Technical Deep Dive of the AEM 6 Platform

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Project Oak

Part of Apache Jackrabbit

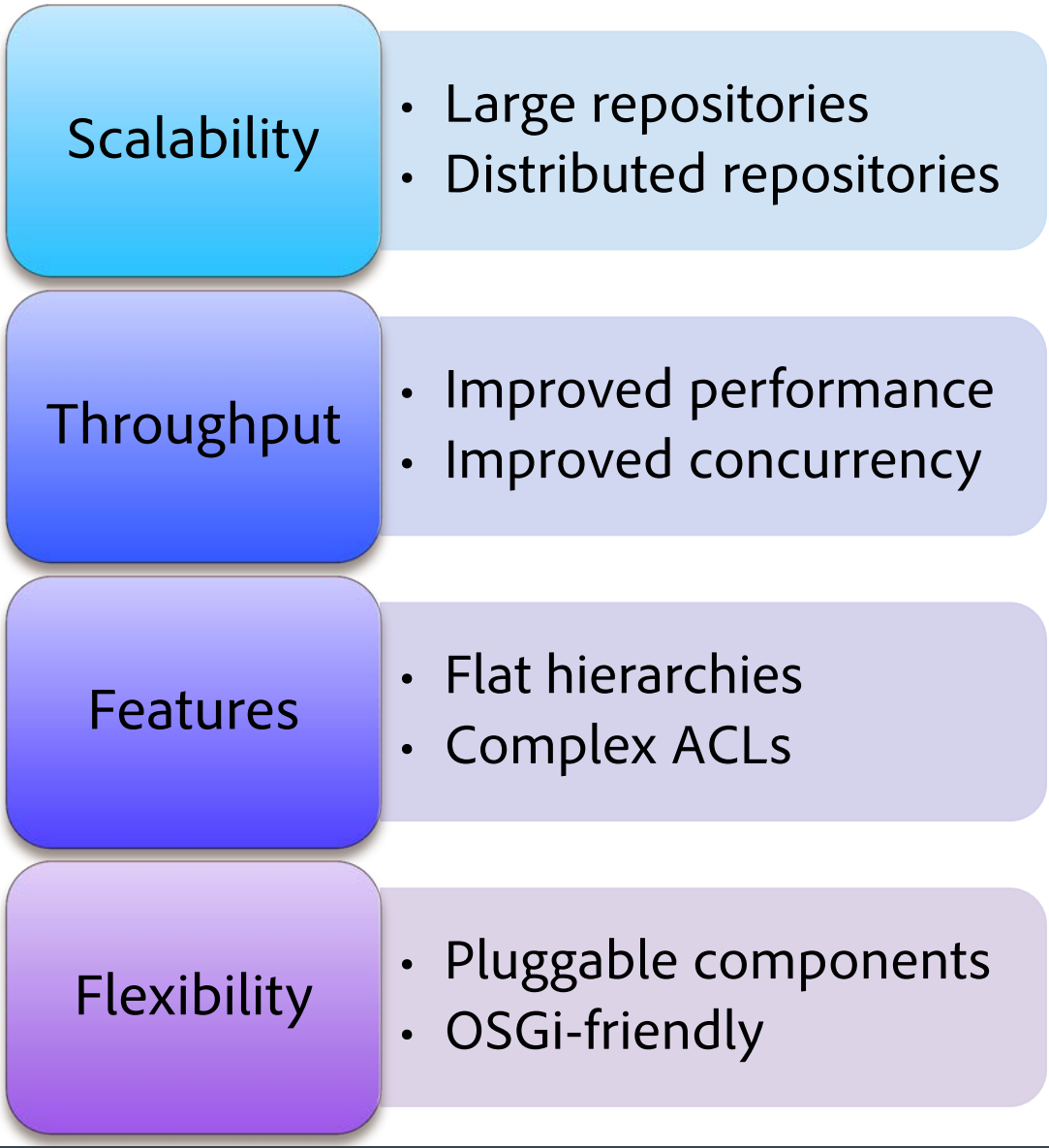
- fully open source, ALv2
- http://jackrabbit.apache.org/oak/
- one of the most active Apache projects by commit counts

Fresh implementation of JCR 2.0

- mostly backwards compatible
- some optional features excluded to avoid bad performance/scalability tradeoffs

Project timeline:

- 2008: initial design ideas
- 2011: prototyping
- 2012: project launched
- 2014: Oak 1.0 released



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Key differences

Oak

- MVCC
- tree persistence
- designed for scalability
- plugin architecture
- pluggable query indices

CRX2

- synchronous updates
- key-value persistence
- clustering as add-on
- static extension points
- one index per workspace

Architecture

JCR

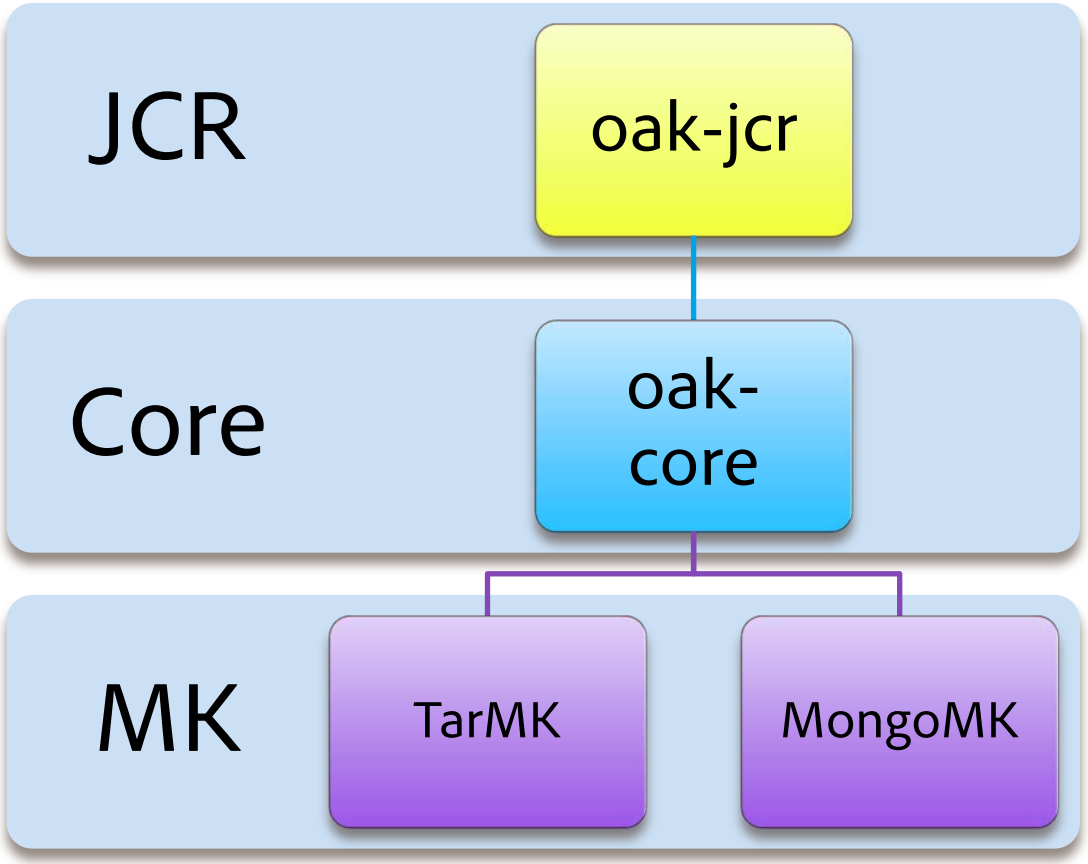
- JCR API binding
- convenience and safety features like auto-refresh and thread-safety guards

Core

- high-level functionality
- search, versioning, security, etc.
- most features implemented as pluggable extensions

MicroKernel

- versioned tree storage
- clustering, caching, etc.



