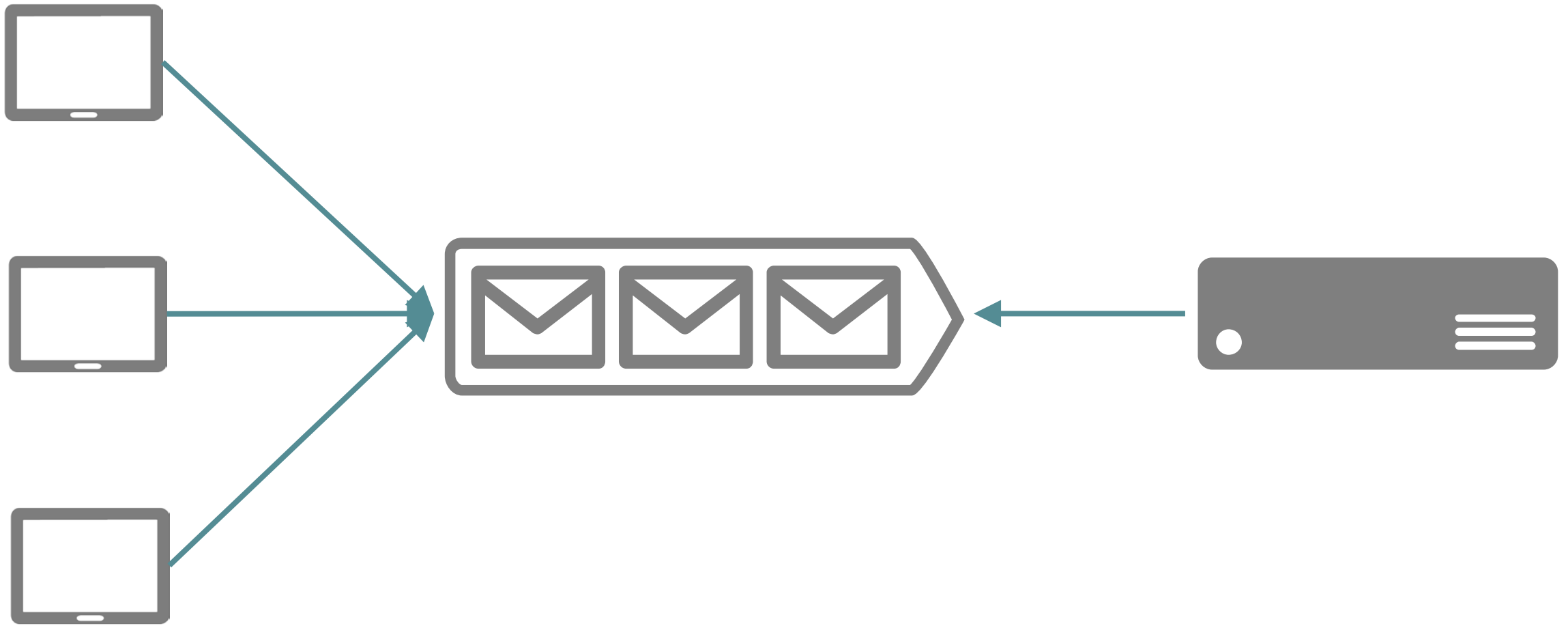


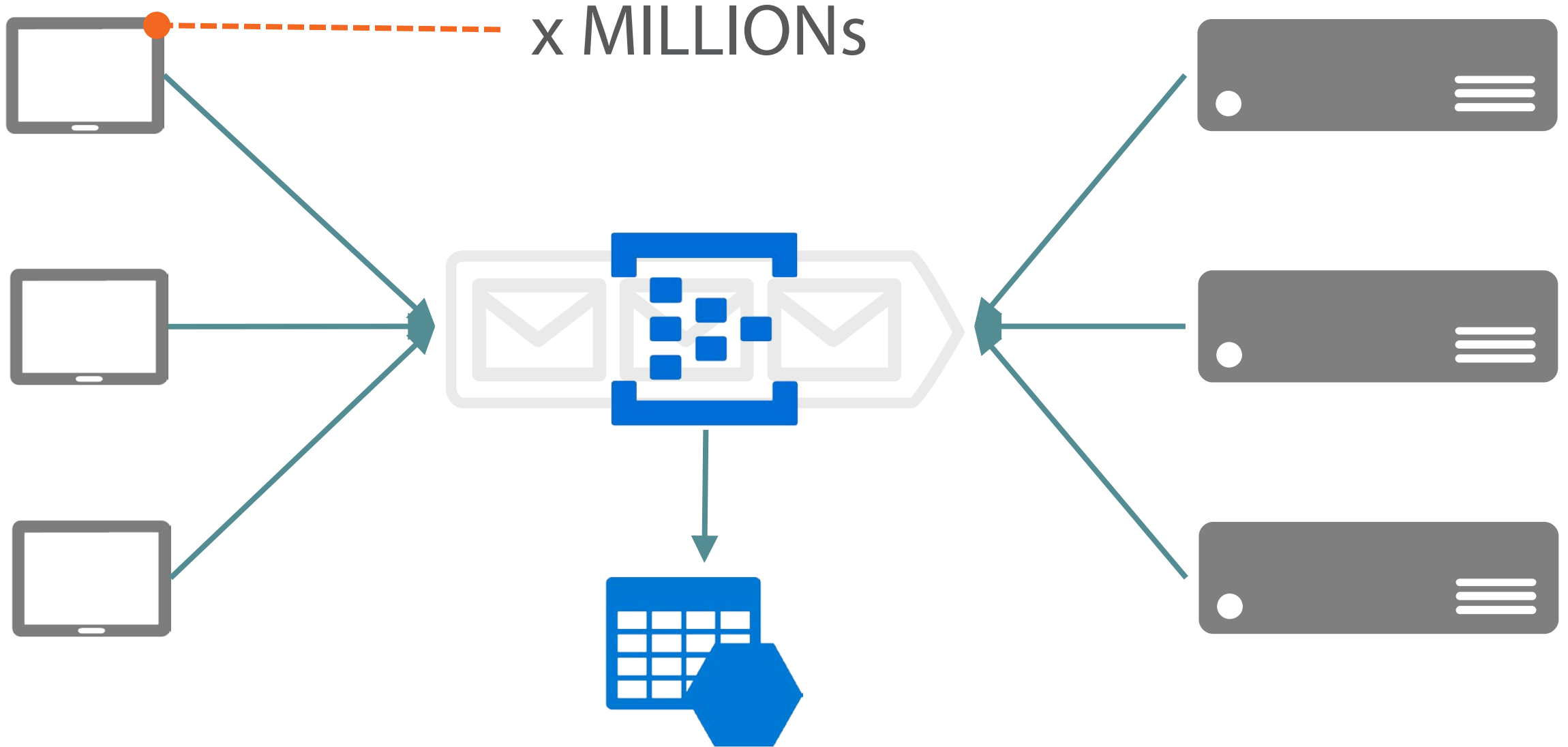
