

**adaptTo()**

APACHE SLING & FRIENDS TECH MEETUP  
BERLIN, 23-25 SEPTEMBER 2013

## Scaling CQ5

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- Web Content Management system built on Sling/JCR stack
- CQ5 scaling concepts applicable to other Sling applications
- CQ5 specific concepts:
  - Author instances/publish instances
  - Replication: technology to transport serialized JCR content between instances
  - Dispatcher: web server plugin for caching

# Performance vs. Scalability

- Performance: “it takes X secs to do Y”
- Scalability: “it takes X secs to do Y simultaneously Z times”
  - But performance can help with scalability
- This talk
  - is about horizontal scalability (vertical scaling is trivial)
  - is about pre-Oak scalability patterns

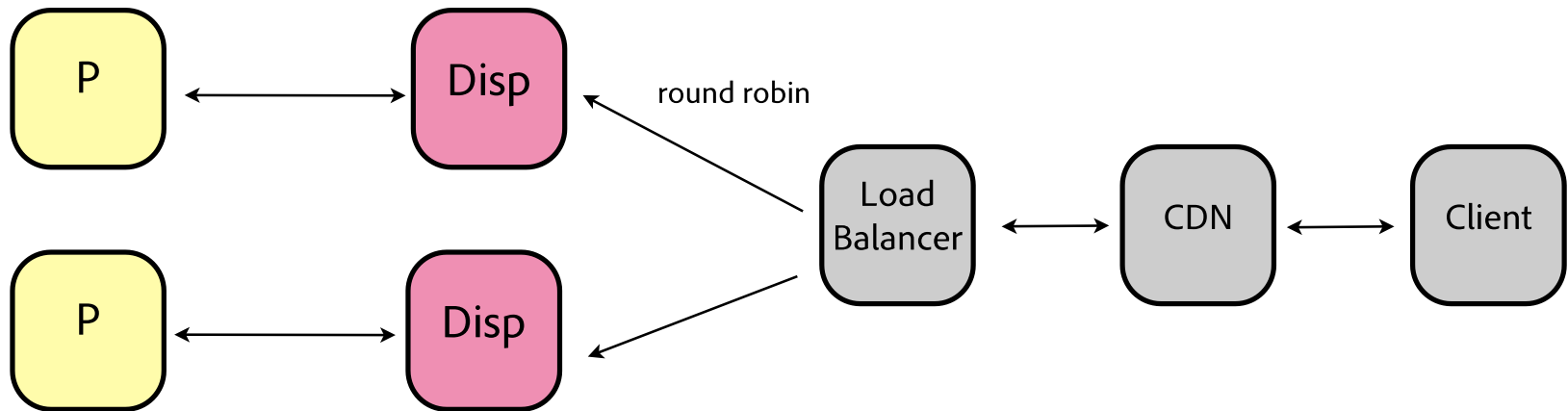
1. High Volume and High Performance Delivery
2. High Frequency Input Feed
3. Many Editors
4. High Processing Input Feed
5. High Volume Input Feed
6. Geo-distributed Editors
7. Many DAM assets
8. Geo-distributed disaster recovery

# High Volume and High Performance Delivery - Description

- Use Case:
  - High traffic site (100m impressions/d)
- Examples: [adobe.com](http://adobe.com)
- Limiting factor
  - CPU on publish

# High Volume and High Performance Delivery - Solution Pattern

- Leverage dispatcher caching as much as possible
  - in latest dispatcher: single-page dispatcher flush and scripted flushing, use to cache/flush content in dispatcher
  - SSI and/or client-side for personalized content
  - Selectors for query caching
- CDN with short TTL



- Related to rendering performance, see also
  - CQ performance patterns (use CQ timing component, prefer tree walking over JCR queries, use ClientLibraryManager to concat and minify JS, etc, see [1])
  - Generic performance patterns (reduce requests with e.g. css sprites, gzip responses, put JS calls at bottom of HTML, etc, see [2])
- Anti-Pattern
  - Adding publishers before leveraging caching