For more details, see:
http://www.slideshare.net/jukka/oak-the-architecture-of-apache-jackrabbit-3

Deployment scenarios

AEM6 Author

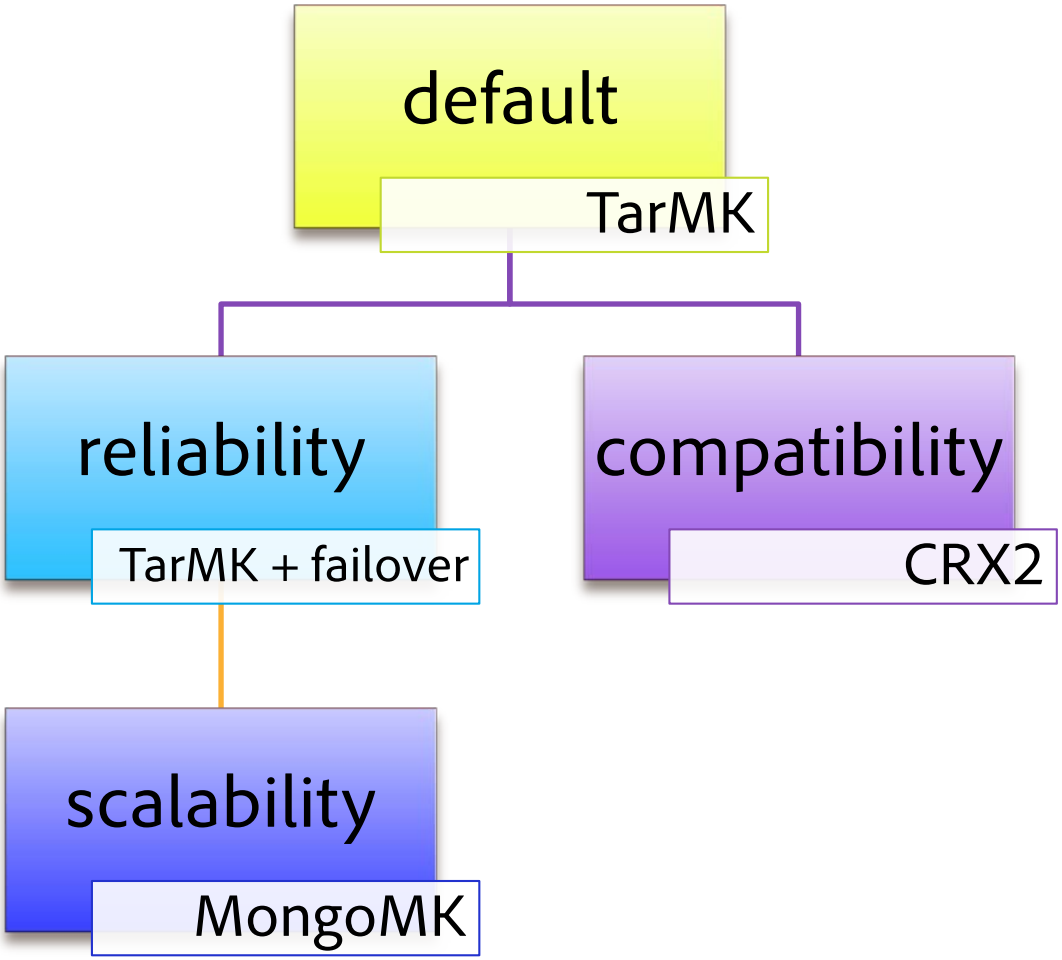
Which repository backend to use for AEM 6.0 author deployments?

Instructions:

- start from the top
- follow lines to add required features
- stop when happy

Note:

- each step adds complexity
- most steps can be postponed to when actually needed



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AEM6 Publish

Which repository backend to use for AEM 6.0 publish deployments?

Instructions:

- pick your main use case

Note:

- in most cases it will be possible to switch the backend later on, though the migration may be a bit costly

Publishing	User generated content
• TarMK • farm of replicas	• MongoMK • publish cluster

TarMK

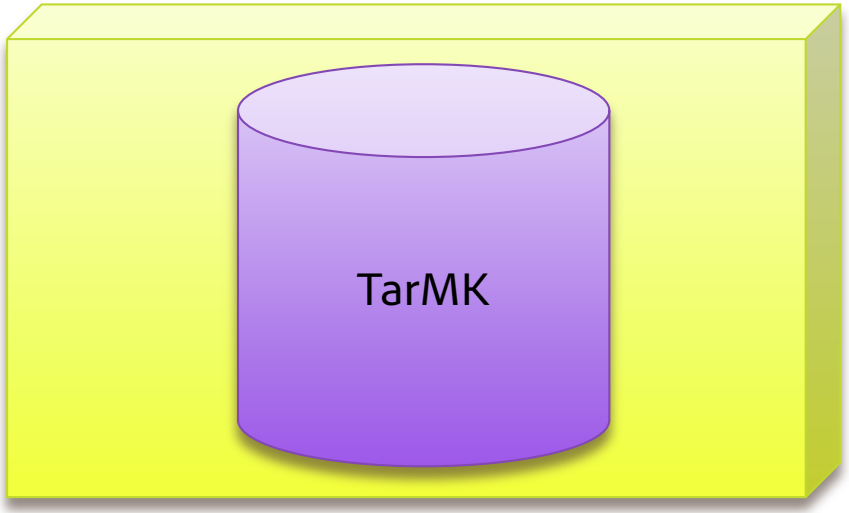
Simple default deployment option

Heavily optimized for
single-node performance

- memory mapping (64bit JVMs)
- compactness
- locality of reference

Optionally with a data store
for large binaries

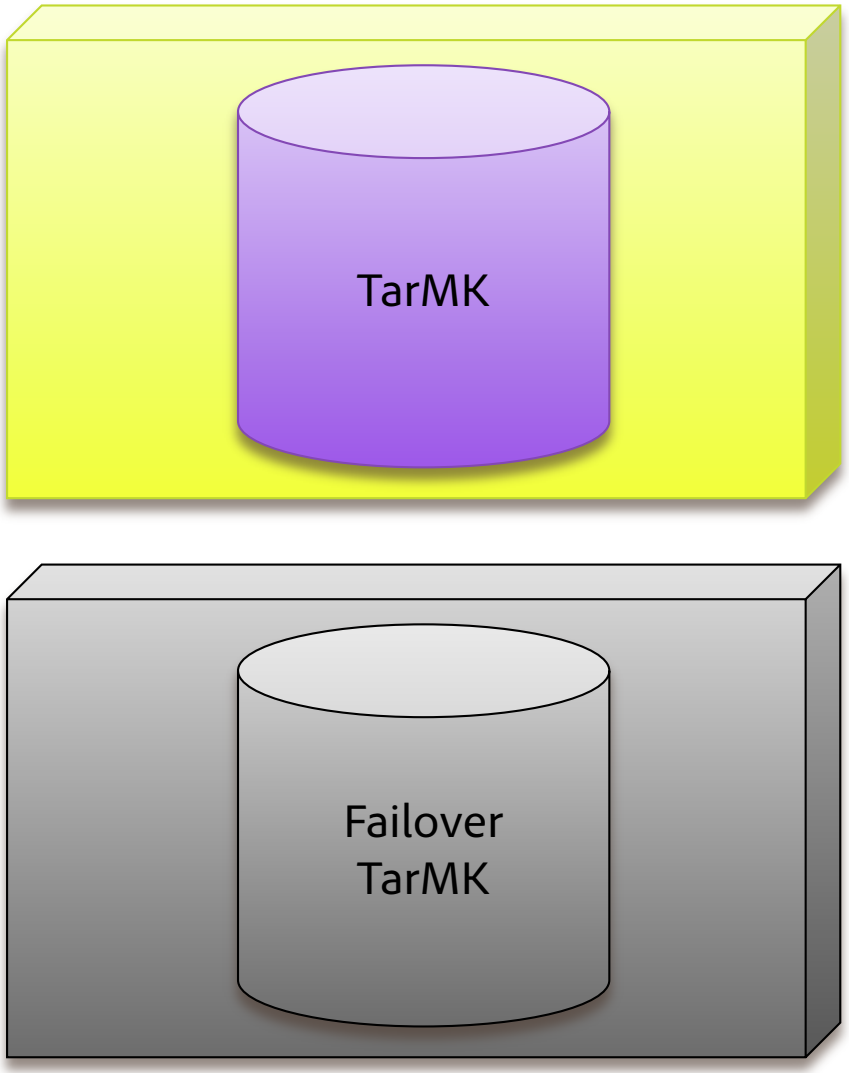
- migration from crx2
- external storage (NAS/SAN, S3)