Ingesting Data into Event Hubs



Elton Stoneman

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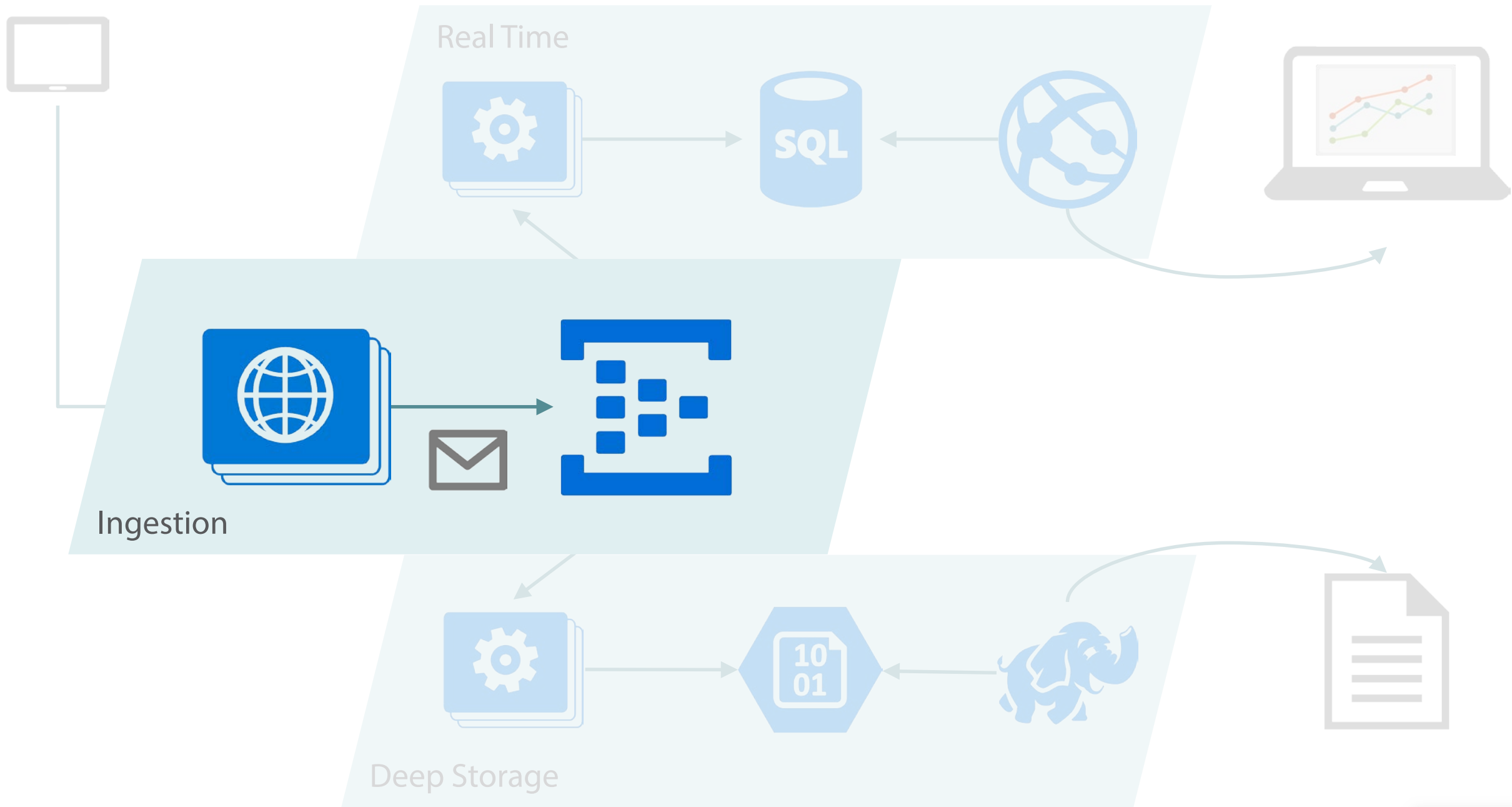


