Experiments in AEM Author Scalability

Matt Ryan | Sr. Software Engineer | Adobe

Agenda:

1. Scalability and AEM Authors
    1. Why is it needed?
    2. What is meant by “scalability”?
    3. Where to focus the efforts?
2. What has been done to scale AEM?
3. Q & A

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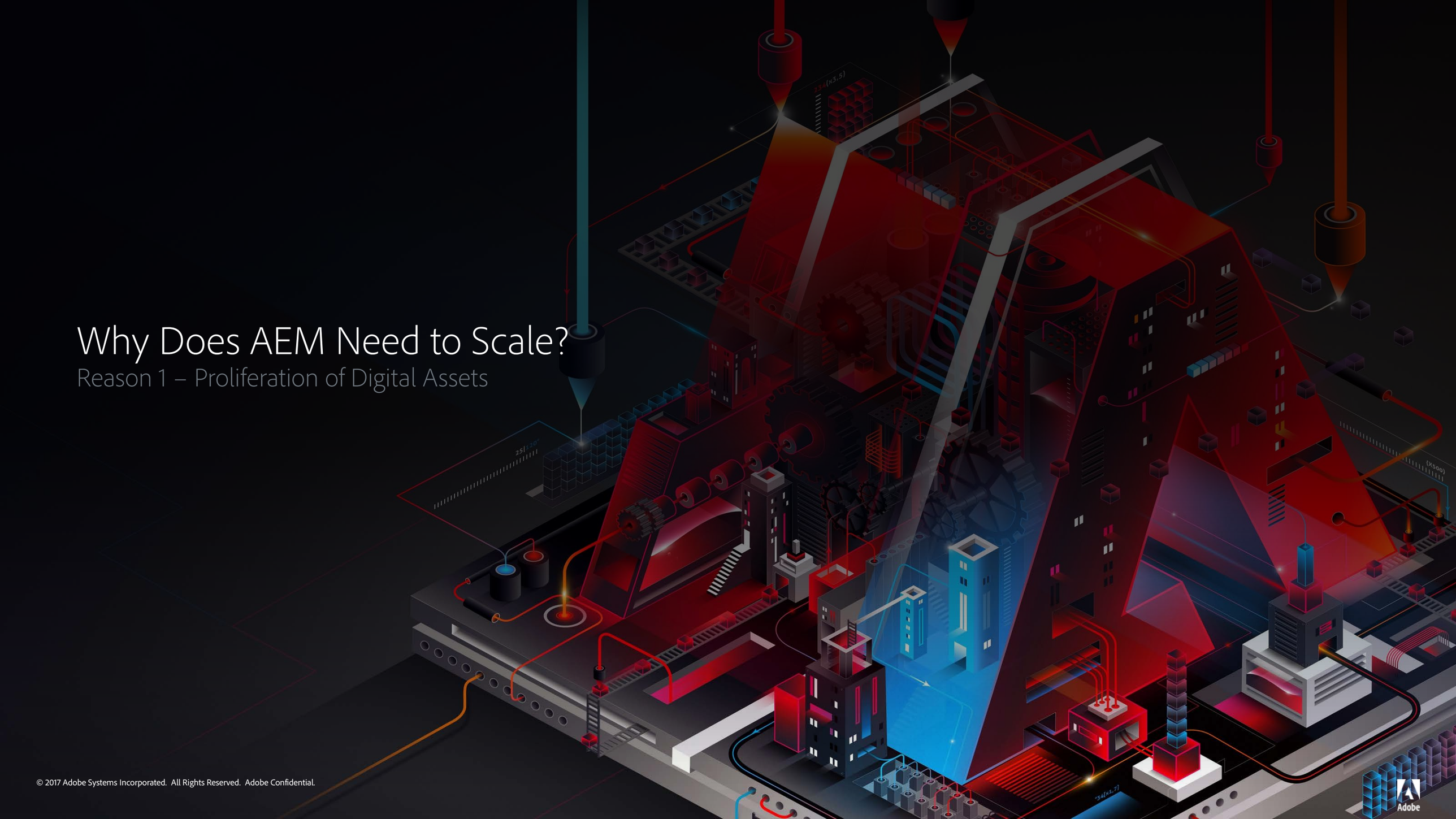
Why Does AEM Need to Scale?

Reason 1 – Proliferation of Digital Assets



The Digital Asset Explosion

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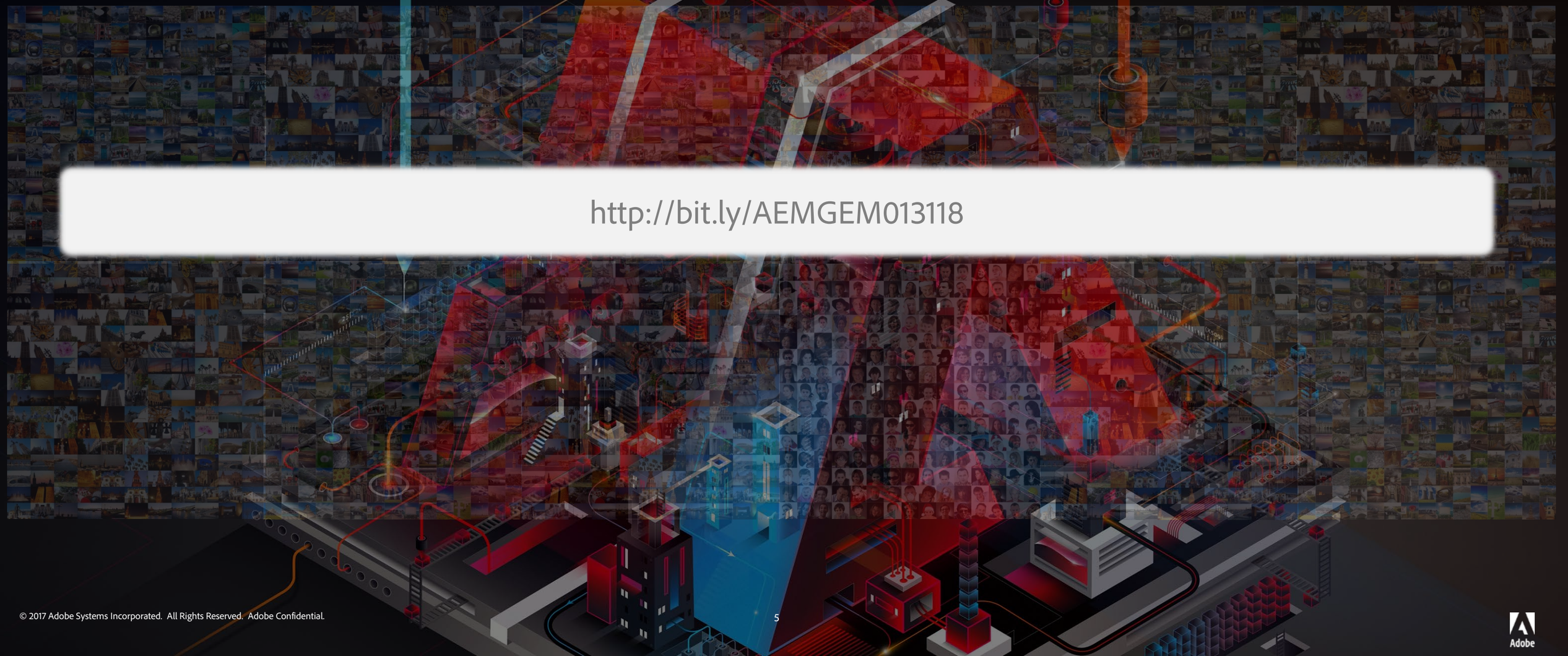
The Digital Asset Explosion



http://bit.ly/AEMGEM013118

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Years Ago – Selective in Taking Photos

Years ago, film was expensive and the number of pictures per film pack was low.

As a result, we were much more selective in taking photos.

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Today – Proliferation of Photos

Today most of us carry a camera around in our pocket, capable of taking and storing thousands of high-quality photos.

As a result, we are much less selective about the photos we take.

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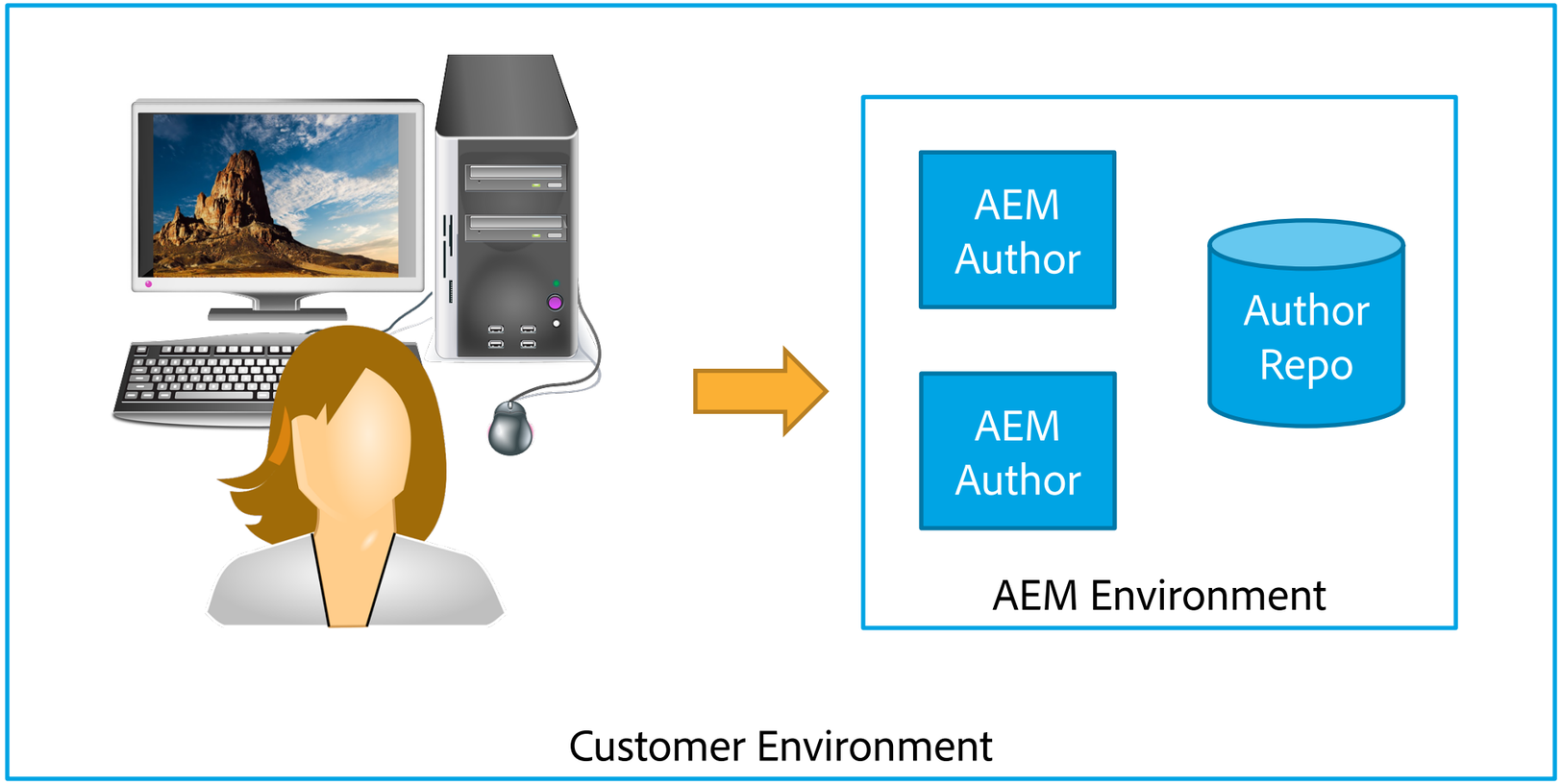
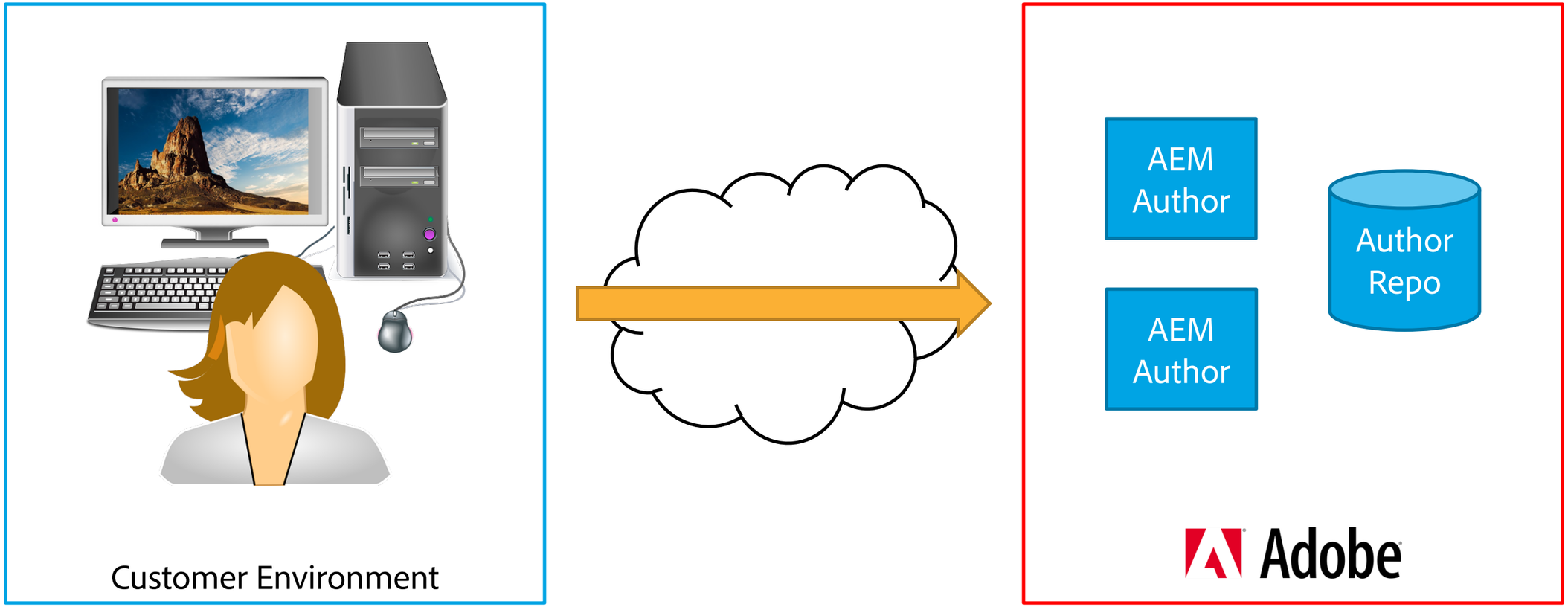
Why Does AEM Need to Scale?