[1] <http://dev.day.com/docs/en/cq/current/deploying/performance.html>

[2] <http://shop.oreilly.com/product/9780596529307.do>

# High Frequency Input Feed - Description

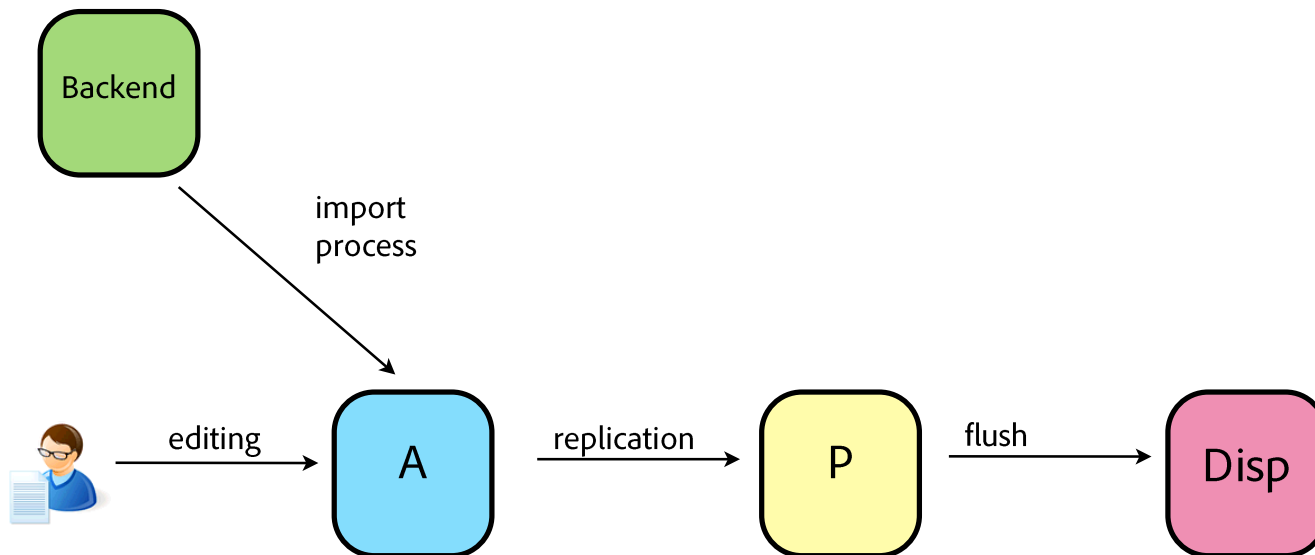
- Use Case: news feed import (moderate amounts, but constant updates)
- Limiting factor
  - Dispatcher cache invalidation
    - Therefore actual limiting factor is CPU on publish



