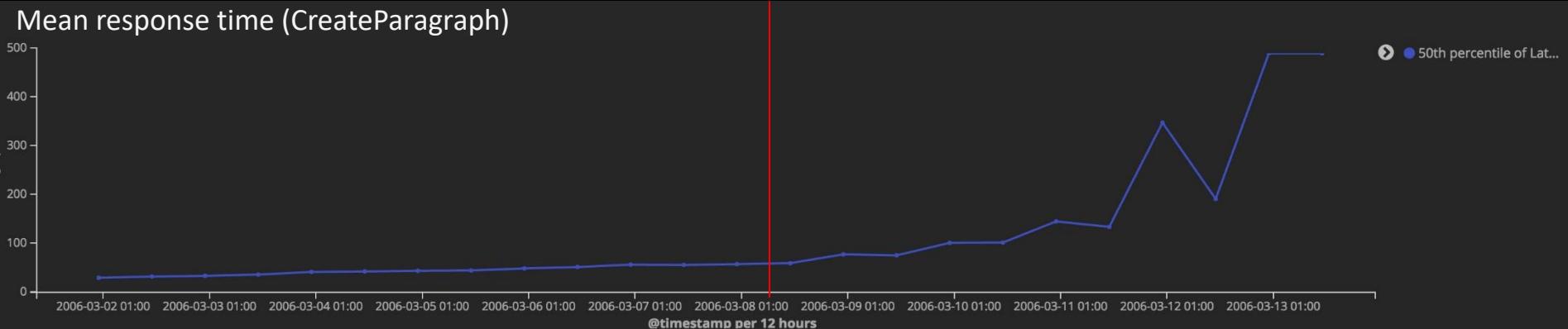
JVM memory



System memory

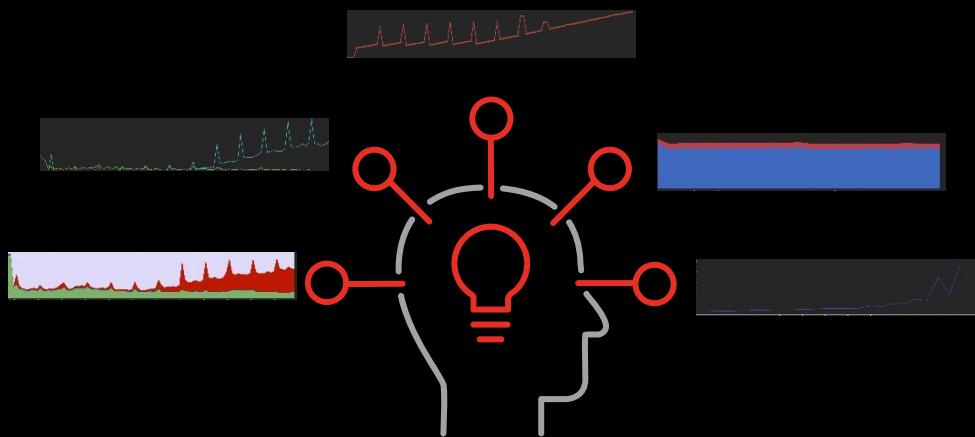


Response Times





Now What?





Now What?





Now What?



NOW WHAAAAAAAT?!

Now What?



NOW WHAAAAAAAT?!

1.



Now What?



NOW WHAAAAAAAT?!

1.



2. Qualify the problem

Now What?



NOW WHAAAAAAAT?!

1.