Reason Two – Changing Deployment Models

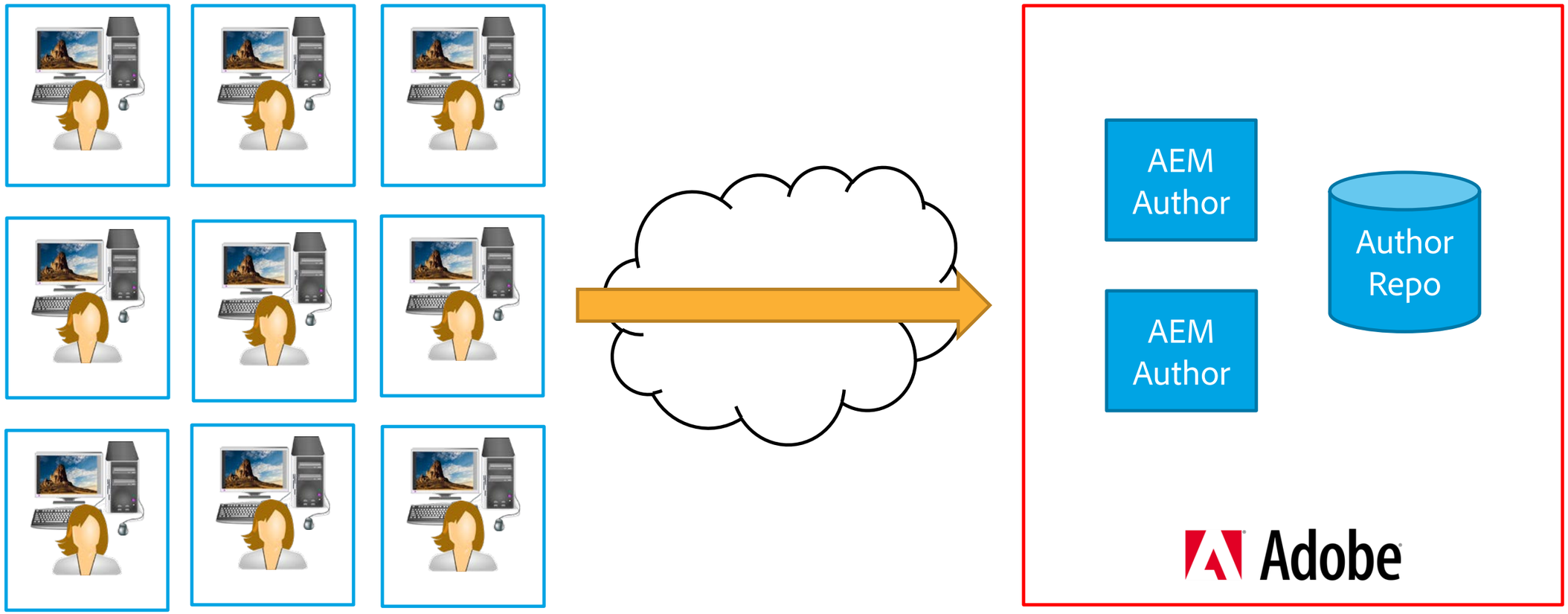
On-Premise AEM to Hosted AEM



On-Premise AEM to Hosted AEM



On-Premise AEM to Hosted AEM



Common Approaches to Application Scalability

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Common Approaches to Application Scalability

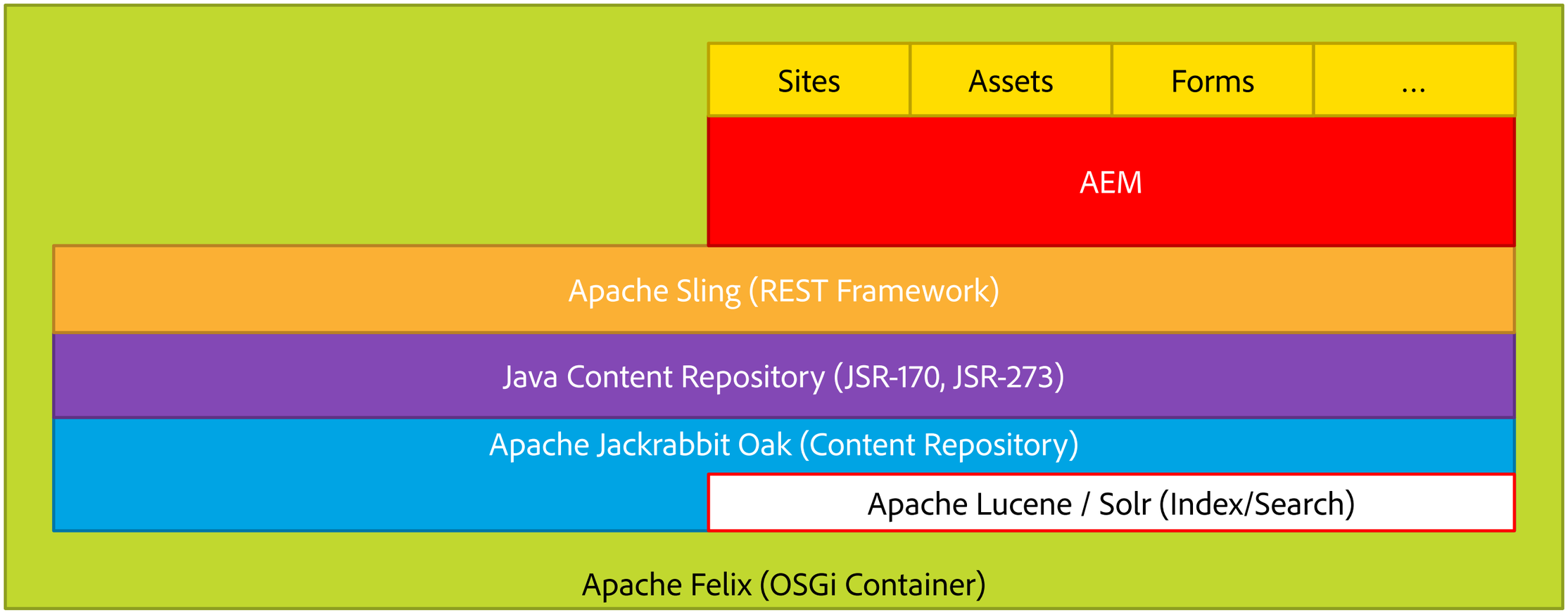
Vertical Scalability

Horizontal Scalability

Data Partitioning

Where Should We Focus Scalability Efforts?

The Architecture of AEM – What Needs to Scale?



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The Core of AEM – Apache Jackrabbit Oak

Apache Jackrabbit Oak (Content Repository)

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Separate Data Storage from Oak

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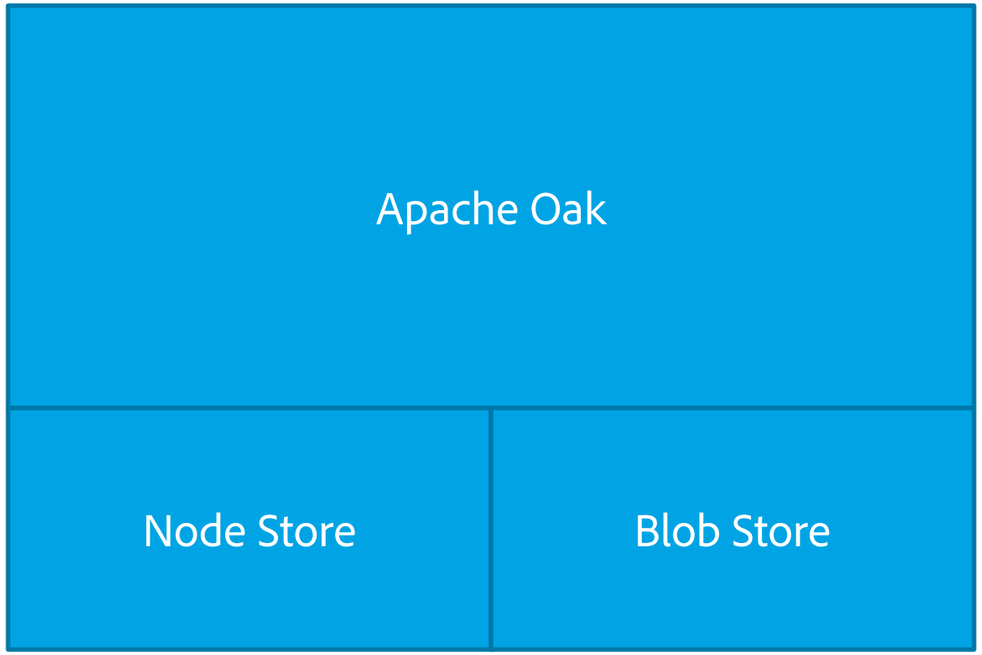
Separating Data Storage from Oak



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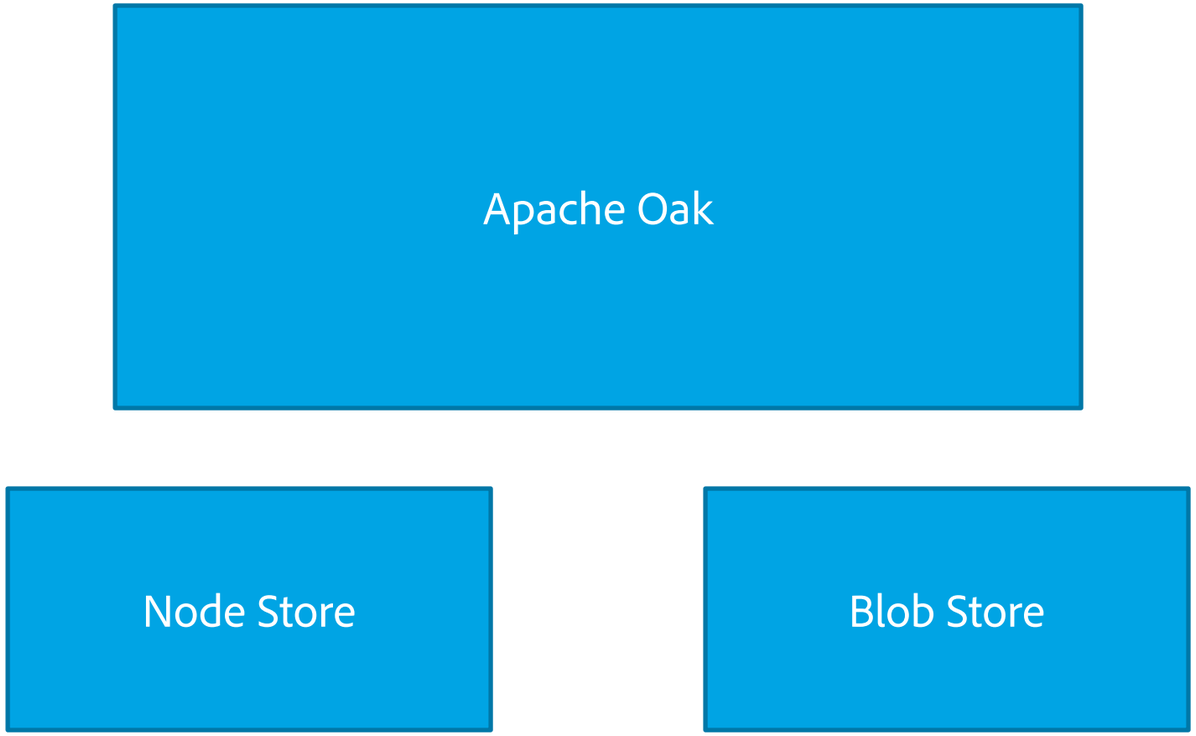
Separating Data Storage from Oak



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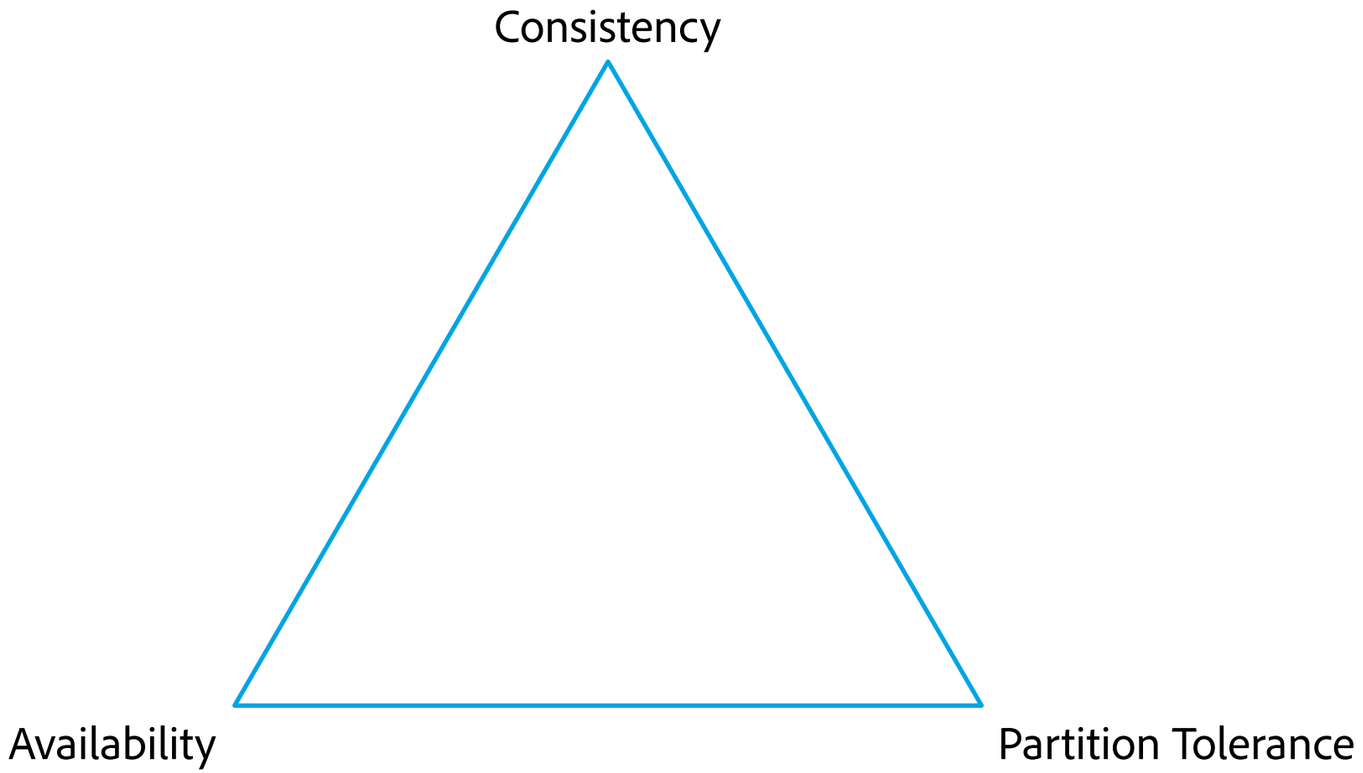
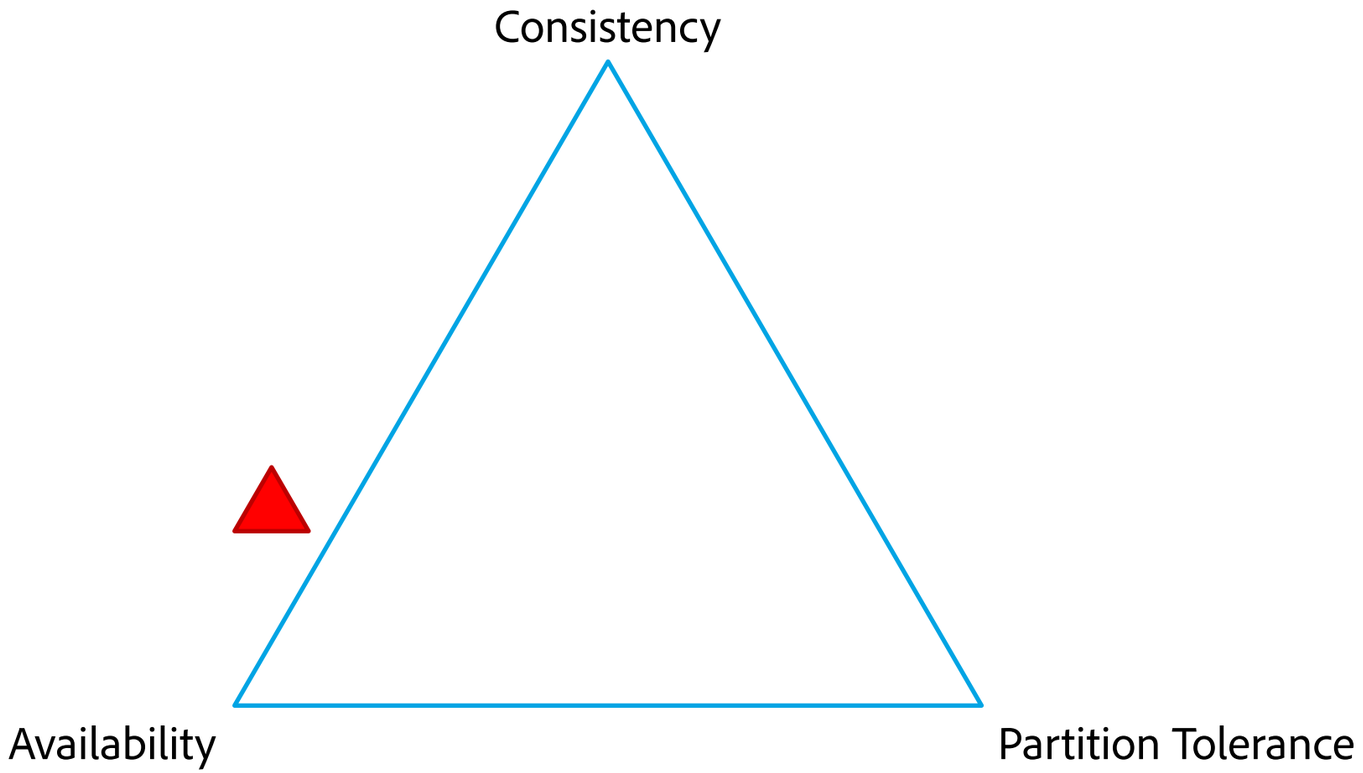
CAP Theorem