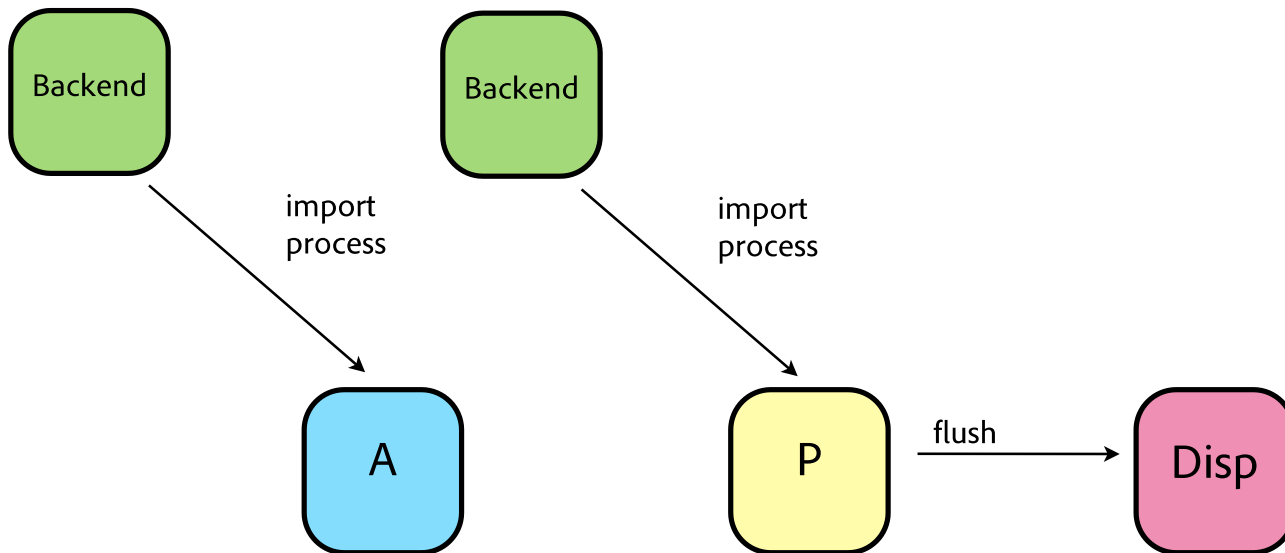
# High Frequency Input Feed - Solution Pattern

## 1

- Set up content structure so that other pages do not get invalidated on dispatcher cache
  - if possible: highly volatile content e.g. in /etc
  - with latest dispatcher: single-page flush possible
- Separate replication queue (so that main queue is not blocked)



- Set up content structure so that other pages do not get invalidated on dispatcher cache
  - as previous pattern
- Import directly into Publish (no replication necessary)



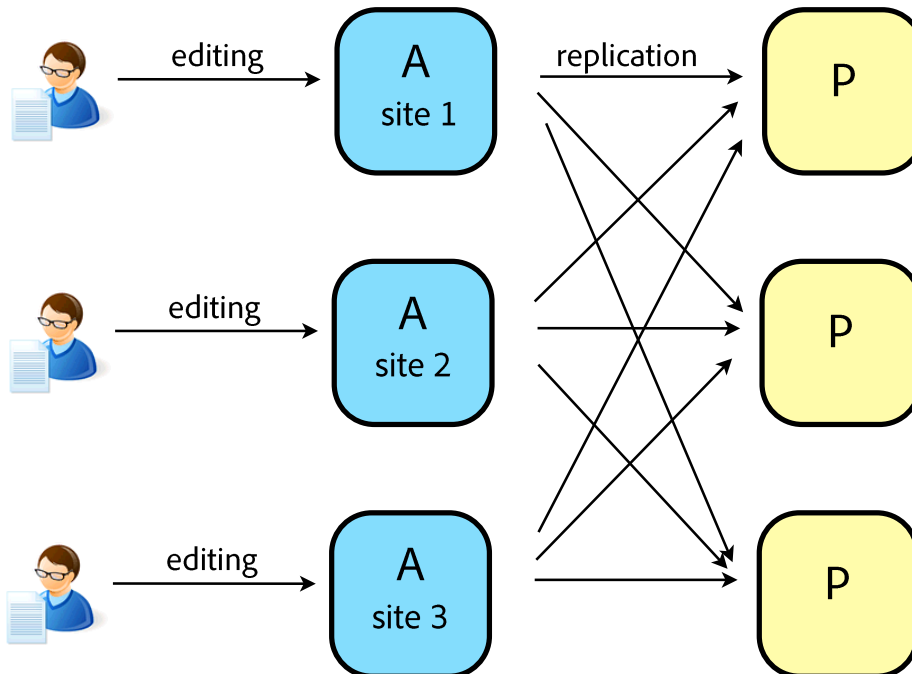
- Questions to ask
  - Human filtering/processing needed? Then imports should be on author and replicated.
    - If no: is the use case OK with different states on publish?
      - if yes: no replication needed, then pattern 2 is preferable