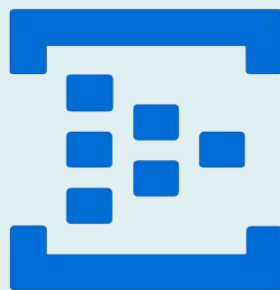
Event Hubs

Explained

Creating and configuring

Isolating the hub

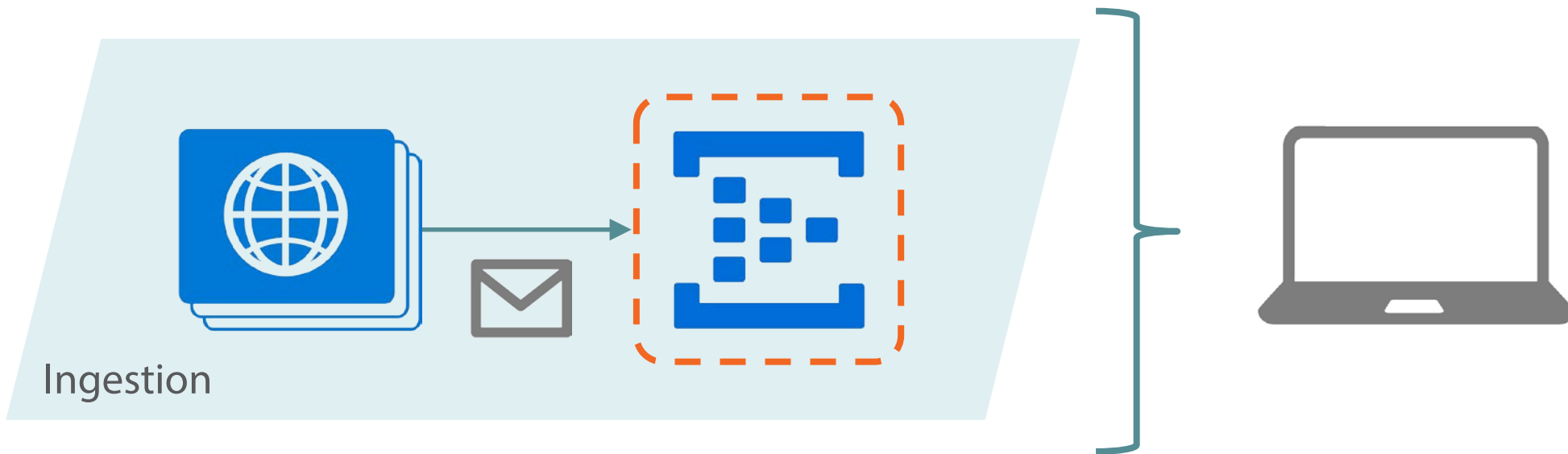




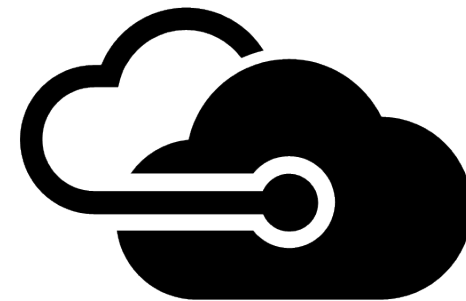
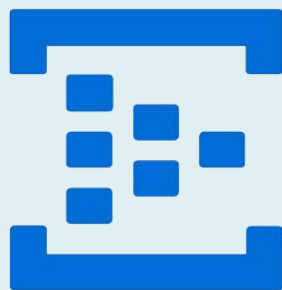
Ingestion