CAP Theorem and AEM



Scaling the Blob Store

Scalable blob storage is a solved problem.

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Scalable database storage is a solved problem.

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Scalable database storage is a solved problem…?

What is the consistency model of MongoDB?

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A Hypothetical MongoDB Deployment

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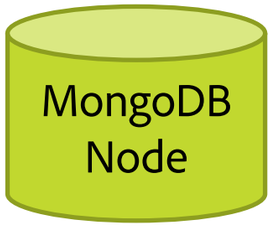

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A Hypothetical MongoDB Deployment

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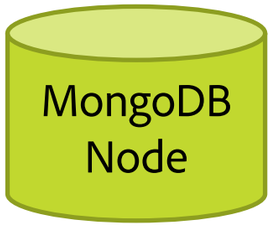

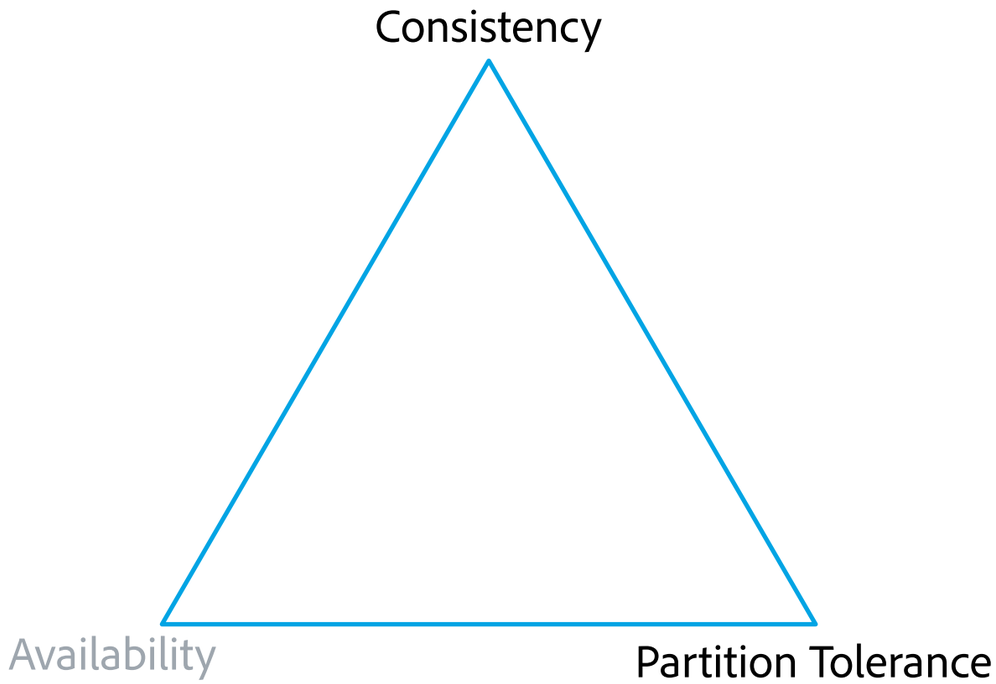

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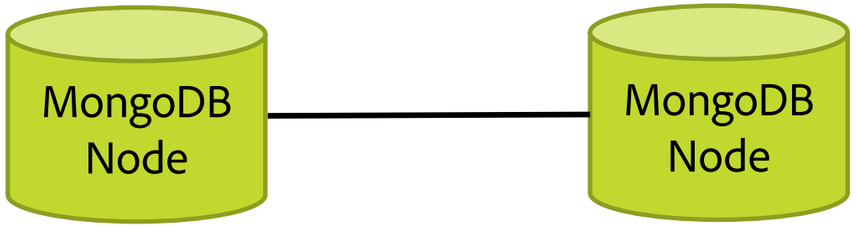

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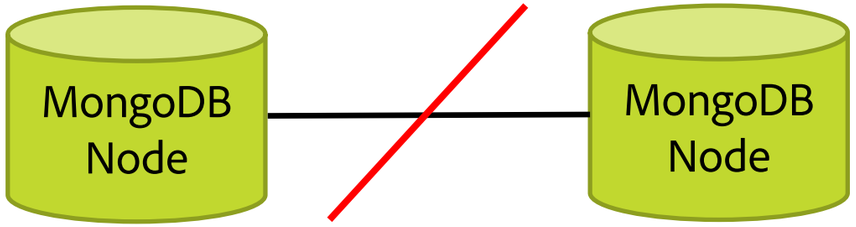

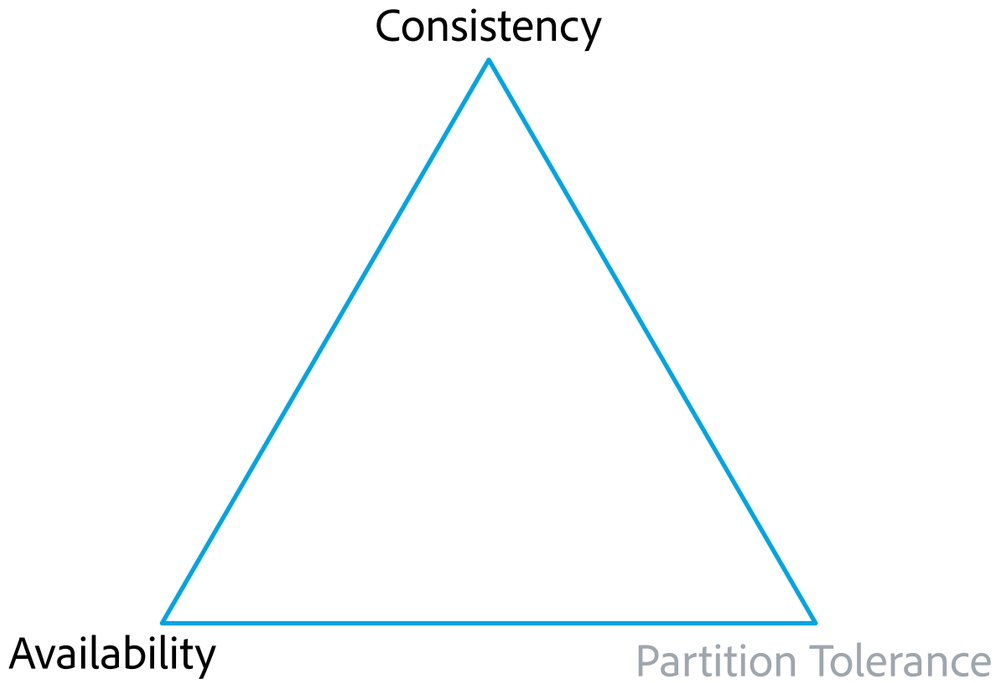

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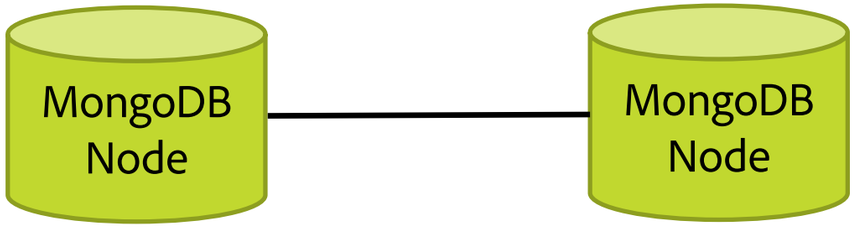

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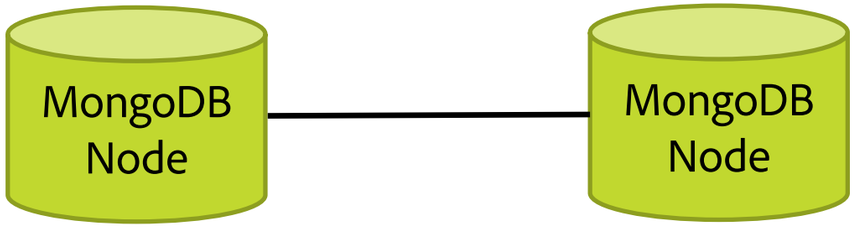

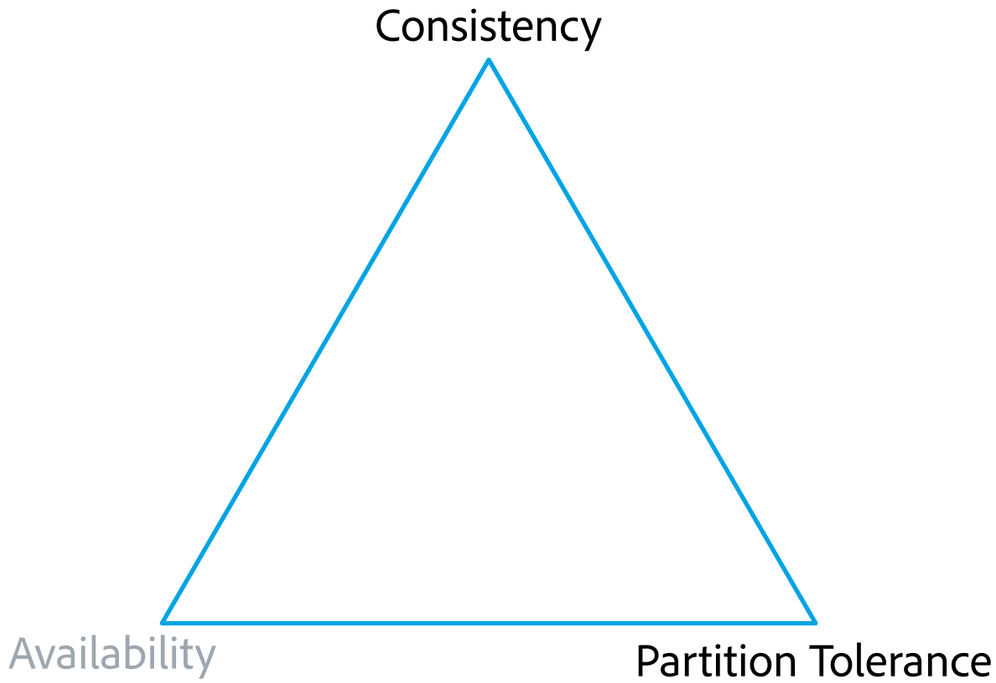

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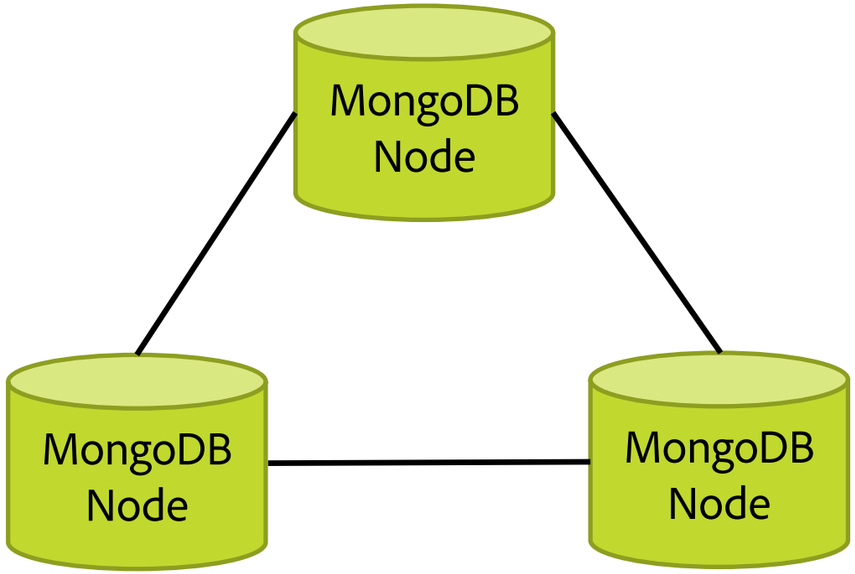