# Many Editors - Description

- Use Case:
  - News or media portal
  - >50 editors editing content concurrently
- Limiting factor
  - Depends on what do the editors actually do:
    - Heavyweight editing, e.g. MSM rollouts, starting WFs: repository- or CPU-bound
    - Lightweight editing: CPU bound

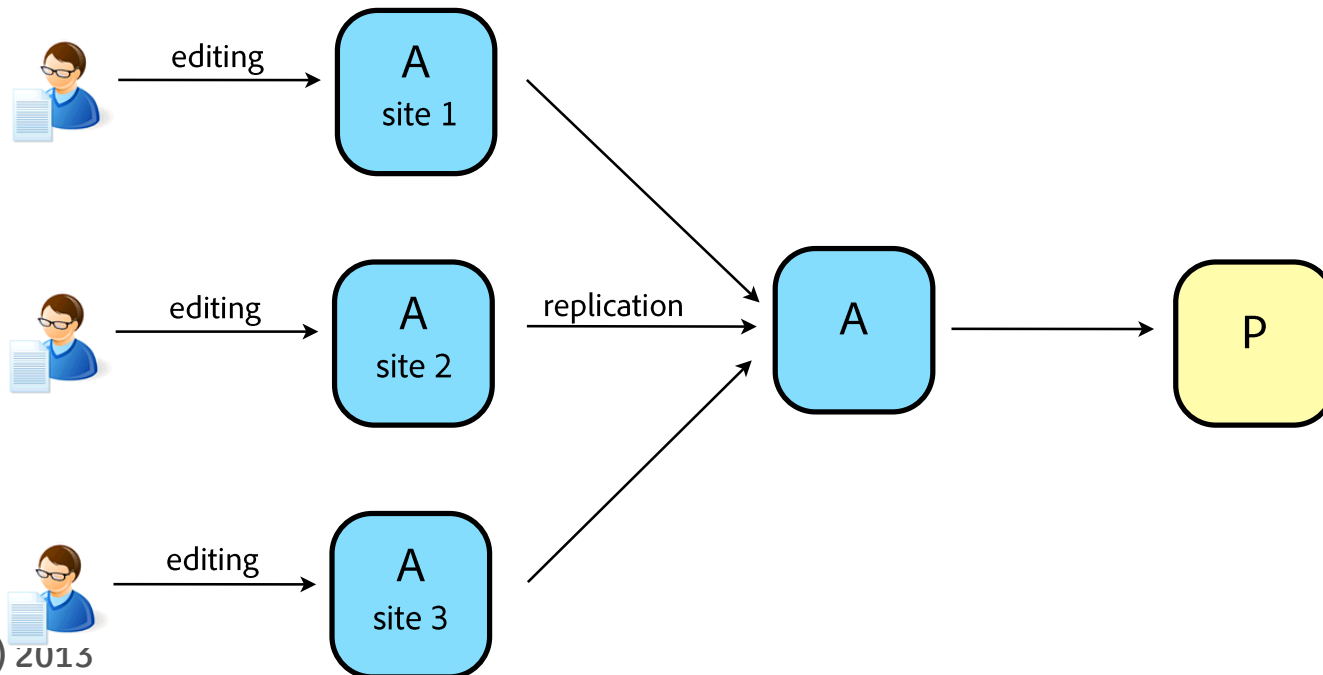
# Many Editors - Solution Pattern 1

- Sharding: split up different web sites / parts of web sites onto separate author instances
- Publish instances are shared



# Many Editors - Solution Pattern 2

- Sharding: split up different web sites into separate author instances, but replicate into one main author, e.g. for shared workflow processes
  - Practical if the shards do not need to share content.
  - Cross-replication can be done, but will be hard to keep consistent
- Publish instances are shared