TarMK + failover

For added reliability

- continuous, incremental backup to a separate failover server
- requires an external smart firewall, load balancer or monitoring tool (Nagios, etc.) for triggering the failover

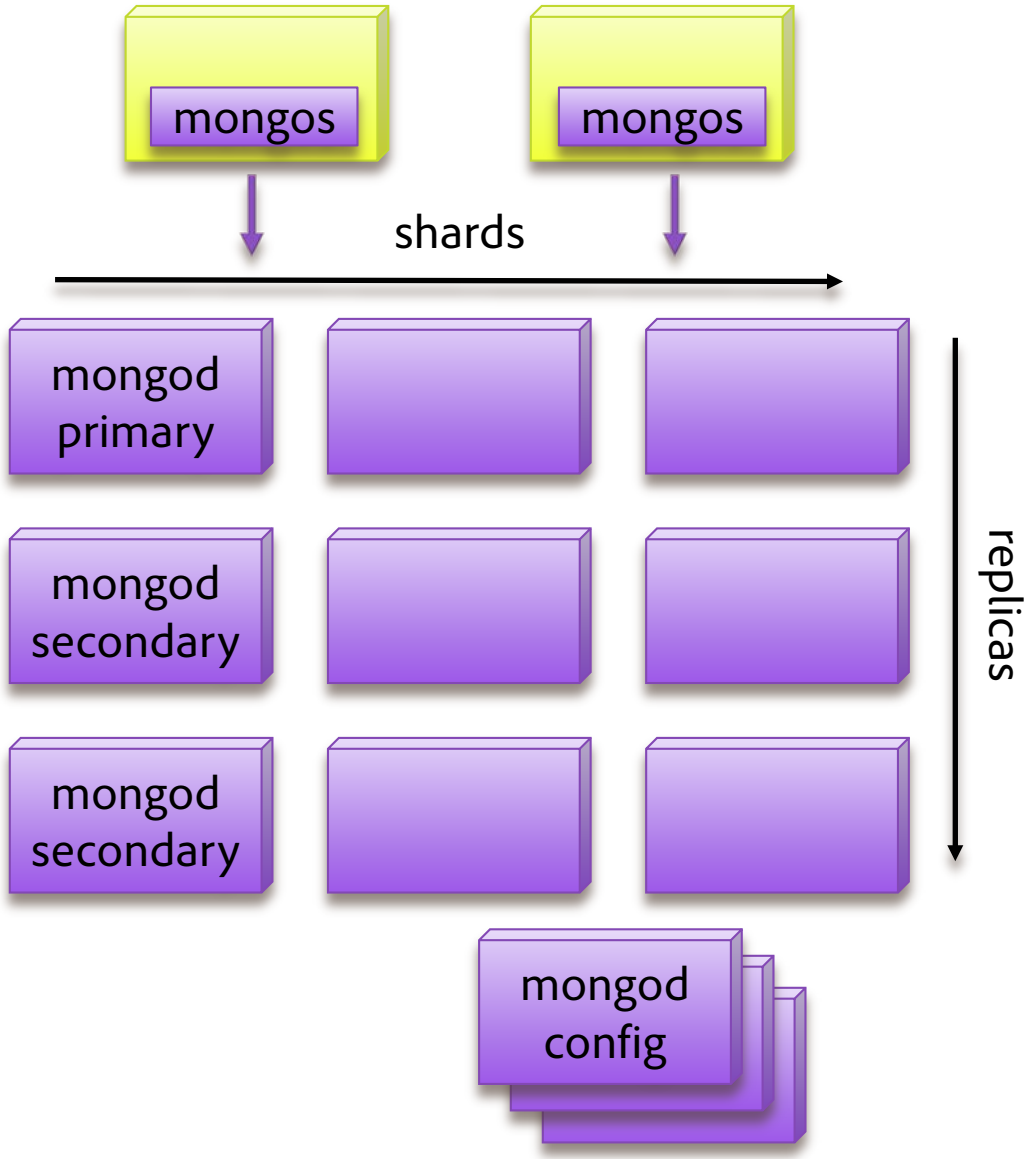


MongoMK

Reliability + scalability

Any number of AEM6 cluster nodes can share an underlying MongoDB cluster

- standard MongoDB replication and sharding features
- all shared state in MongoDB
- eventually consistent



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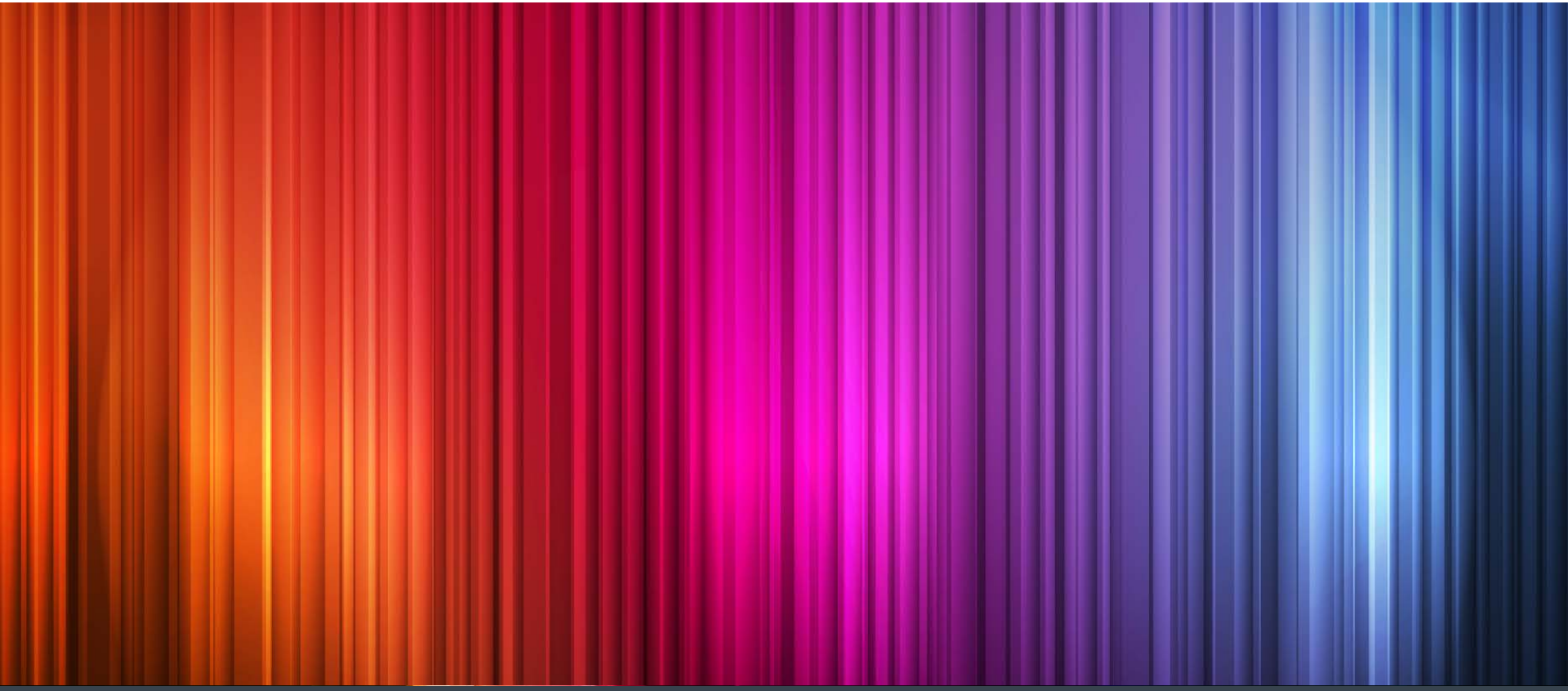
Content Migration