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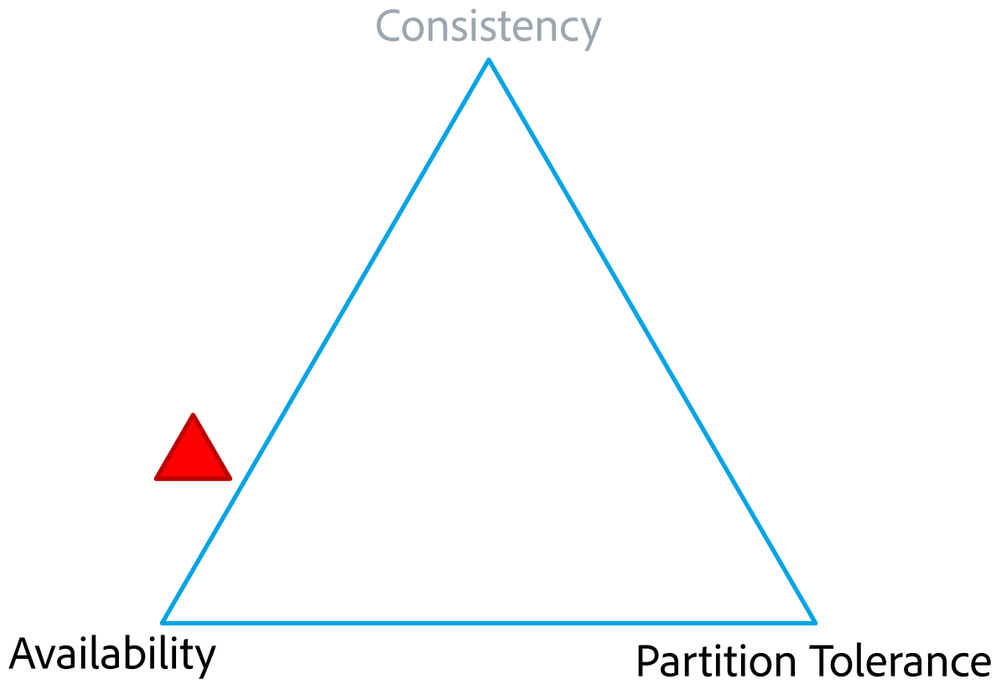

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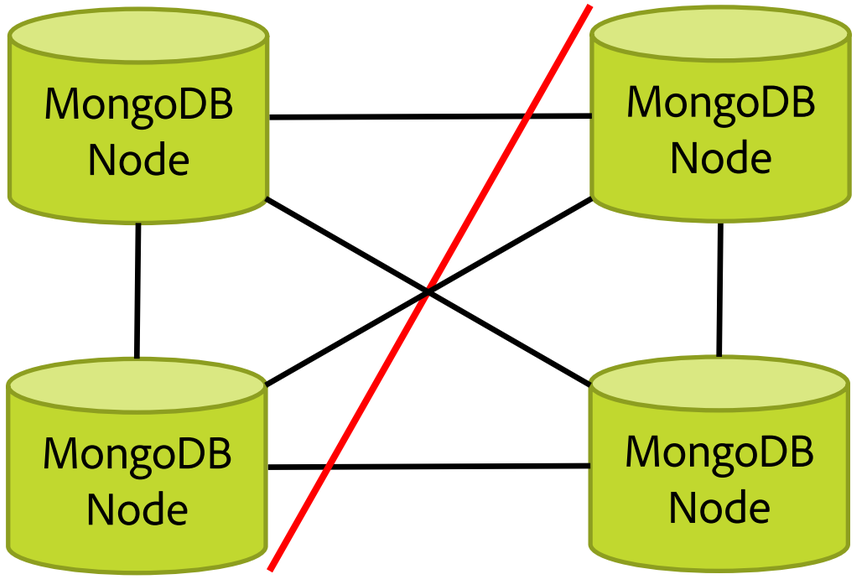

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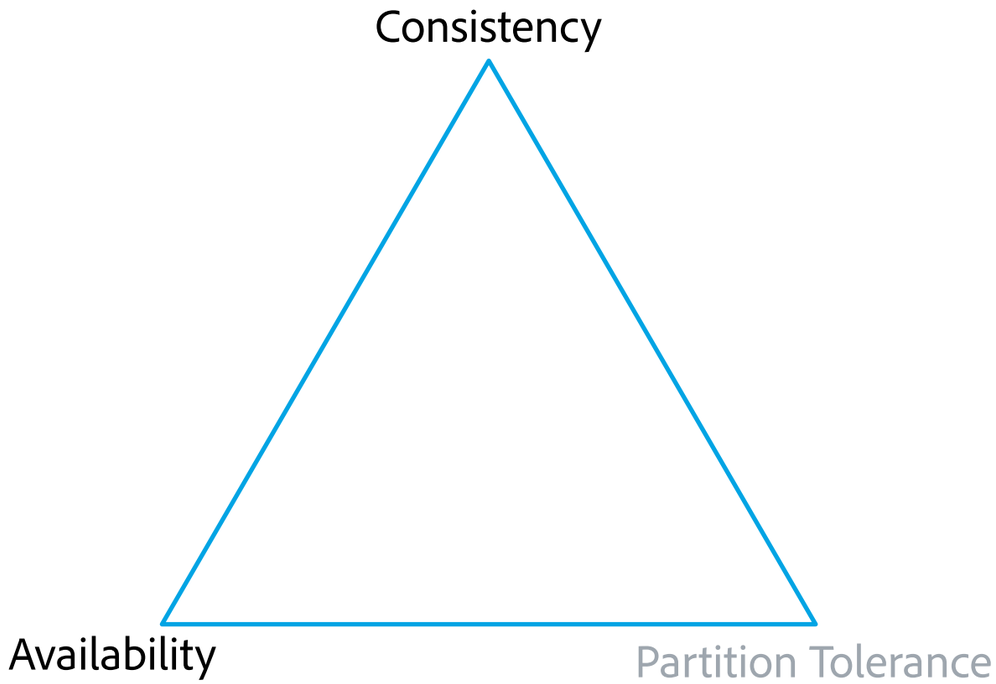

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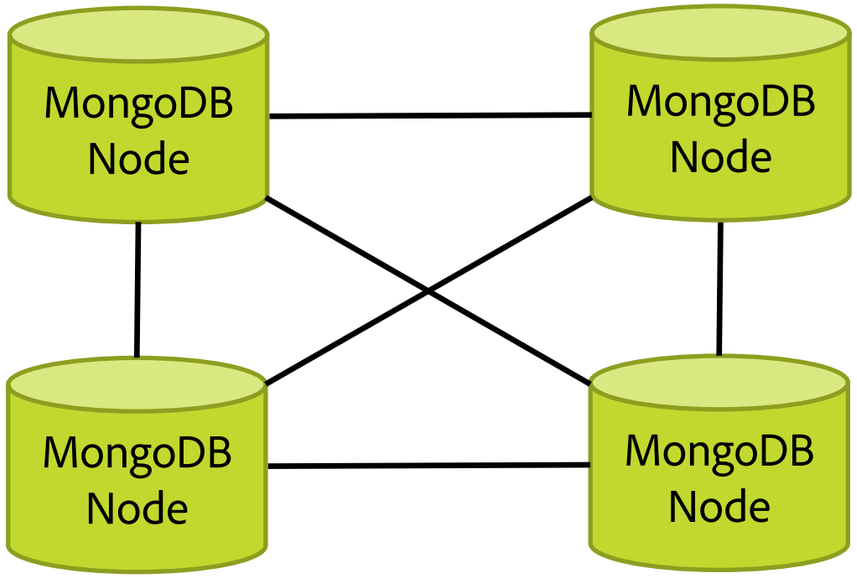

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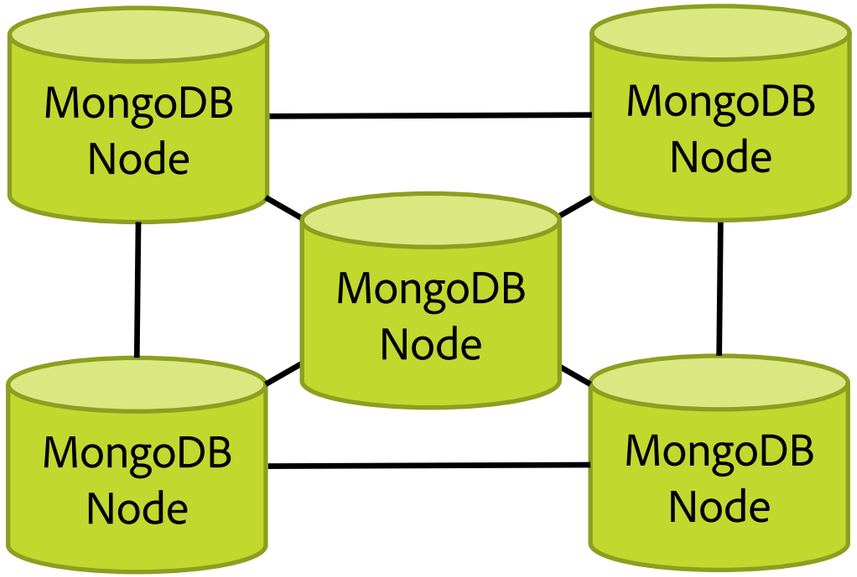
A Hypothetical MongoDB Deployment



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Takeaway

Math and physics says there are limits to how far you can reasonably scale a database.

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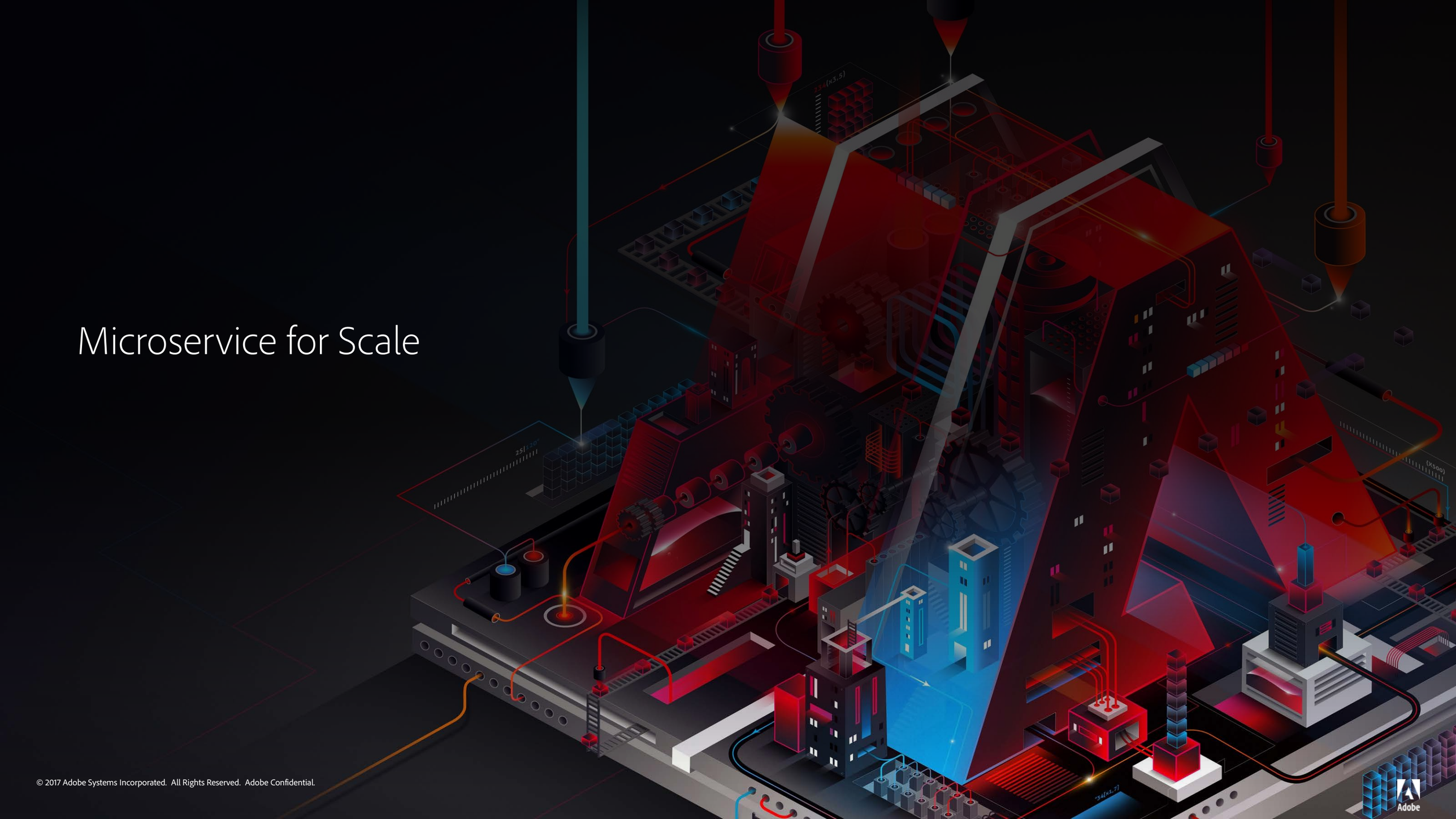
Microservice for Scale

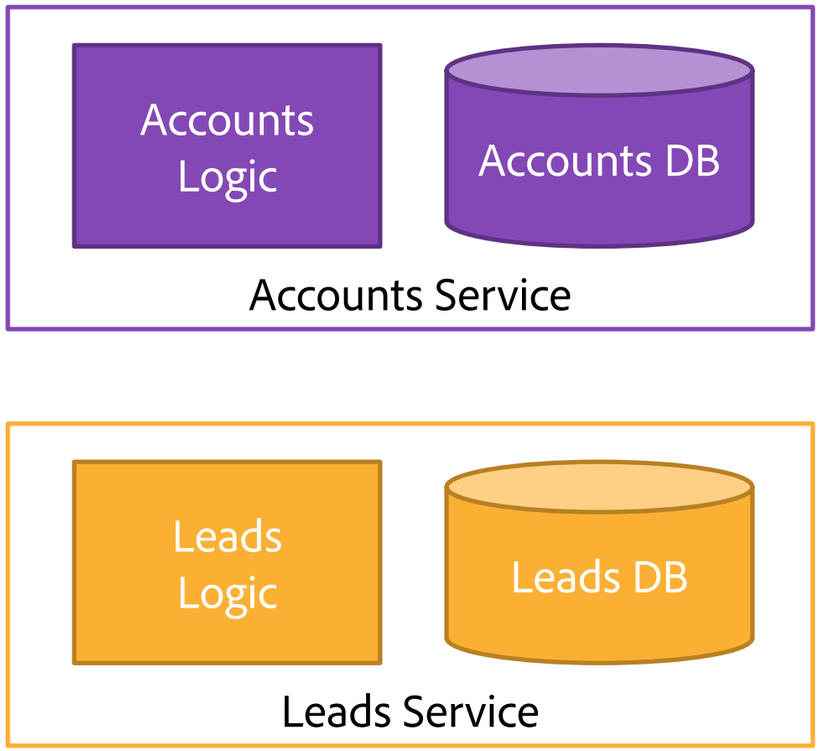


Microservices!!!