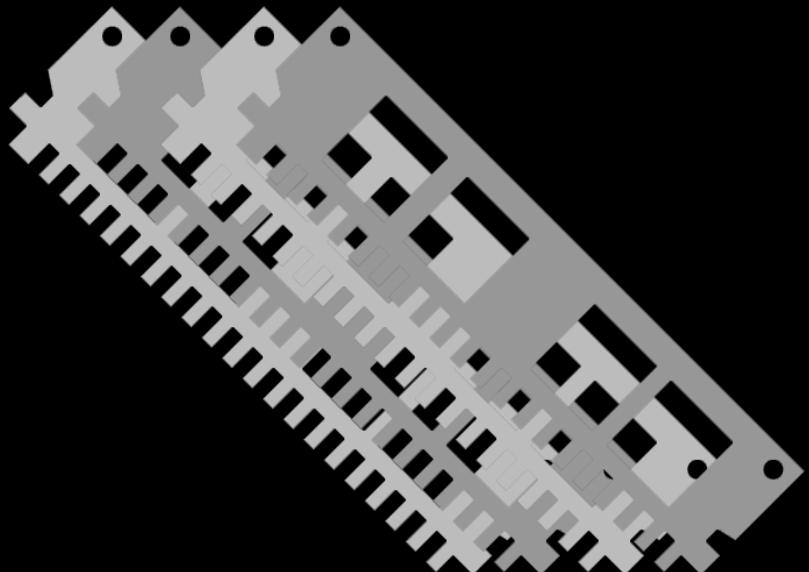
2. Qualify the problem

3. Take prompt actions

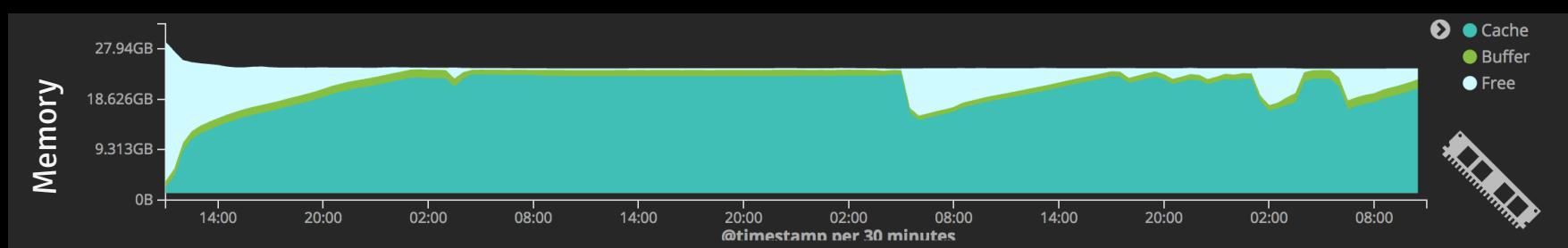
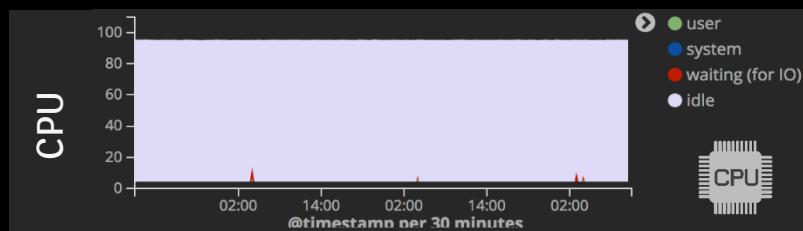
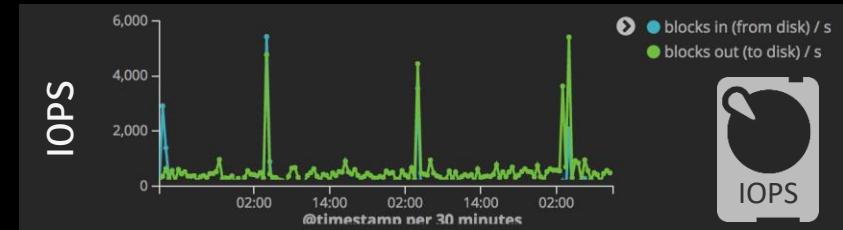
Potential actions (1)

1. Upgrade hardware

- Add RAM
- Optimize IO



A1: Upgrade (increase RAM to 32GB)



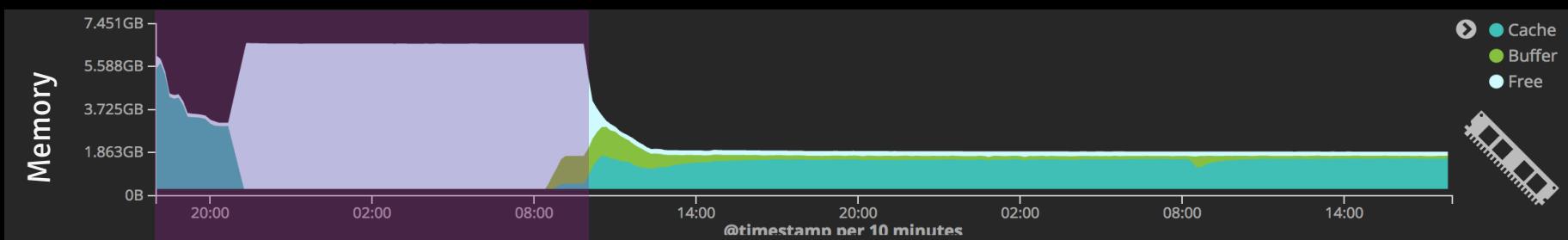
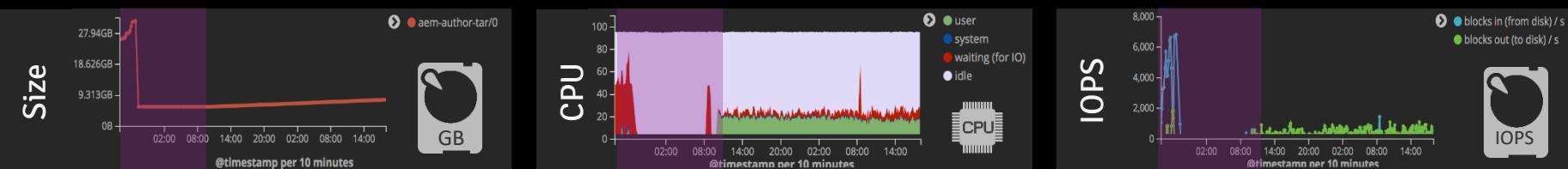
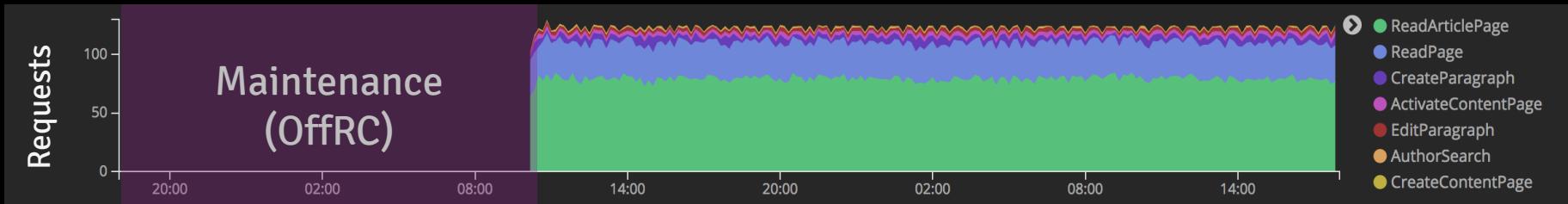
Potential actions (2)