- Efficiency
- Reliability



Ingestion





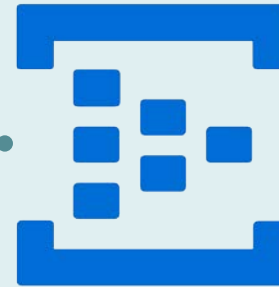
Azure Service Bus



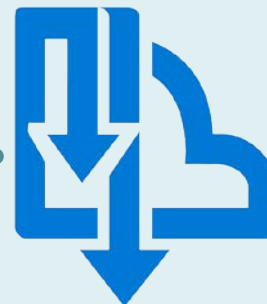
Queues

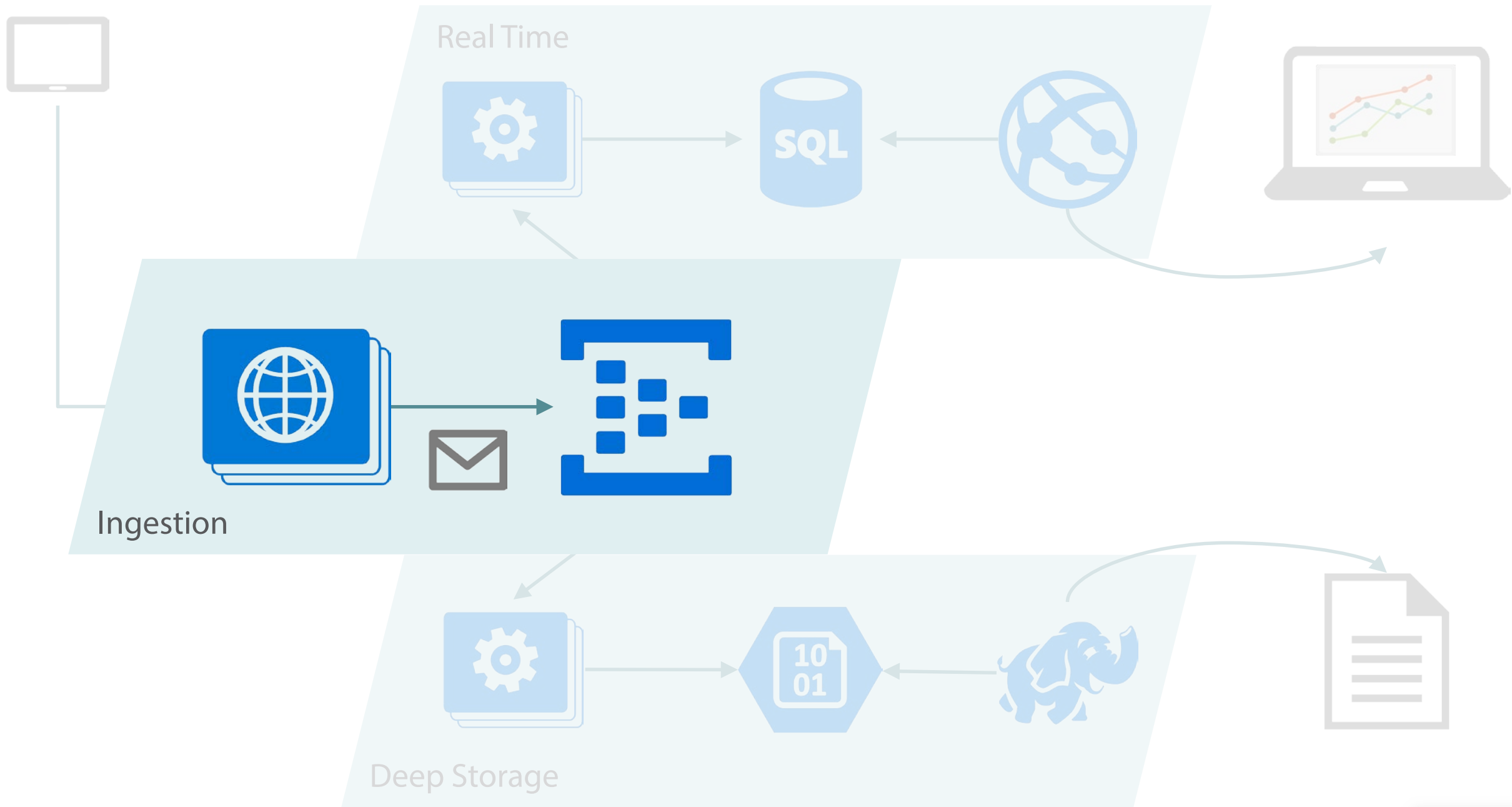