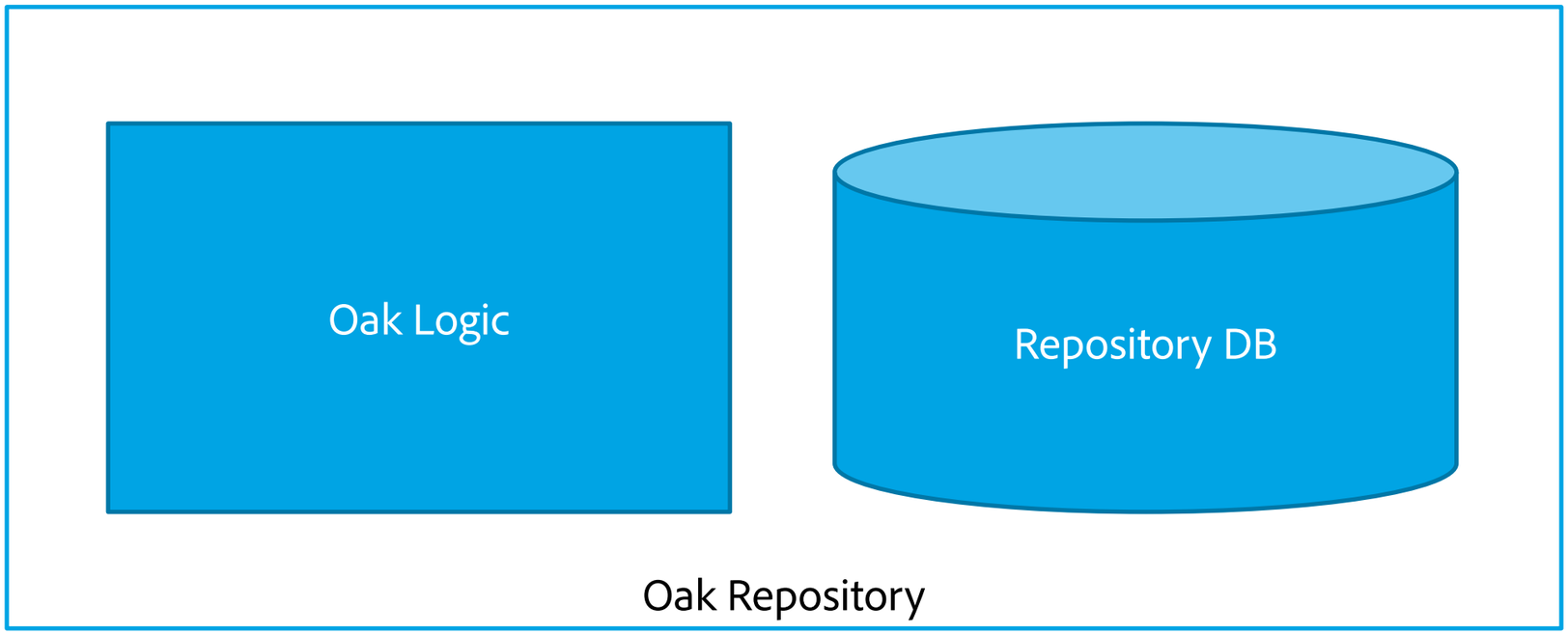
We should microservice Oak.

What is a Microservice?

- Small, autonomous services that work together[1]
- Single Responsibility Principle
- Independently deployable, manageable, and scalable
- Loose couplings
  - No shared data



Splitting Oak into Microservices



- What are Oak's responsibilities?
- How do you split the data for Oak?

Microservices???

Should we microservice Oak?

Takeaway

Microservices are inseparable from their data.

Scalability Challenge Number One

You cannot split a data store into true microservices.

Splitting AEM by Function (Not True Microservices)

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Splitting out AEM Functionality

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Splitting out AEM Functionality

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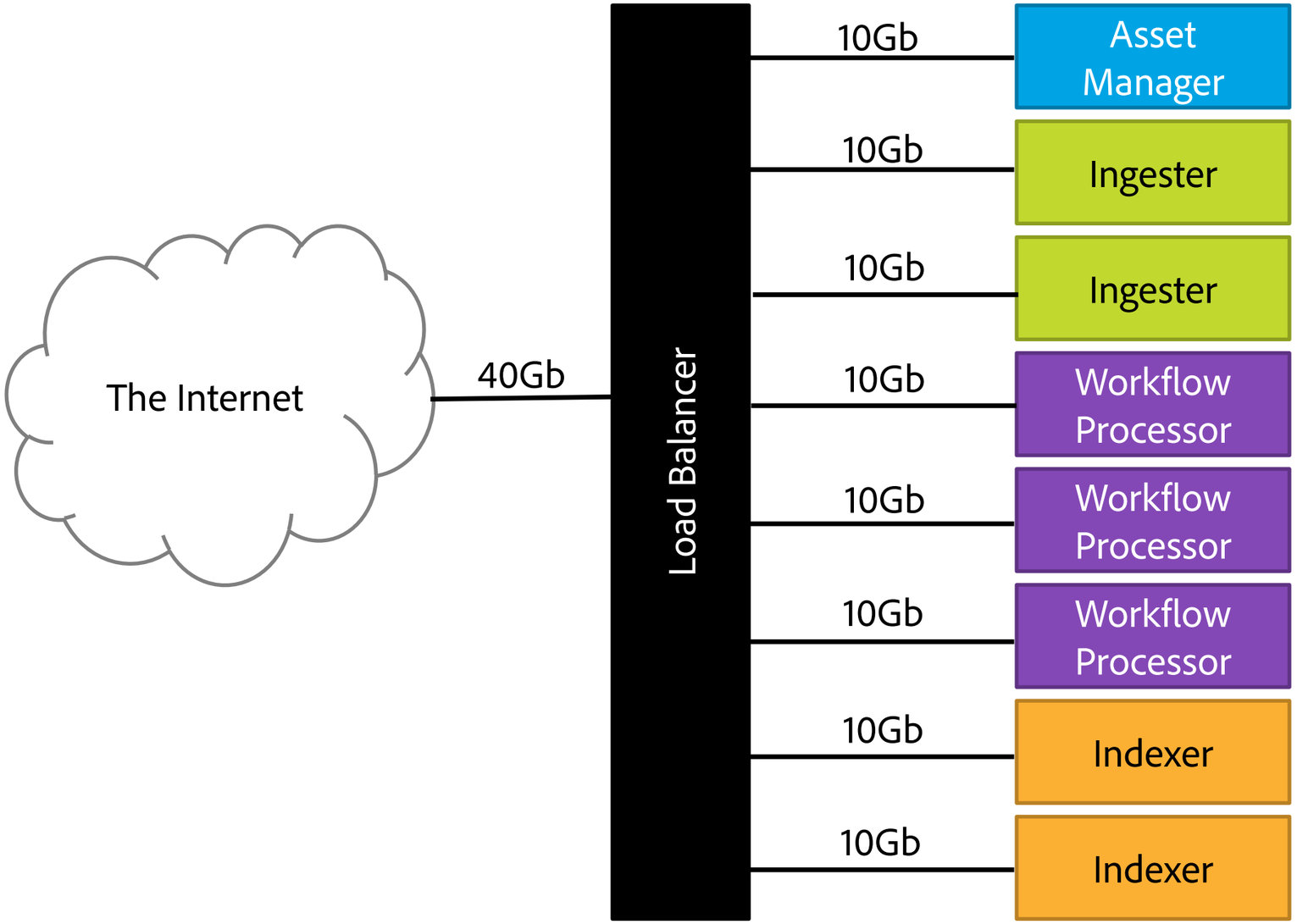
Problem Solved



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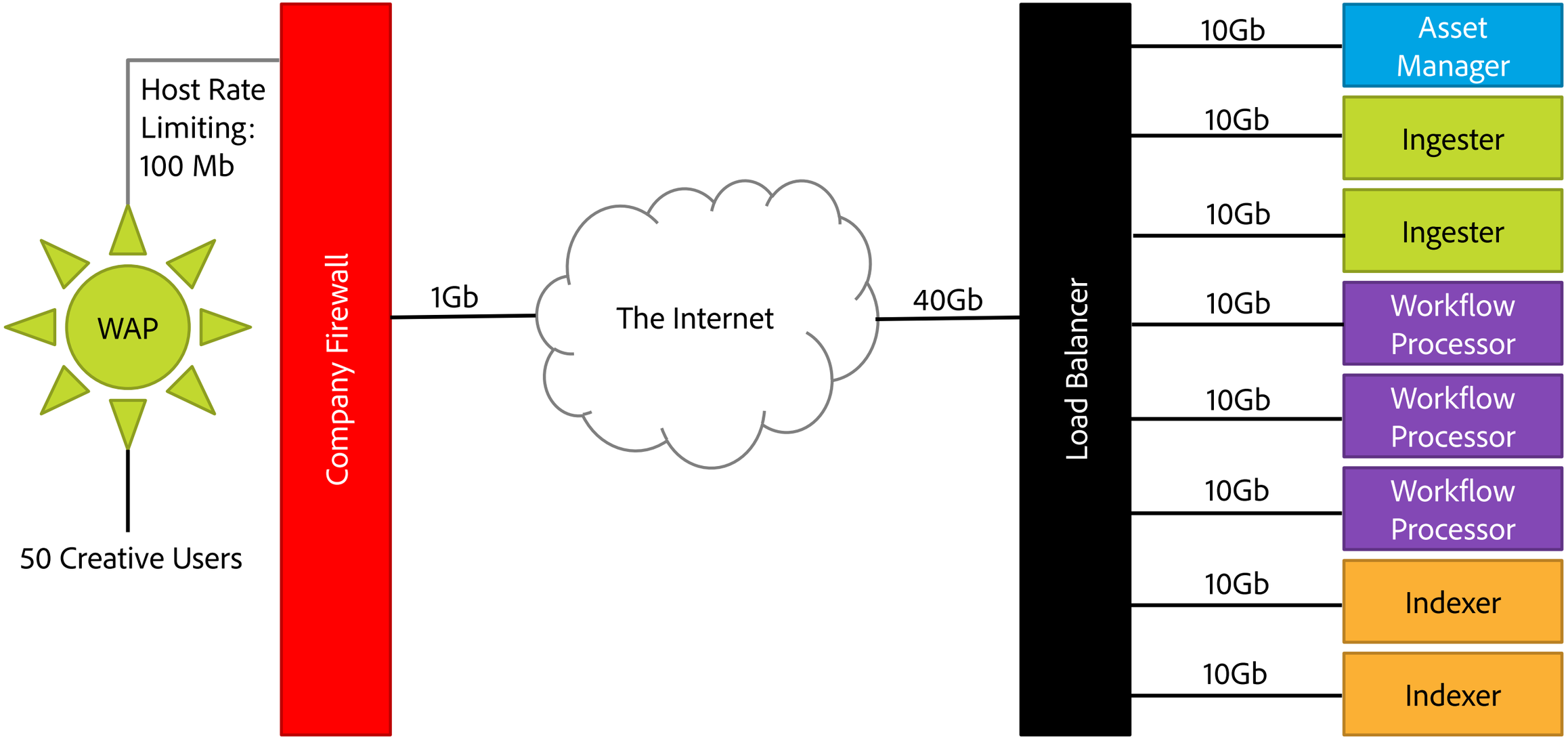
Problem Solved…???



Zero Problems Solved

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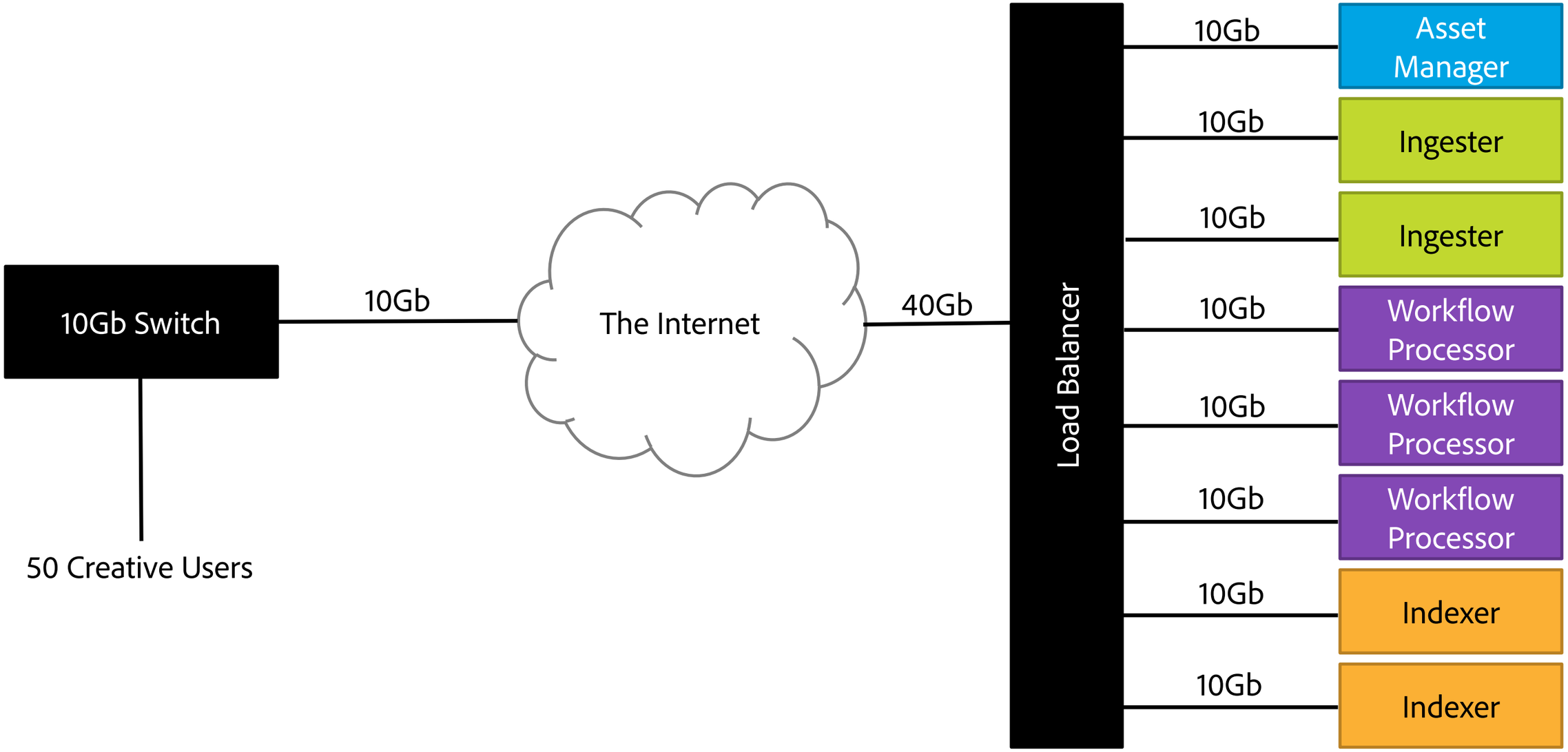
Scalability Challenge Number Two

LAN infrastructure may limit the ability to scale effectively.