2. Reduce repository

- Use a blob store
- Manage inactive content
(Content hygiene)
- Optimize indexes



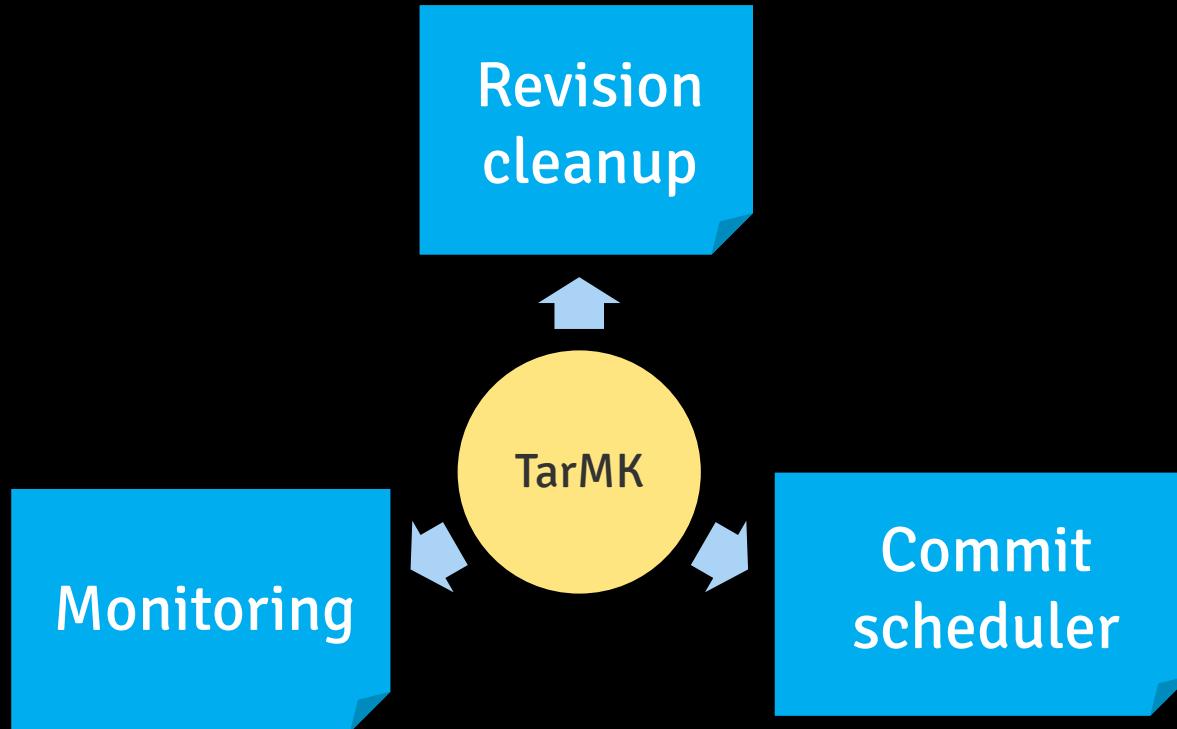
A2: Cleanup content (and offline revision cleanup)





Outlook

Areas of Improvement





Thank you

Questions ?



Appendix

Typical Segment Store Composition