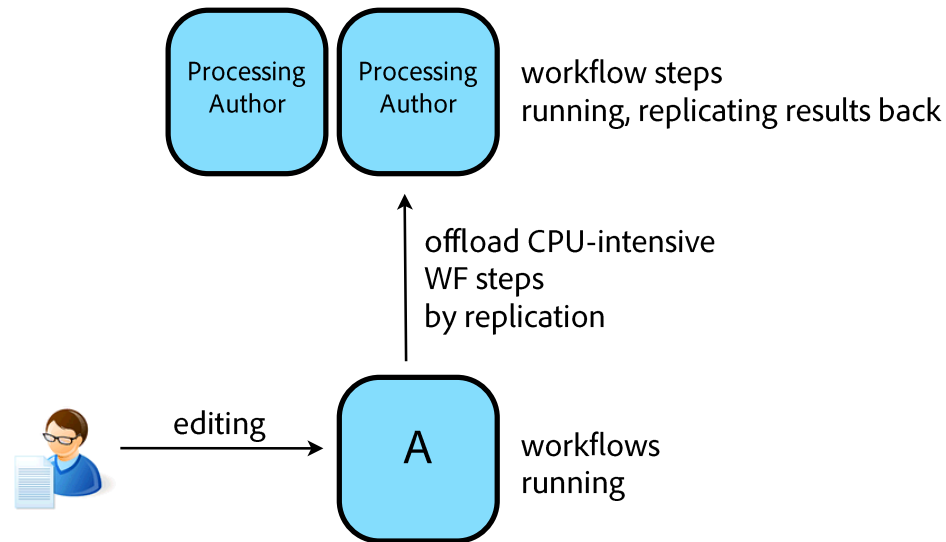


- **Notes**
  - Author dispatcher helps to reduce CPU load on author instances
  - Author cluster instead of sharding will mitigate the problem if CPU-bound

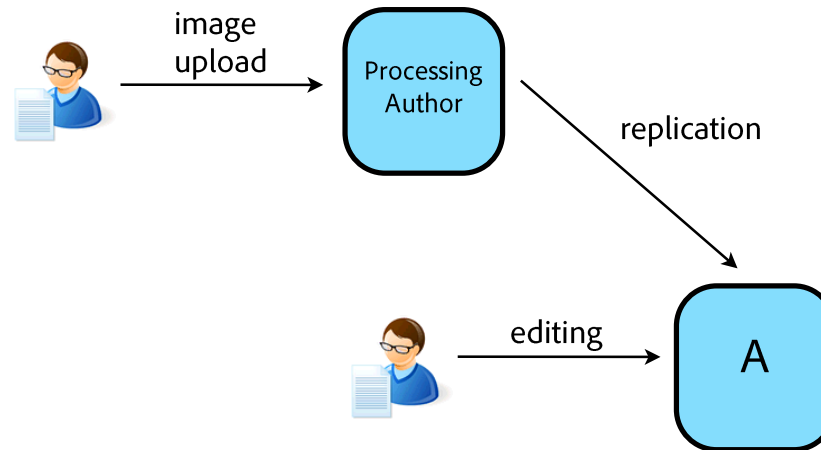
- **Use Case:**
  - **DAM import of images**
    - 1000 images at once
    - happens regularly
    - other editors are editing content at the same time
- **Limiting factor**
  - CPU, memory on author



- Separate processing instances from human editing instances
  - Offload 1 Workflow step, e.g. thumbnail generation from PSDs
  - There can be more than 1 processing instance
  - Replicate back and forth in packages if possible
  - CQ5.6.1: share DS between instances and replicate without binary, offloading framework



- Separate pre-processing instances for uploading
  - There can be more than 1 pre-processing instance
  - CQ5.6.1: share DS between instances and replicate without binary