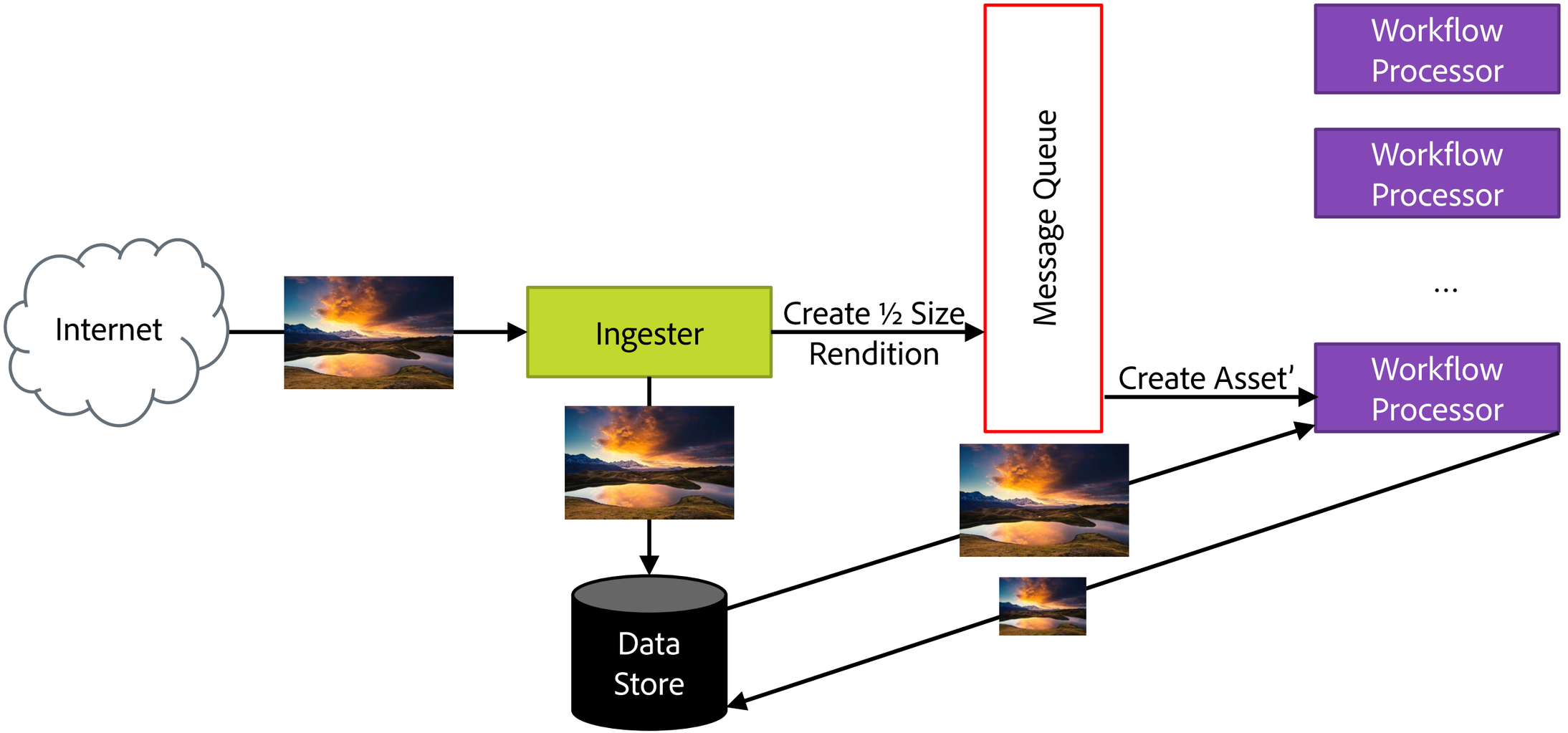
Takeaway

Be clear about the benefits you hope to gain when refactoring for scalability.

Problem Solved…???



Scaling the Ingestion Process



Is it worth the expense?

1. Research message queueing systems to determine best fit
2. Adding a message queueing system
3. Modify code to use a queue
4. Modify code to us an asynchronous model
5. Split codebase into distinct services
6. Run services on separate infrastructure
7. Testing

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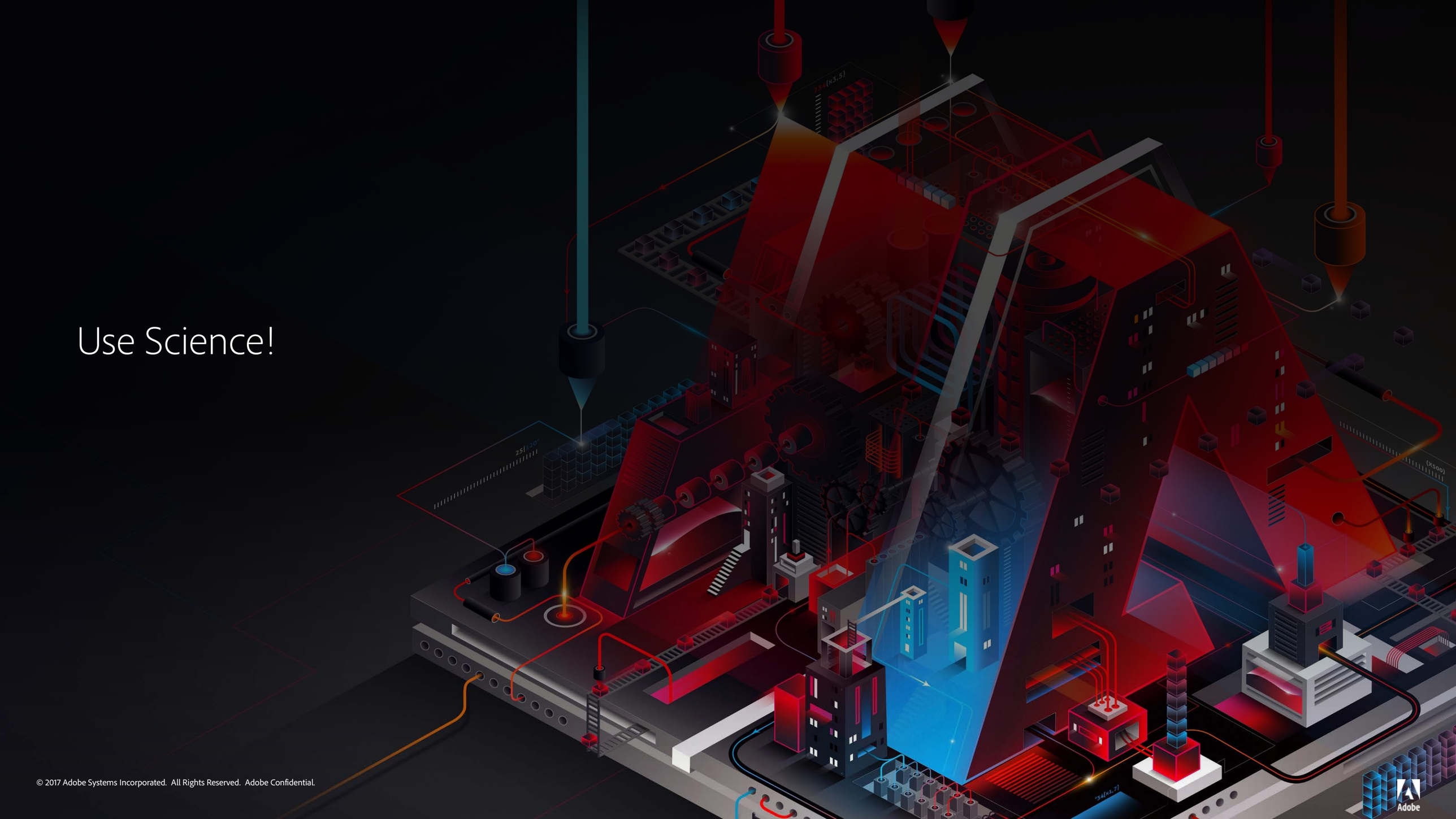
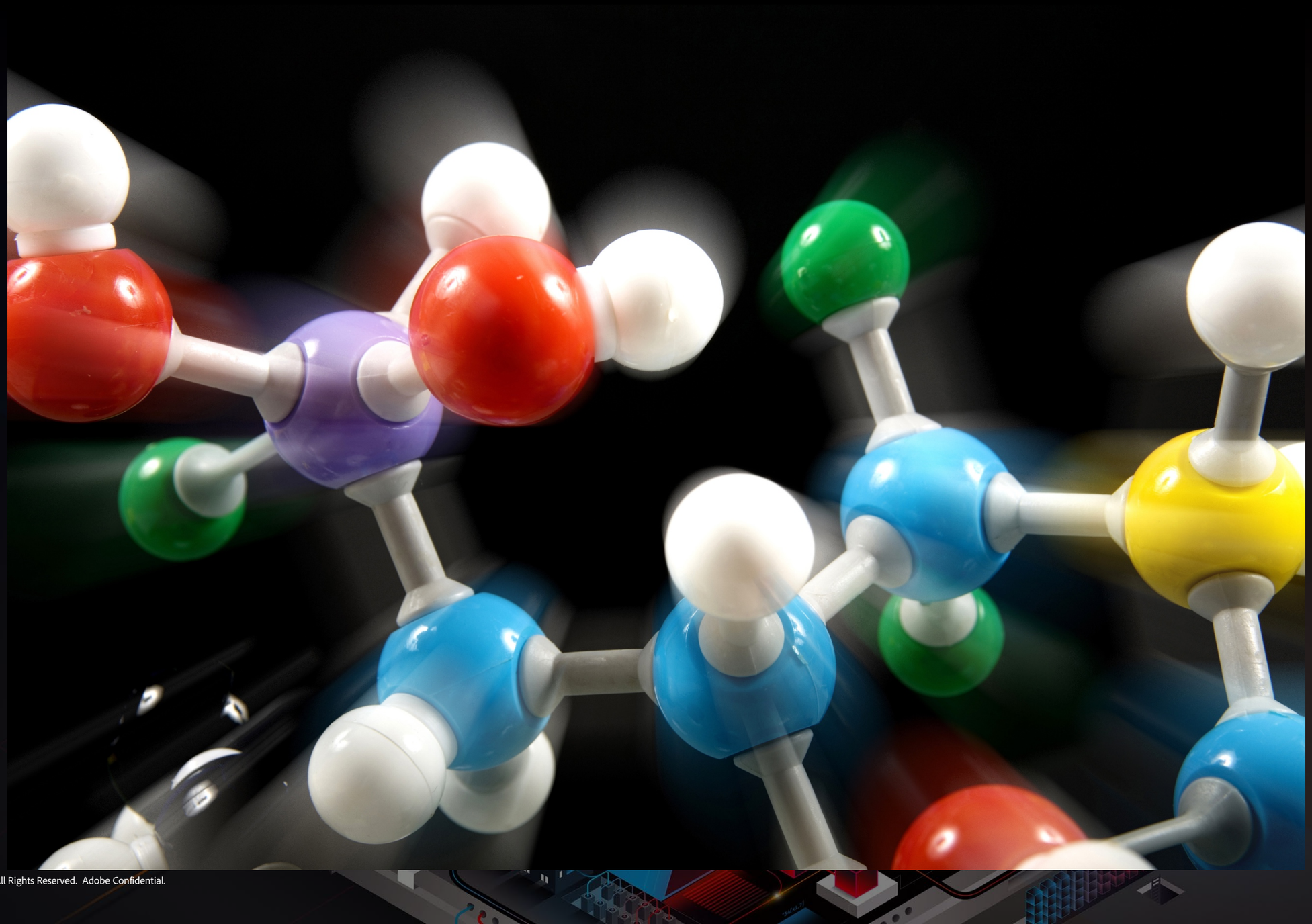
Use Science!



Question

What limits AEM performance?
Is AEM CPU bound or I/O bound?



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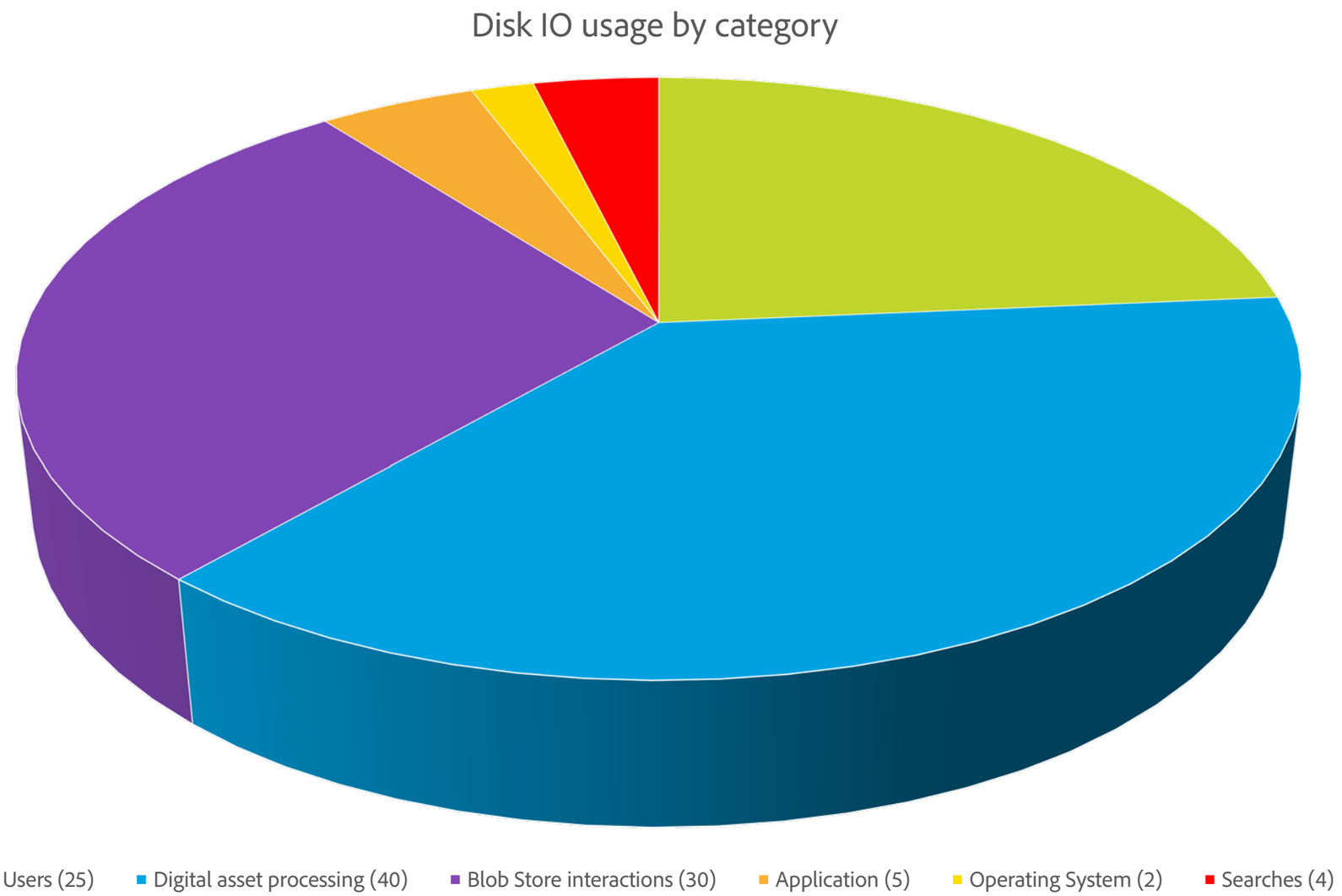
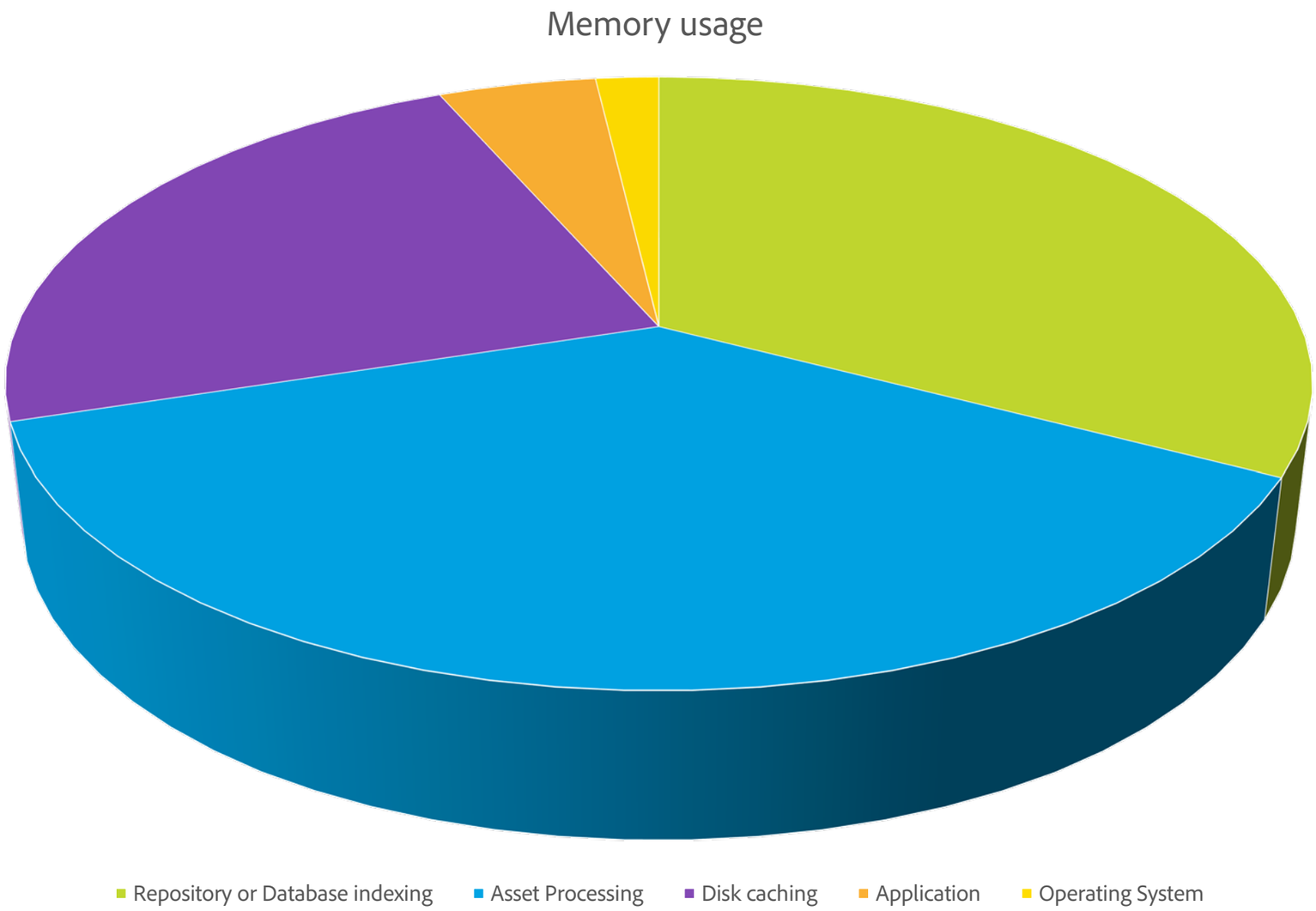
What We Learned: More Server Disk I/O = More Performance