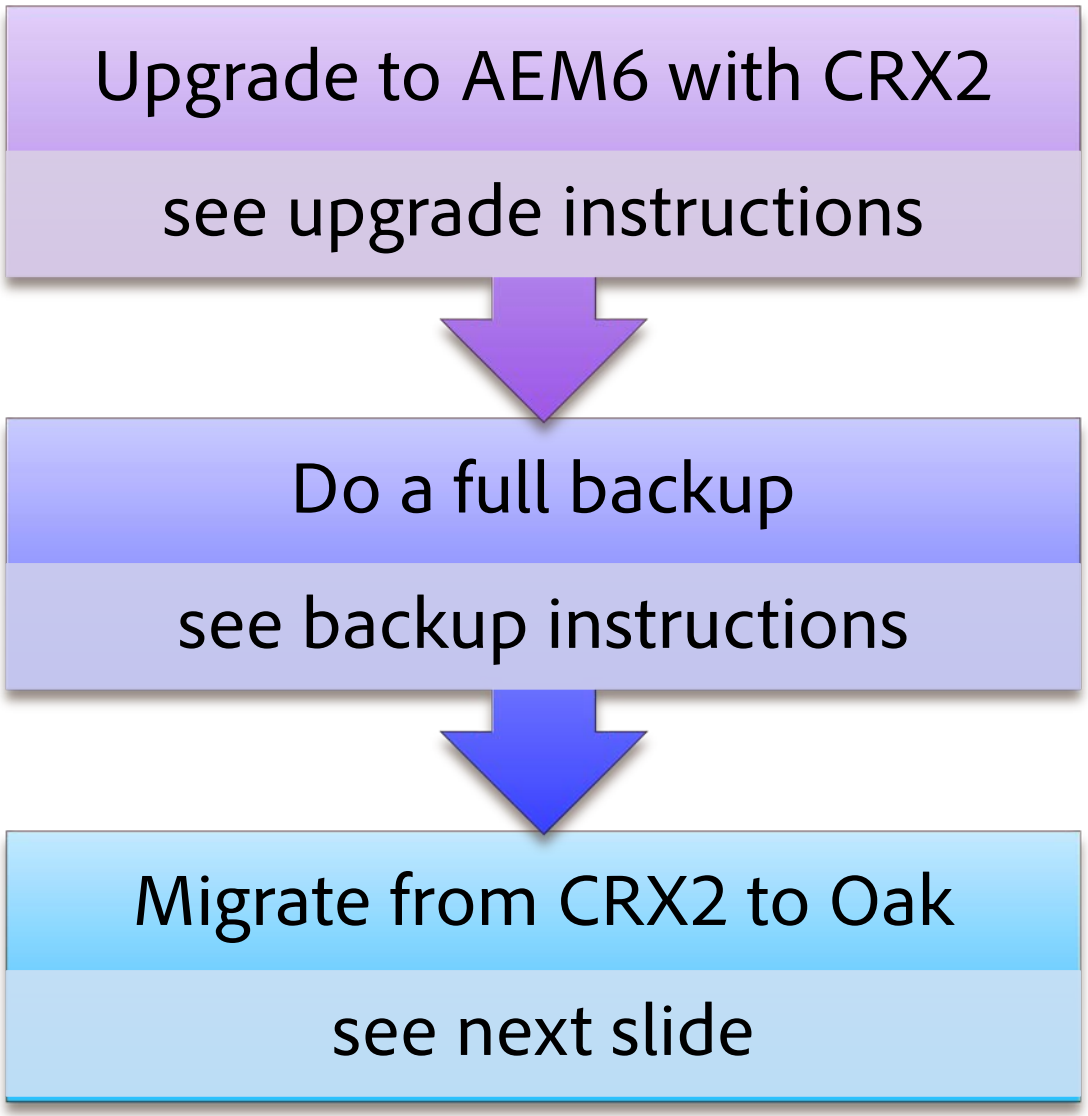
Content Migration

How to migrate an existing
AEM 5.x deployment
to AEM 6.0 with Oak?

BTW, why the migration?

- radically different storage format
- need for an explicit decision because of changes in backwards compatibility

For details, see:
http://docs.adobe.com/content/docs/en/aem/6-0/deploy/upgrade.html



Content Migration

How to migrate a CRX2 repository to CRX3 with TarMK?

Prerequisites:

- use Java 7 or higher
- first upgrade to AEM 6

For MongoMK:

- -r crx3,crx3mongo
- -Doak.mongo.uri
- DocumentNodeStoreService.cfg
- see documentation for details

For custom data stores:

- see documentation for details

For details, see:
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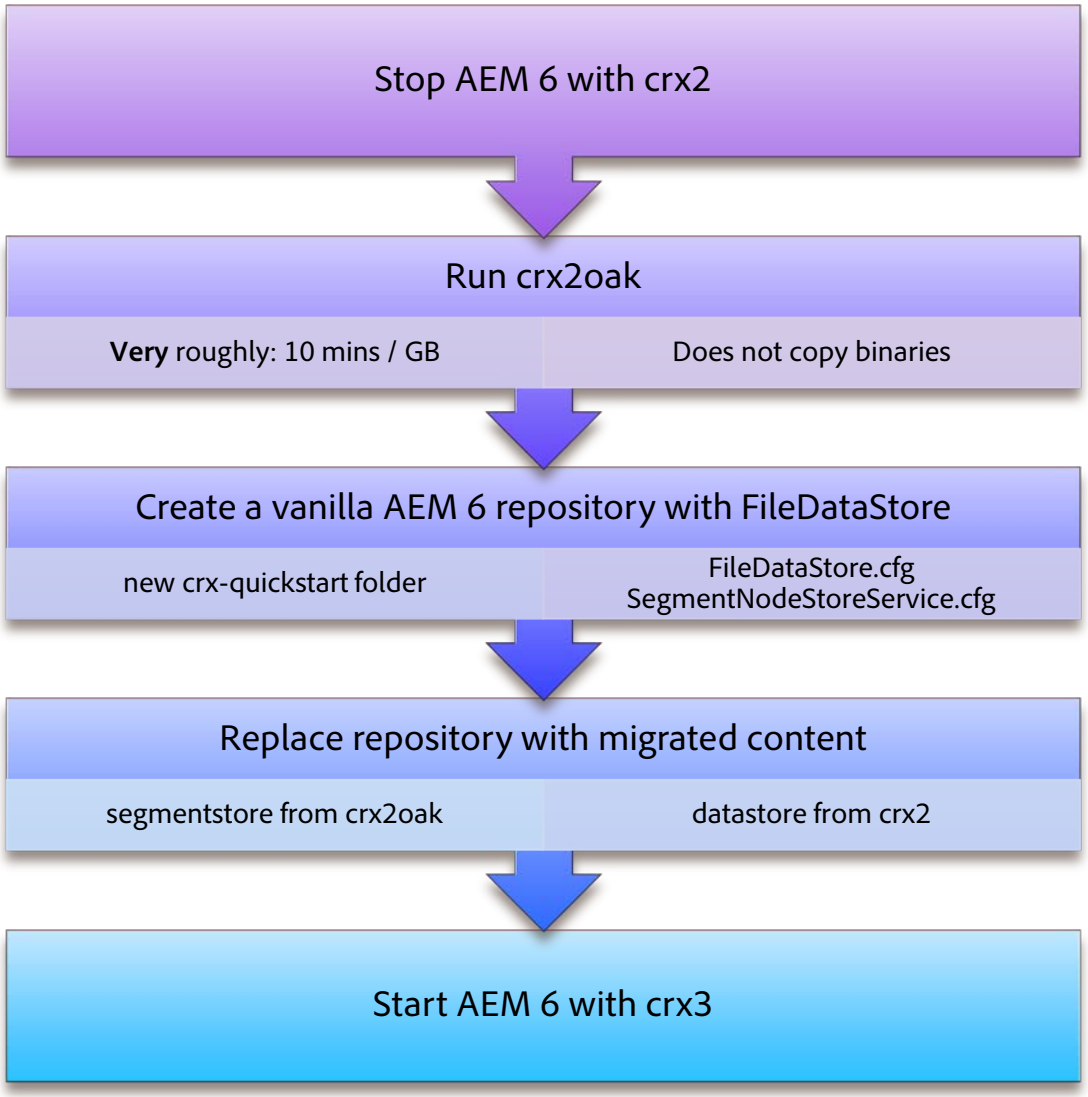

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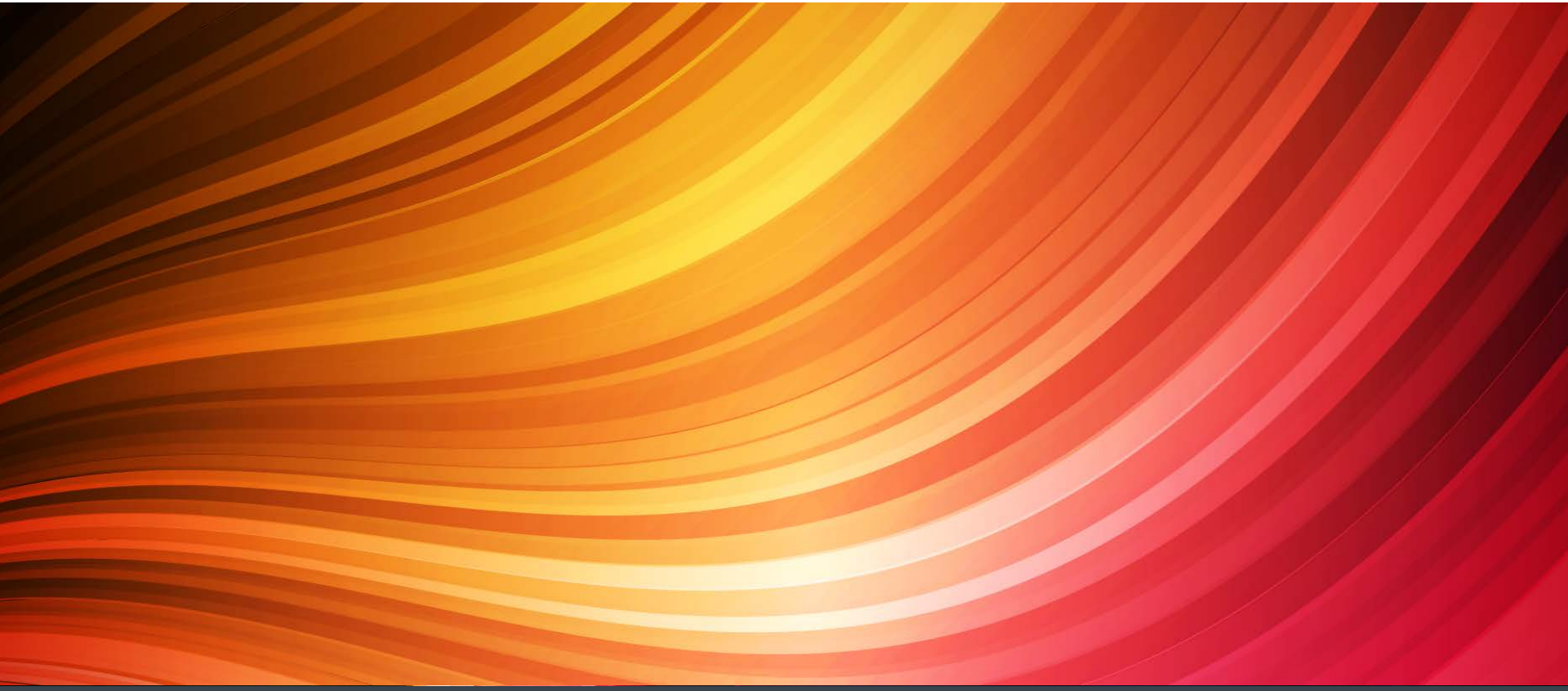
Migration between TarMK and MongoMK

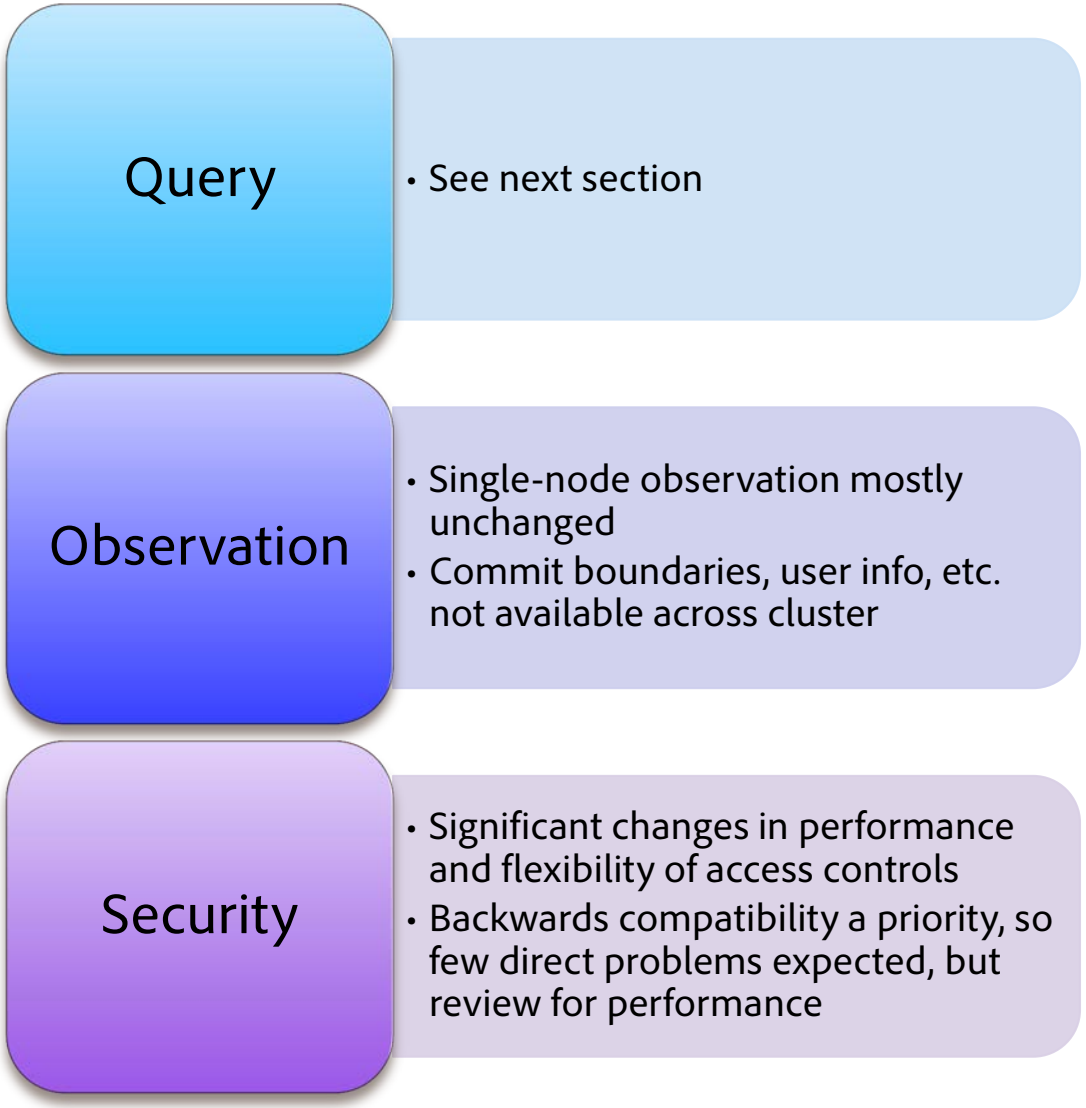
- Backend choice mostly transparent to higher level code
- Migrating the full repository
  - use backup/restore
- Migrating selected subtrees
  - use content packages