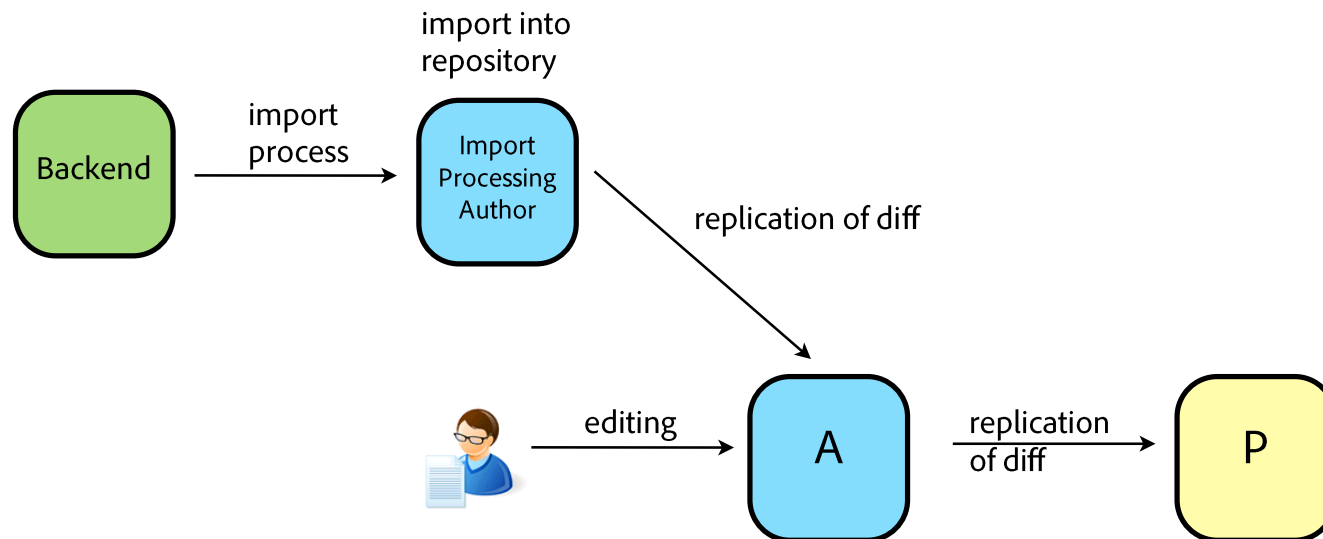


- Notes
  - Author cluster can help mitigate the problem, but editors must edit content on slave
  - Throttling WFs or execution during night can help mitigate the problem
  - If the import is limited by CPU needed image conversion consider using ImageMagick rather than Java

- **Use Case:**
  - **Product data import**
    - 1 million products, 10000 modifications/day
- **Limiting factor**
  - **Writing to the repository**
    - reads are also blocked
  - **Potentially (to a lesser degree) in case repository scans are needed to create diffs:**
    - CPU for calculating diffs
    - Repository read caches get flushed

# High Volume Input Feed - Solution Pattern

- Separate import instance to process imports, partition if possible
  - only useful if import requires significant CPU (e.g. no diff delivered)
- Replicate to author
  - Replicate as package
  - CQ5.6.1: share DS between instances and replicate without binary
- Replication to publish as package if possible