What We Learned: More Server RAM = More Disk I/O Performance



What We Learned: Bottlenecks and Priority

Priority

1. LAN bandwidth, including WiFi
2. Server Disk IO

   Individual spinning hard disks are not useful for large deployments.
3. Server RAM

   Unused RAM improves Disk IO
4. Server CPU

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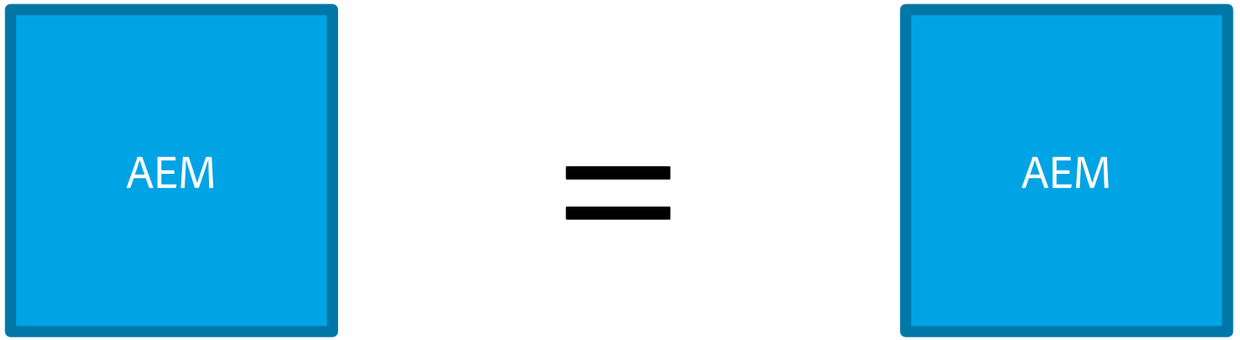
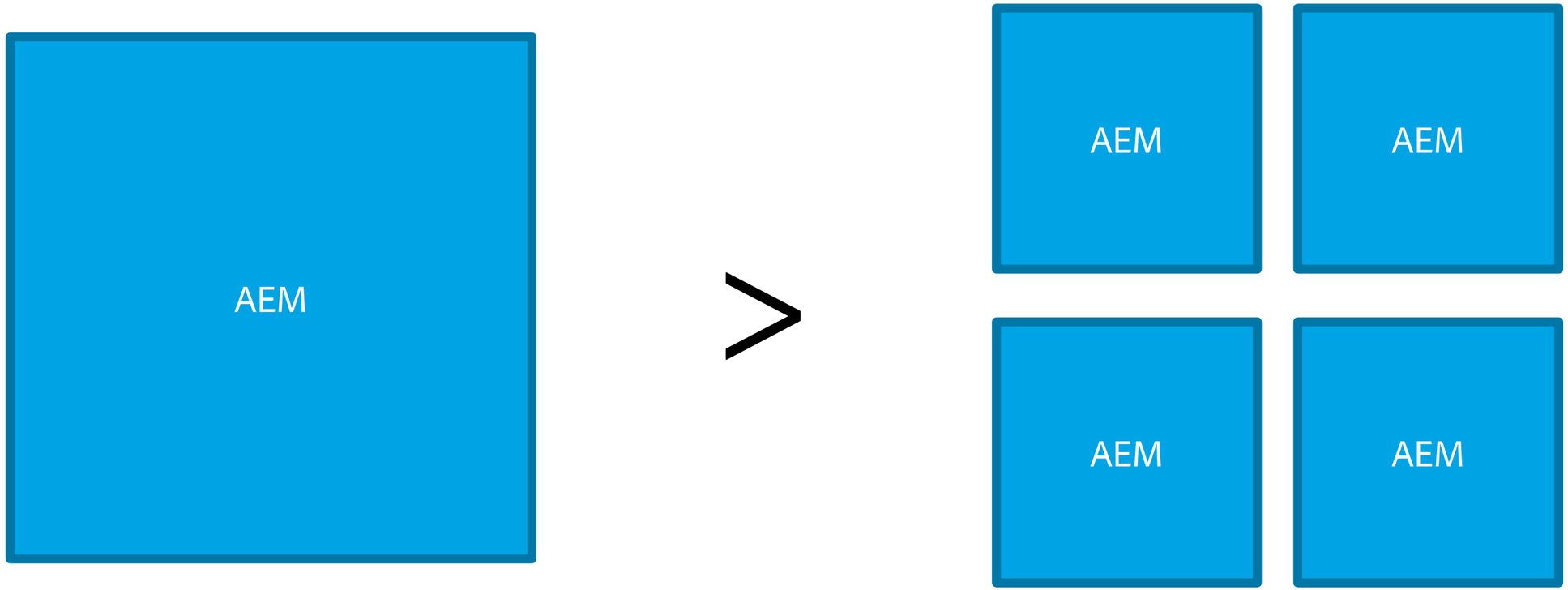
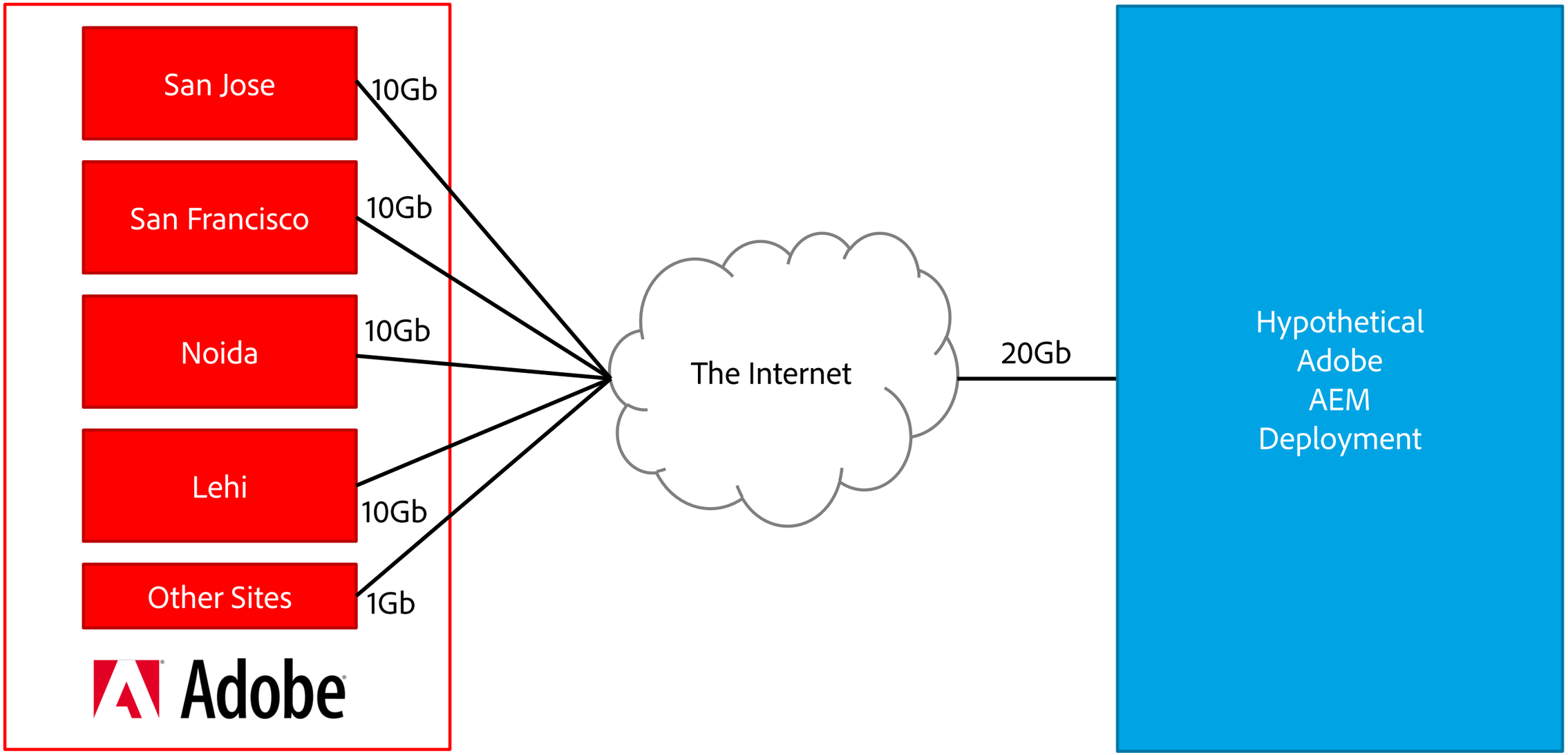
What We Learned: Vertical Scaling – More Effective than Horizontal Scaling



What We Learned: Vertical Scaling – More Effective than Horizontal Scaling



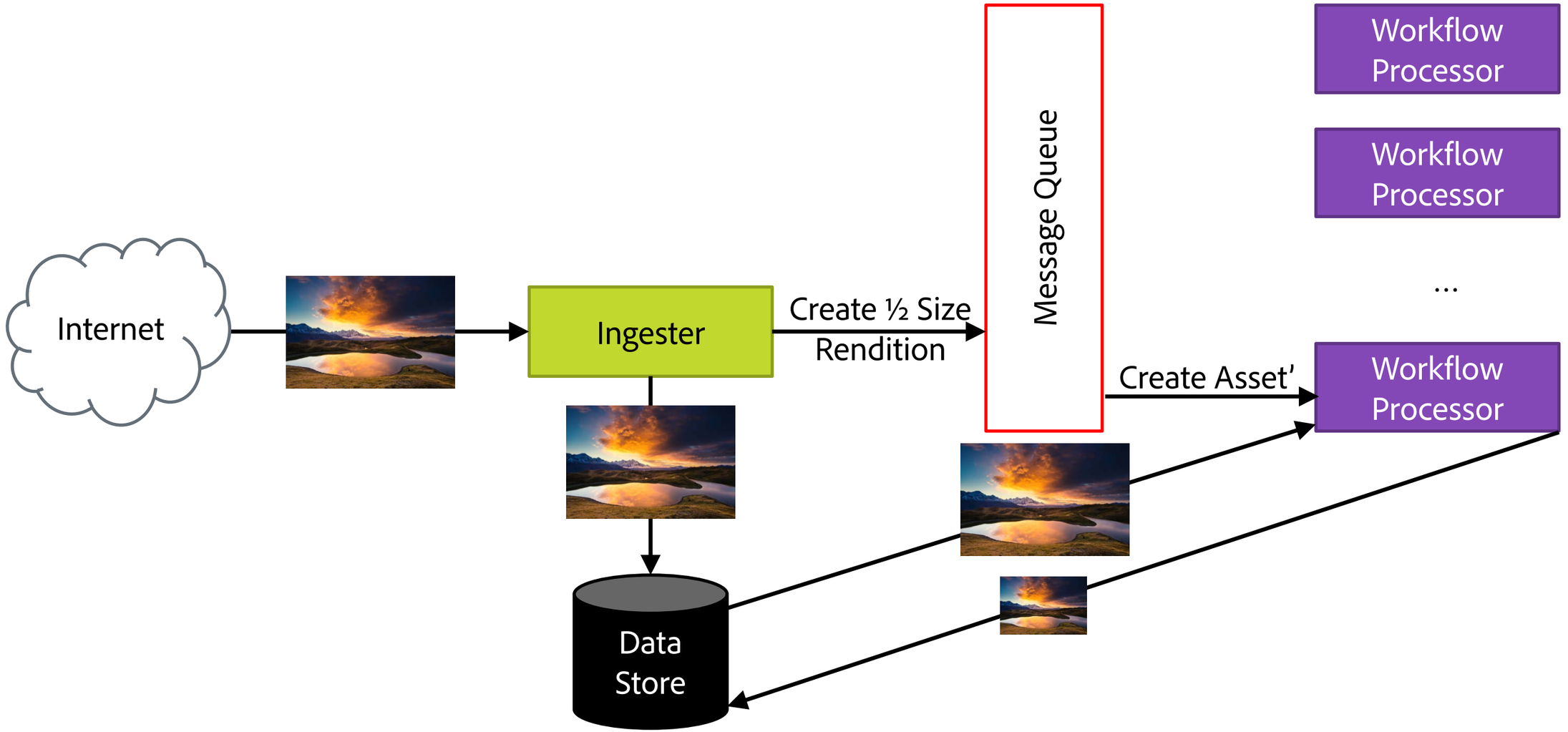
Can Vertical Scalability Really Be the Answer?



Takeaway

Sometimes, vertical scalability is the answer.