Backwards compatibility



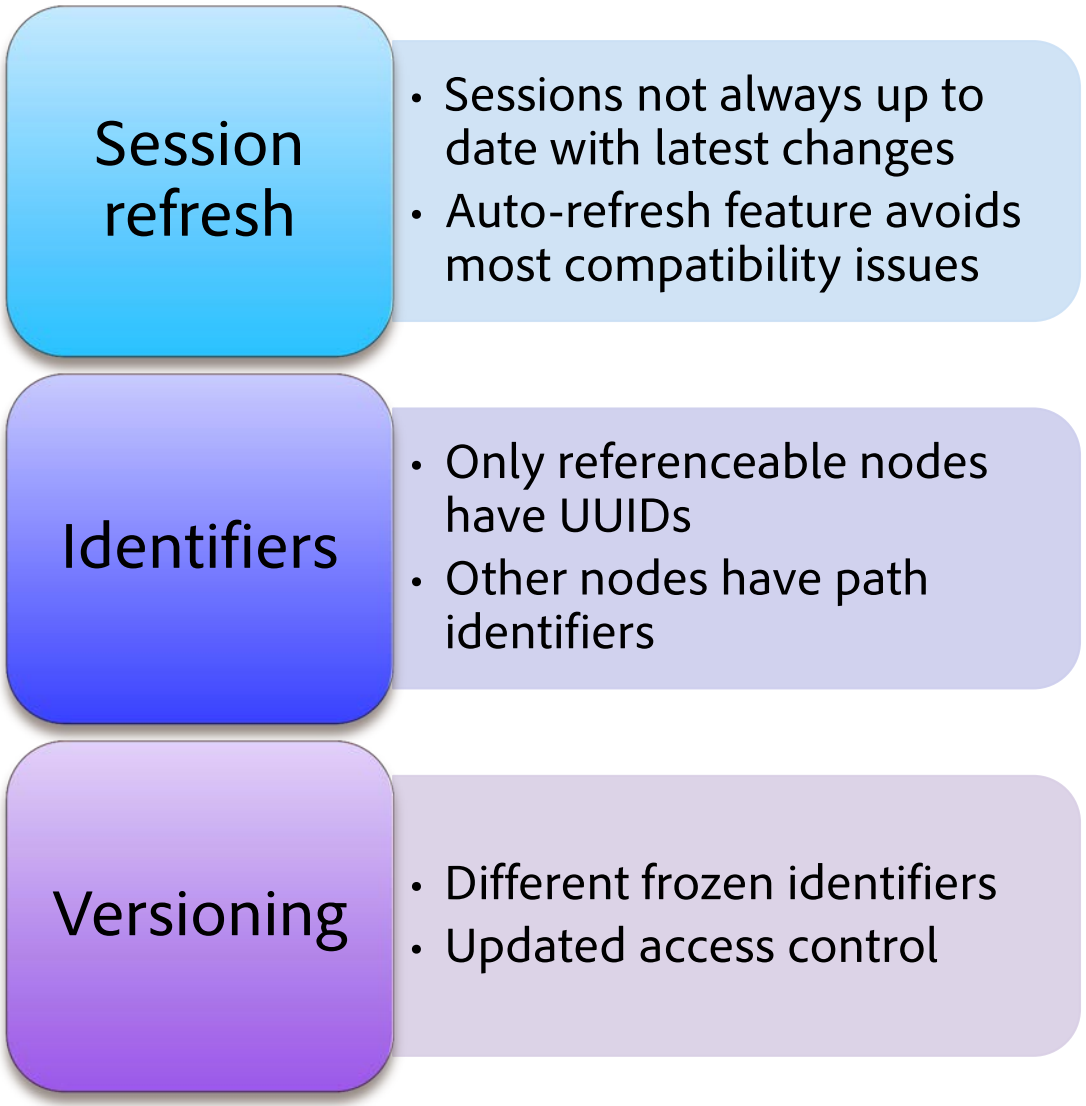
Significant changes

Functionality with significant changes in implementation and whose use in client code should be reviewed and, if needed, adapted