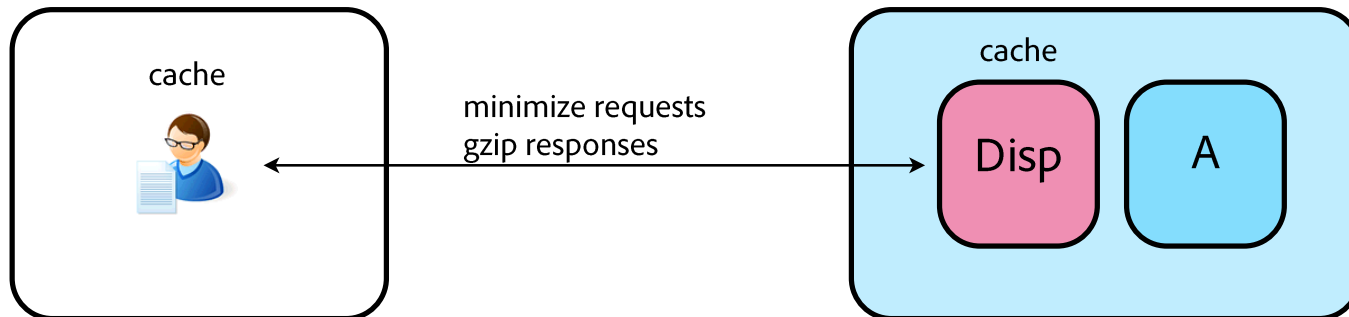
# High Volume Input Feed

- Questions to ask
  - Can the import be throttled? Most problems get much less severe.
  - Do all changes get on publish?
- Notes
  - Use batch saves (1000 nodes) on import (reduces overhead in indexing, etc and speeds up the import overall)
  - Import as nt:unstructured rather cq:Page if possible
    - If not: switch off heavy listeners (e.g. ContentSync) or use the JcrObservationThrottle
- Anti-Pattern
  - Usage of network disc (usually have high latency)
  - Replicating to publish through same replication queue as editorial content

- Use Case:
  - Editors located in different geos (US, EMEA, APAC)
- Limiting factor
  - Bandwidth between editor location and author server location

# Geo-distributed Editors - Solution Pattern

- Use Dispatcher in front of Author
- Guiding principle: limit traffic between Dispatcher and editor location.
  - gzip traffic
  - Use Client Library Manager to minimize traffic
    - minify, concat and gzip all client libraries
  - Cache all responses that are not under /content in
    - Editor's browser cache
    - Potentially also dispatcher cache





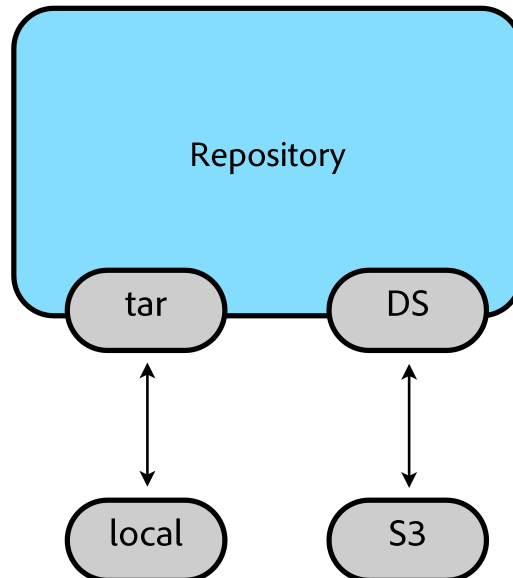
- Notes
  - In extreme cases consider writing templates that treat author renditions differently from publish renditions (especially reducing the number of necessary requests, e.g. by dropping requests to tracking servers, external CSS, etc)
  - Or use Scaffolding for editing

# Many DAM Assets

- Use Case:
  - Many assets (>5Mio) in DAM
- Limiting factor
  - Disc space

# Many DAM Assets - Solution Pattern

- Split physical storage of data store and repository tar files
  - tar files need disc with very low latency
  - for data store high latency is acceptable
  - Locate data store on cheap discs remotely (NAS, S3)
- Share data store between instances
  - In 5.6.1: use binary-less replication in case of shared DS to minimize network traffic



- **Notes**
  - In case of shared DS: the DS garbage collection needs to be run on an instance that keeps references to all assets in DS
  - In 5.6.1: huge performance improvements (~10x or more) for DS GC when the persistence is tar-based

- Use Case:
  - Data centers located in different geos
  - One DC shall act as failover for author
- Limiting factor
  - Latency between DCs (in very low latency cases CRX clustering could be used)

# Geo-distributed disaster recovery - Solution Pattern

- Use file level tools like rsync to create replicas in 2nd DC
- Hourly: sync data store
  - This is usually the most time consuming part
  - Sync can be performed anytime, due to add-only data store architecture
- Nightly:
  - Create incremental backup into filesystem on 1st DC to get consistent state of files
  - Rsync backup to 2nd DC. For that period CQ on 2nd DC must not be running.

Thanks!