Separating Workflow Processing Reduces Performance



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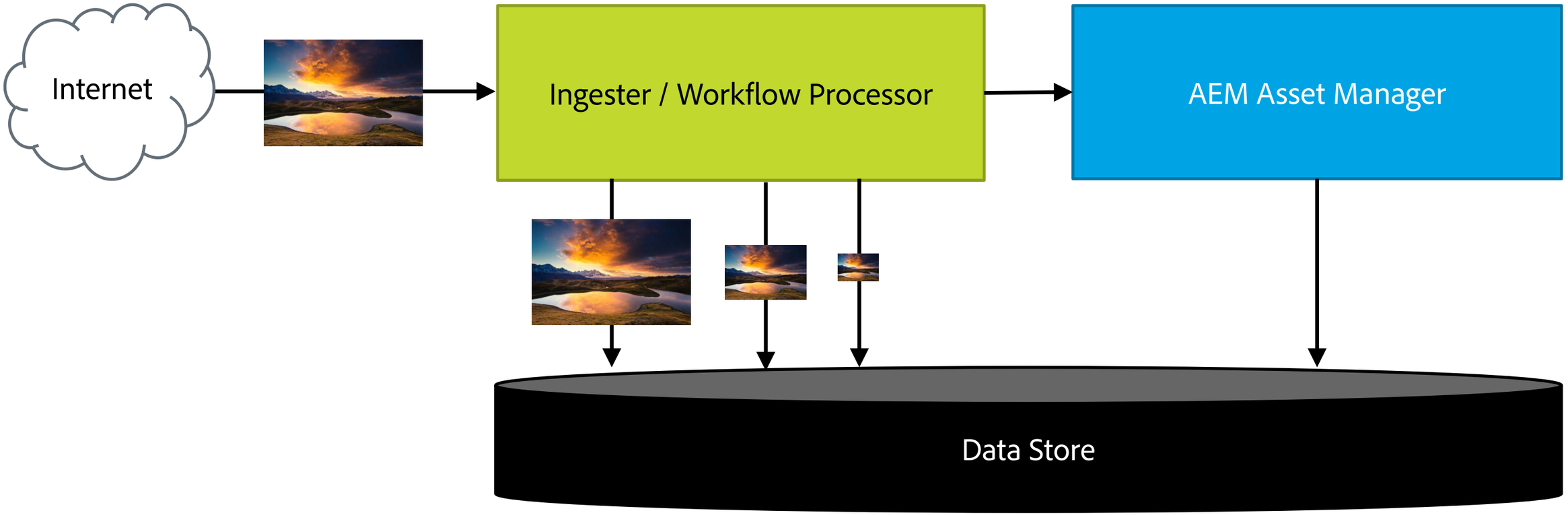
Scaling the Ingestion Process



Takeaway

Don’t rely on assumptions.
Prove your assumptions before you invest in a major architectural redesign.

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Takeaway

Take the time to understand the
best way to partition your application space.

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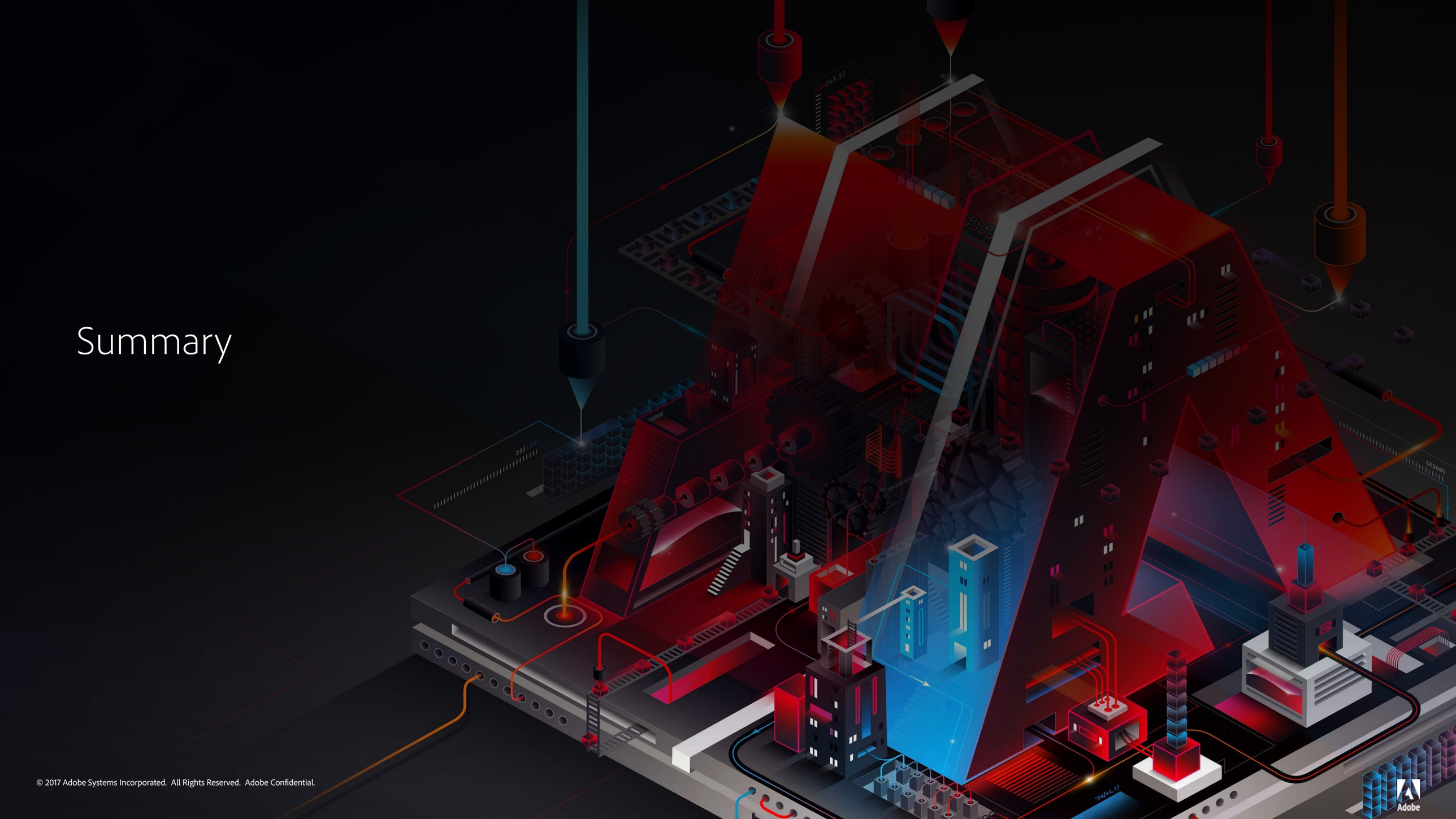
Scalability Challenge Number Three

The nature of the data may change the rules about scalability.

Summary

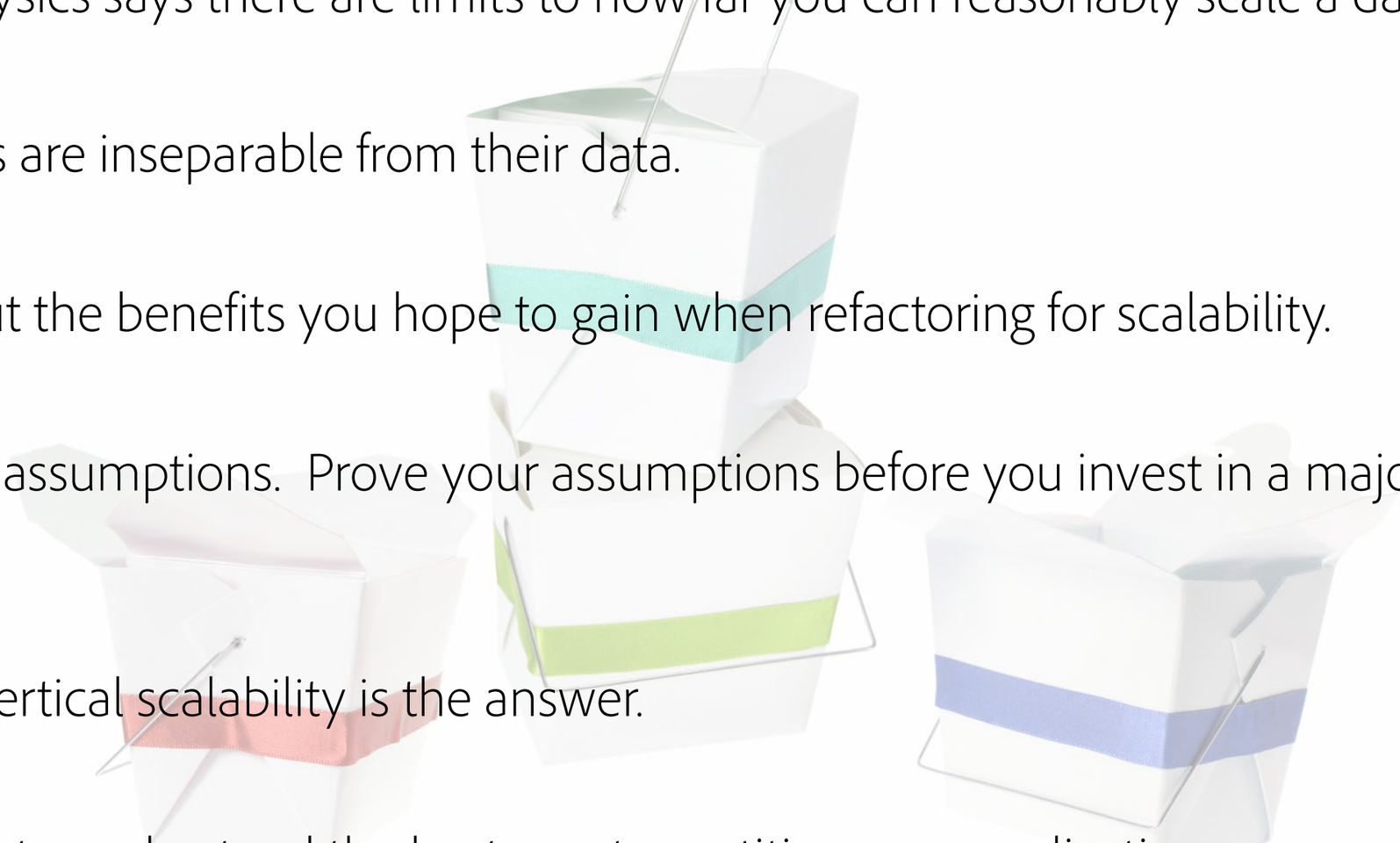


Three Scalability Challenges

- You cannot split a datastore into true microservices.
- LAN infrastructure may limit your ability to scale effectively.
- The nature of the data may change the rules about scalability.

Takeaways

- Math and physics says there are limits to how far you can reasonably scale a database.
- Microservices are inseparable from their data.
- Be clear about the benefits you hope to gain when refactoring for scalability.
- Don't rely on assumptions. Prove your assumptions before you invest in a major architectural redesign.
- Sometimes vertical scalability is the answer.
- Take the time to understand the best way to partition your application space.



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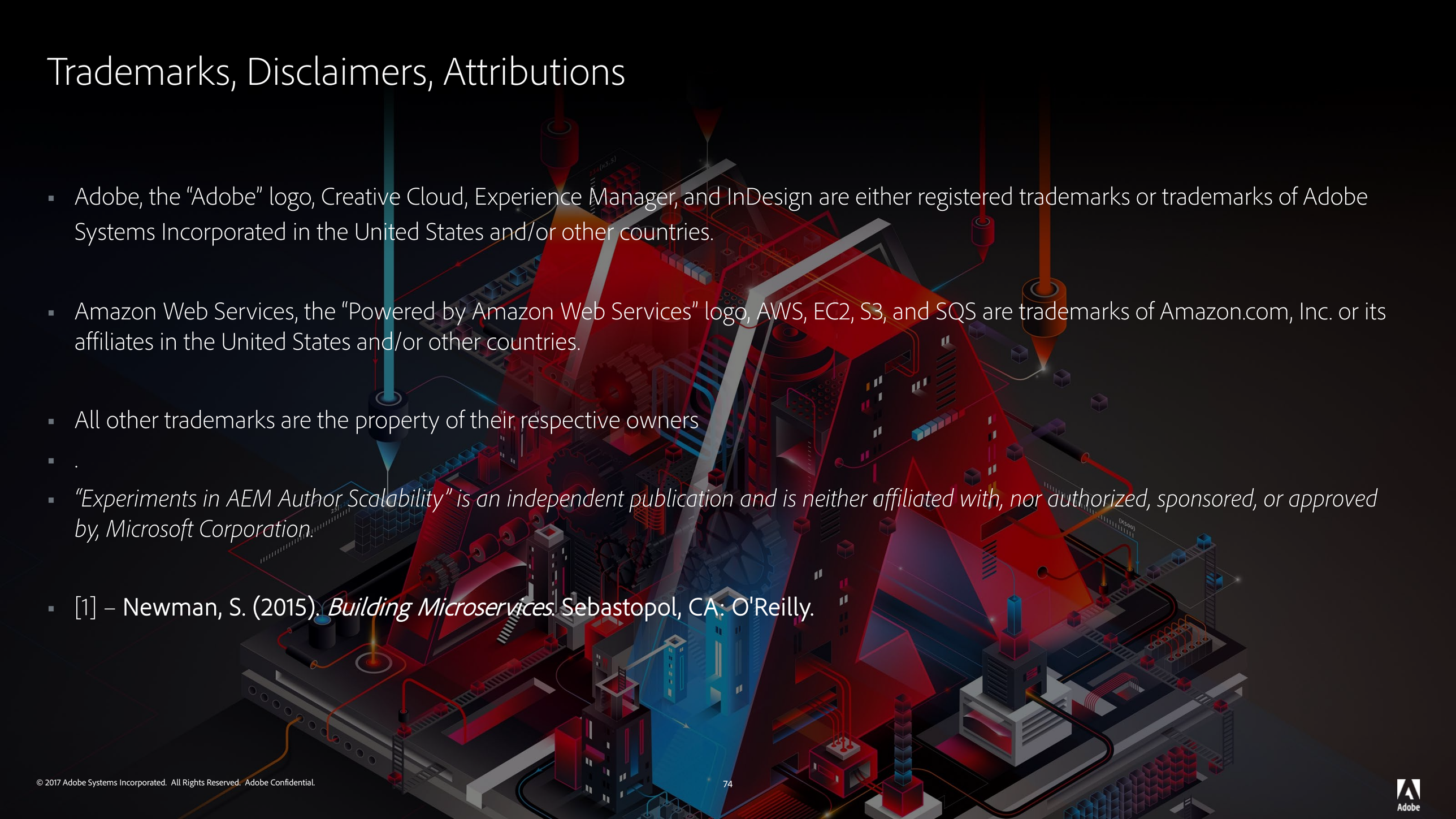

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- [1] – Newman, S. (2015). *Building Microservices*. Sebastopol, CA: O'Reilly.

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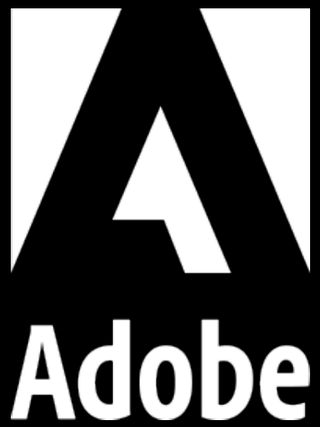
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