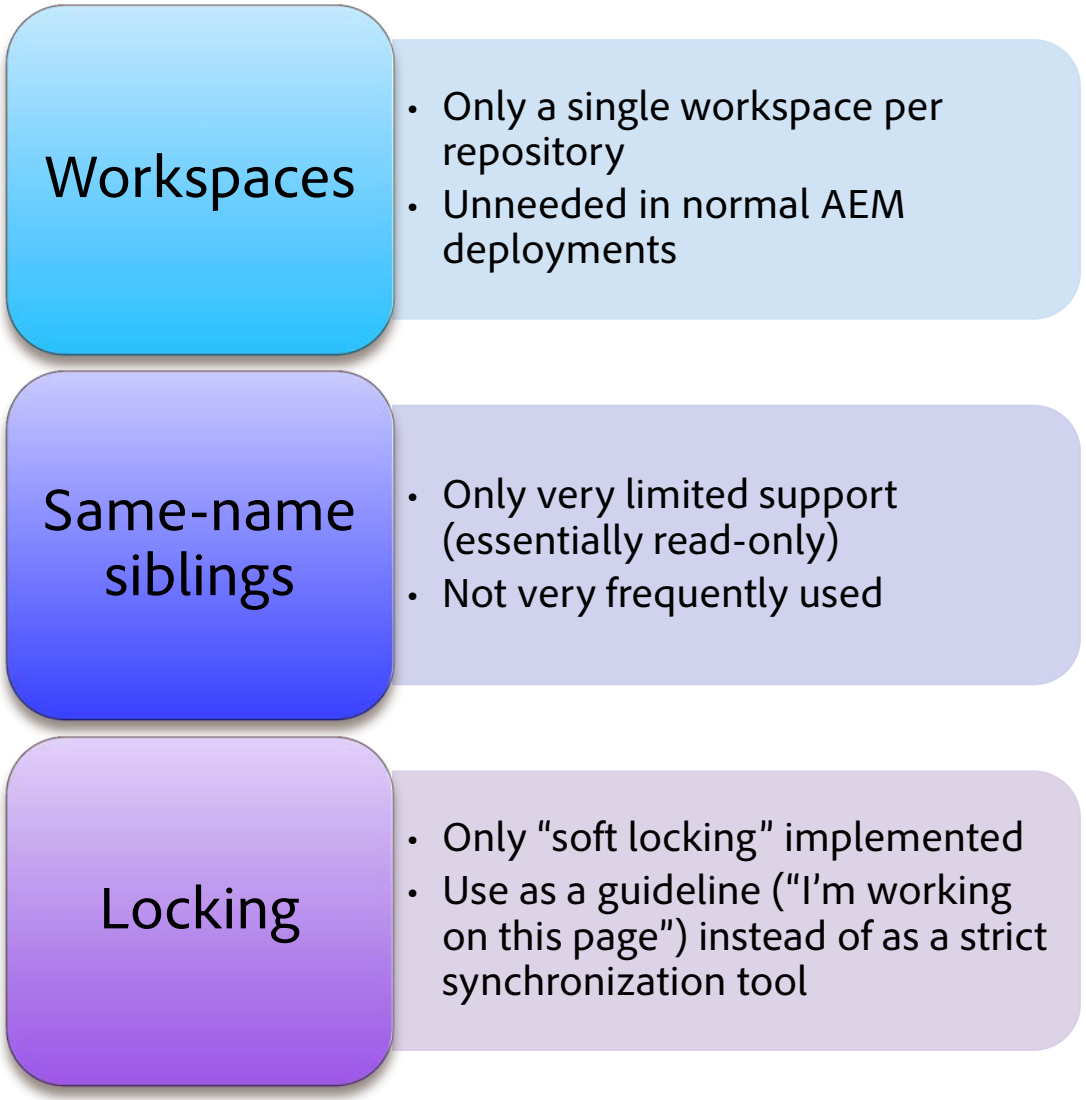
Minor differences

Functional changes that in most cases require few or no changes in client code

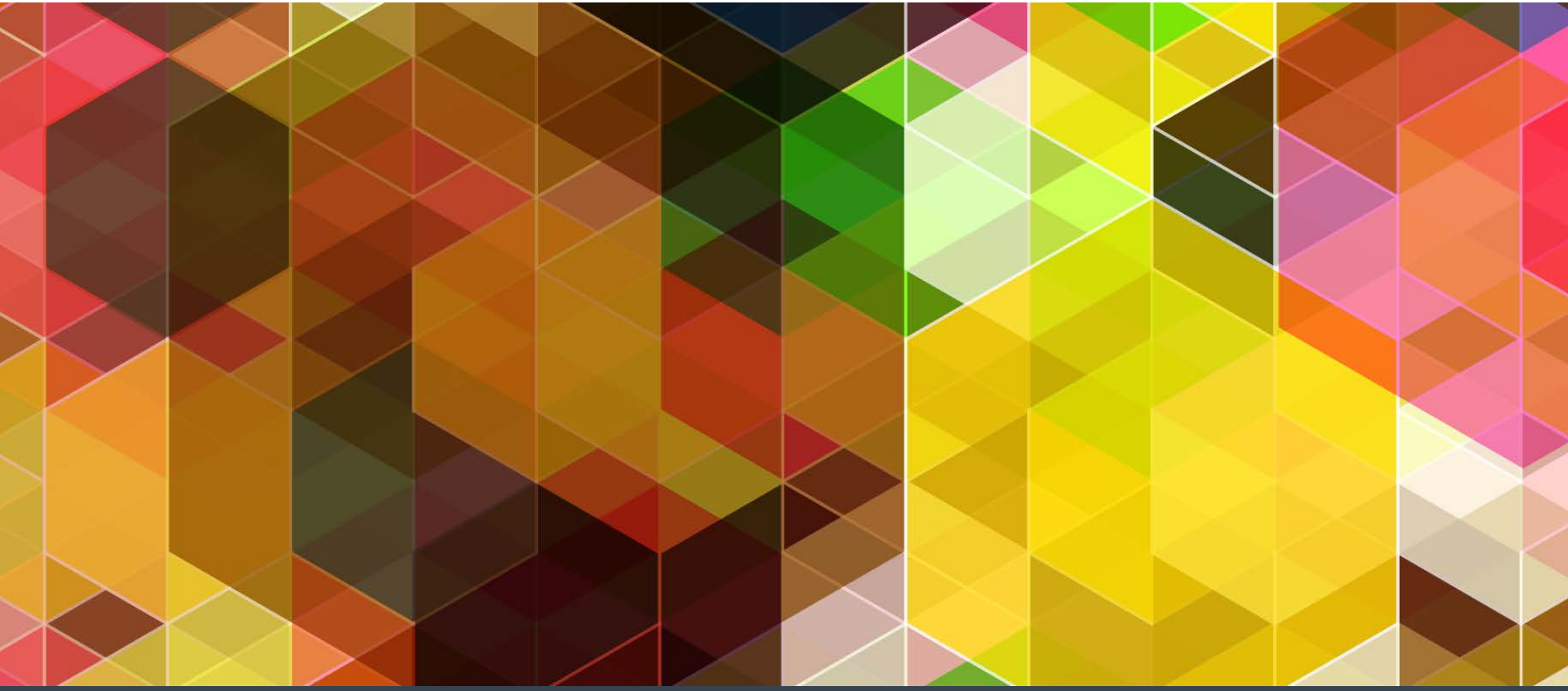


Missing features

Functionality that is either completely missing or significantly less useful than before and thus require significant rewrite in affected client code



Custom search indexes



Search Engine

Features not covered here:

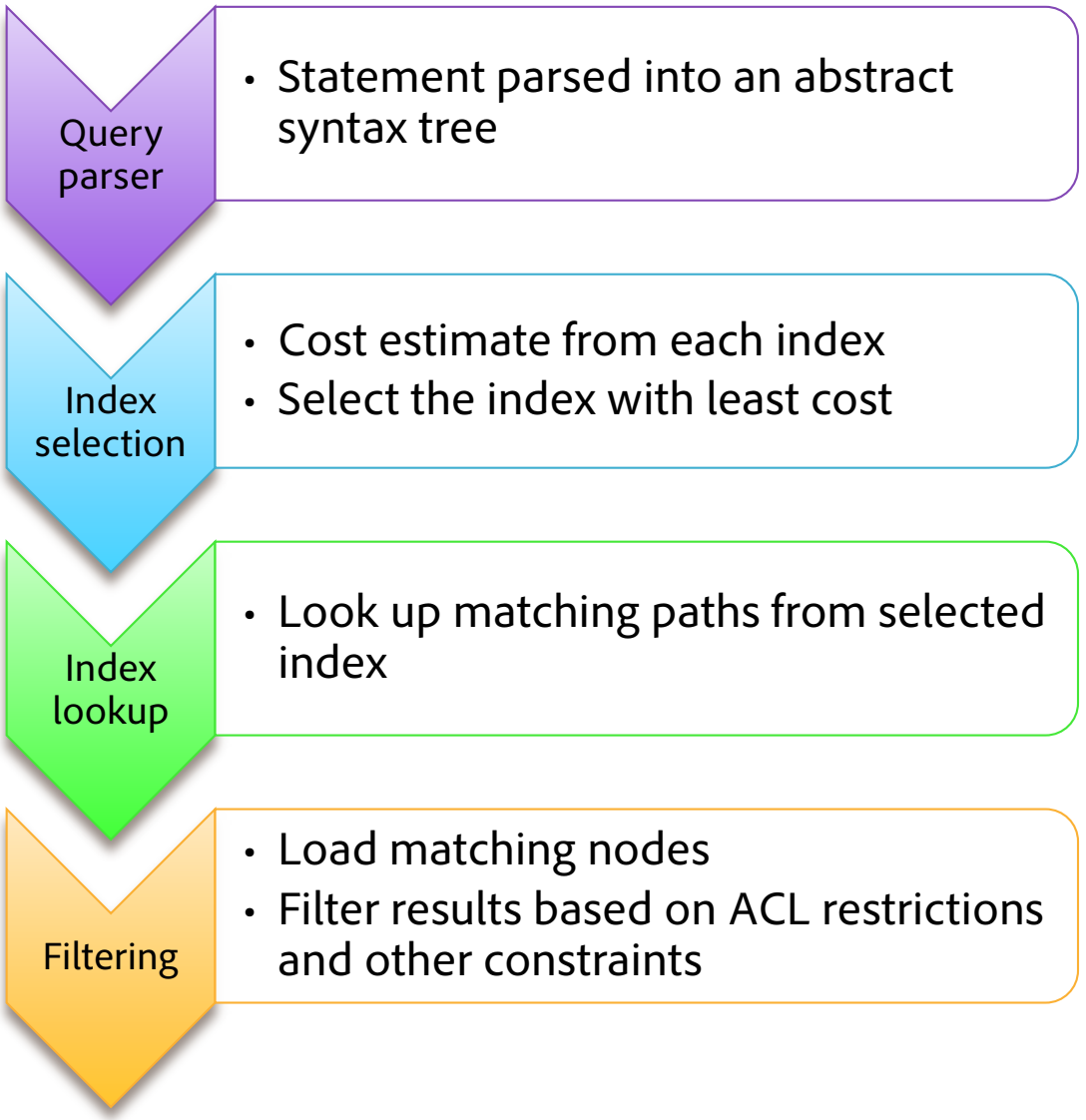
- joins
- ordering

Features not yet available:

- facets
- Aggregates

Trouble with a query?

- try the EXPLAIN feature!



Index definitions

Nodes under /oak:index

- Index data as hidden content or in an external location

Creating an index:

- add a definition node

Removing an index:

- remove the node

Re-indexing:

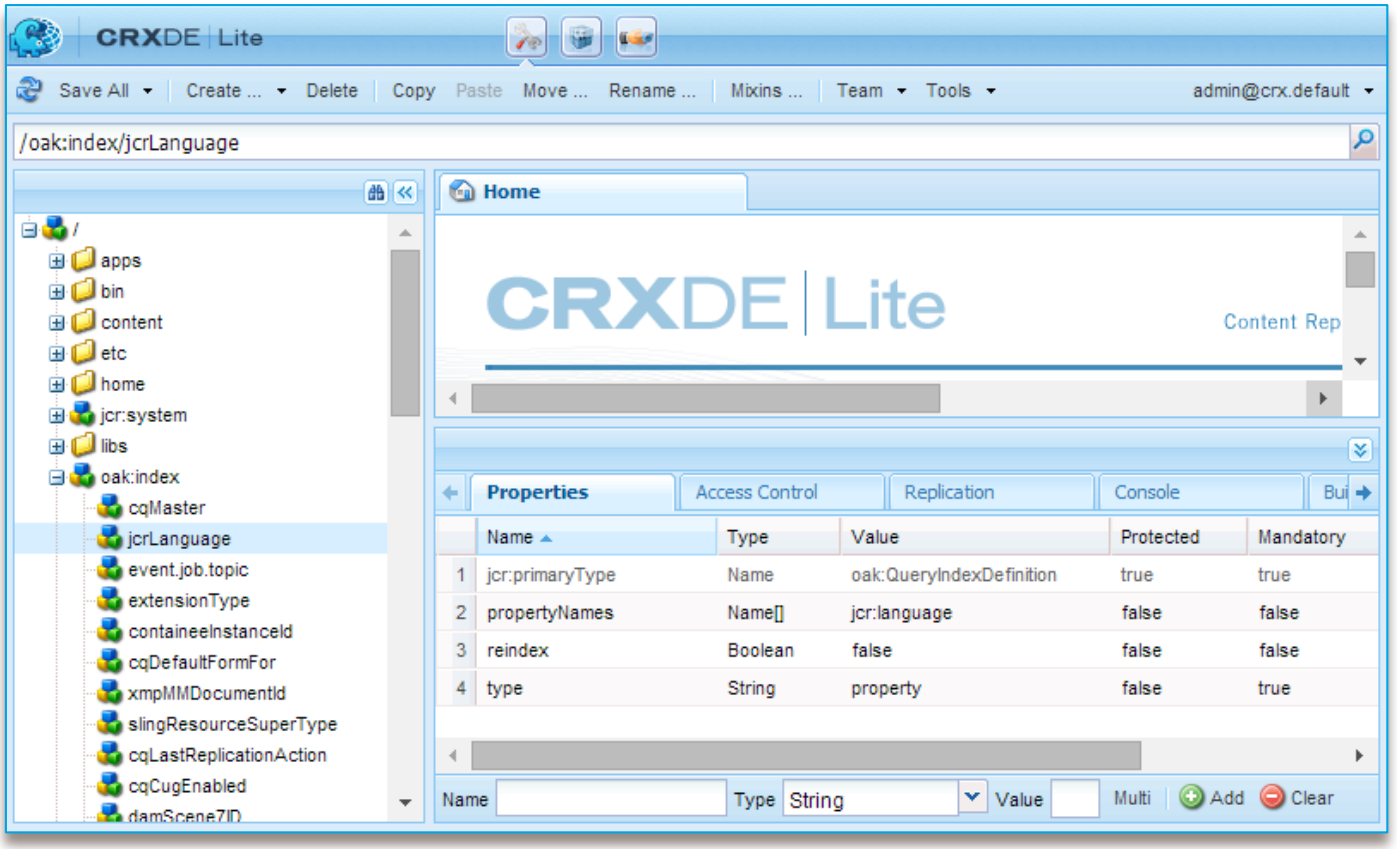
- set reindex=true

Update frequency:

- async="async"

Fallback:

- traversing index



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Property index

SELECT * FROM [mix:language]

WHERE [jcr:language]=?

jcr:primaryType	Name	oak:QueryIndexDefinition
propertyNames	Name[]	jcr:language
reindex	Boolean	false
type	String	property

Constraints on multiple properties

```
SELECT * FROM [nt:base]
WHERE foo=? AND bar=?
```

- one index on foo and another on bar
- engine automatically selects best index
- other constraints applied as extra filters
- future extension: multi-property index

Unique index

SELECT * FROM [rep:Authorizable]

WHERE [rep:principalName]=?

declaringNodeTypes	Name[]	rep:Authorizable
jcr:primaryType	Name	oak:QueryIndexDefinition
propertyNames	Name[]	rep:principalName
reindex	Boolean	false
type	String	property
unique	Boolean	true

Ordered index

```
SELECT * FROM [nt:base]
WHERE [cq:lastModified] > ?
AND [cq:lastModified] < ?
ORDER BY [cq:lastModified]
```

async	String	async
jcr:primaryType	Name	oak:QueryIndexDefinition
propertyNames	Name[]	cq:lastModified
reindex	Boolean	false
type	String	ordered

Lucene / Solr index

SELECT * FROM [nt:base]
WHERE CONTAINS(*, ?)

Lucene index files stored as hidden content inside the repository!

Solr index in an external search server.

async	String	async
excludePropertyNames	String[]	analyticsProvider, analyticsSni
includePropertyTypes	String[]	String, Binary
jcr:primaryType	Name	oak:QueryIndexDefinition
reindex	Boolean	false
type	String	lucene


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