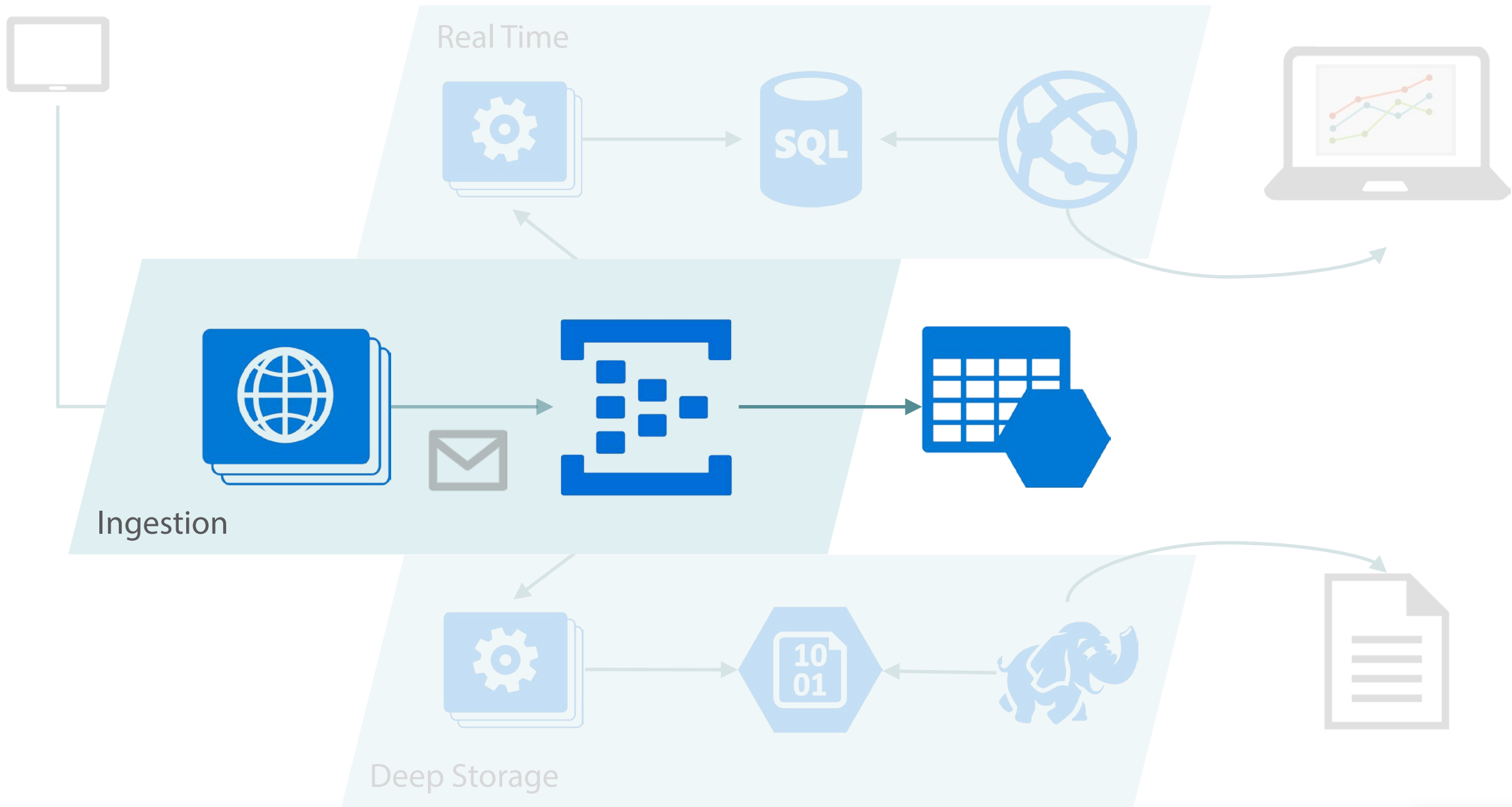
Event Hubs

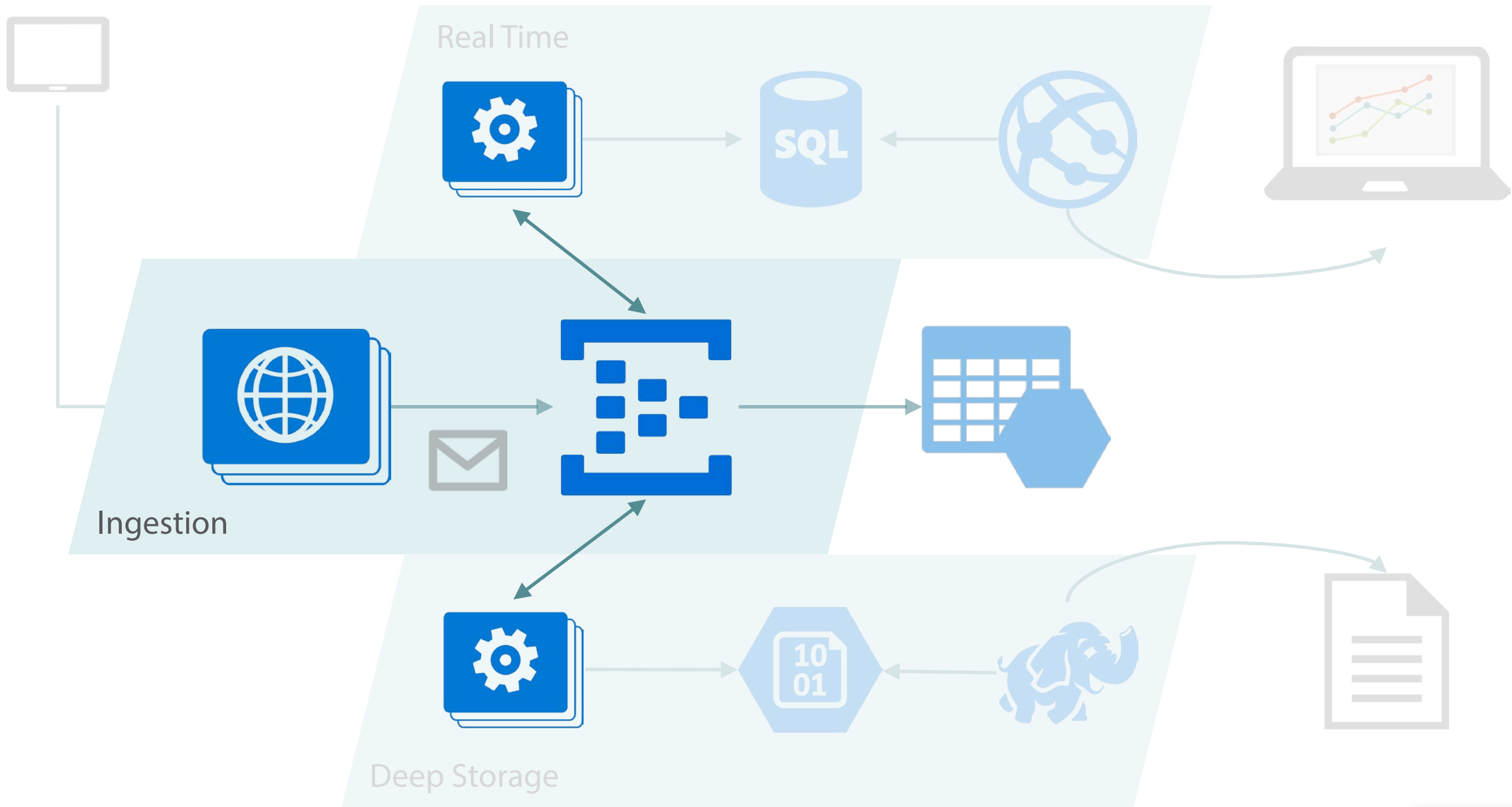


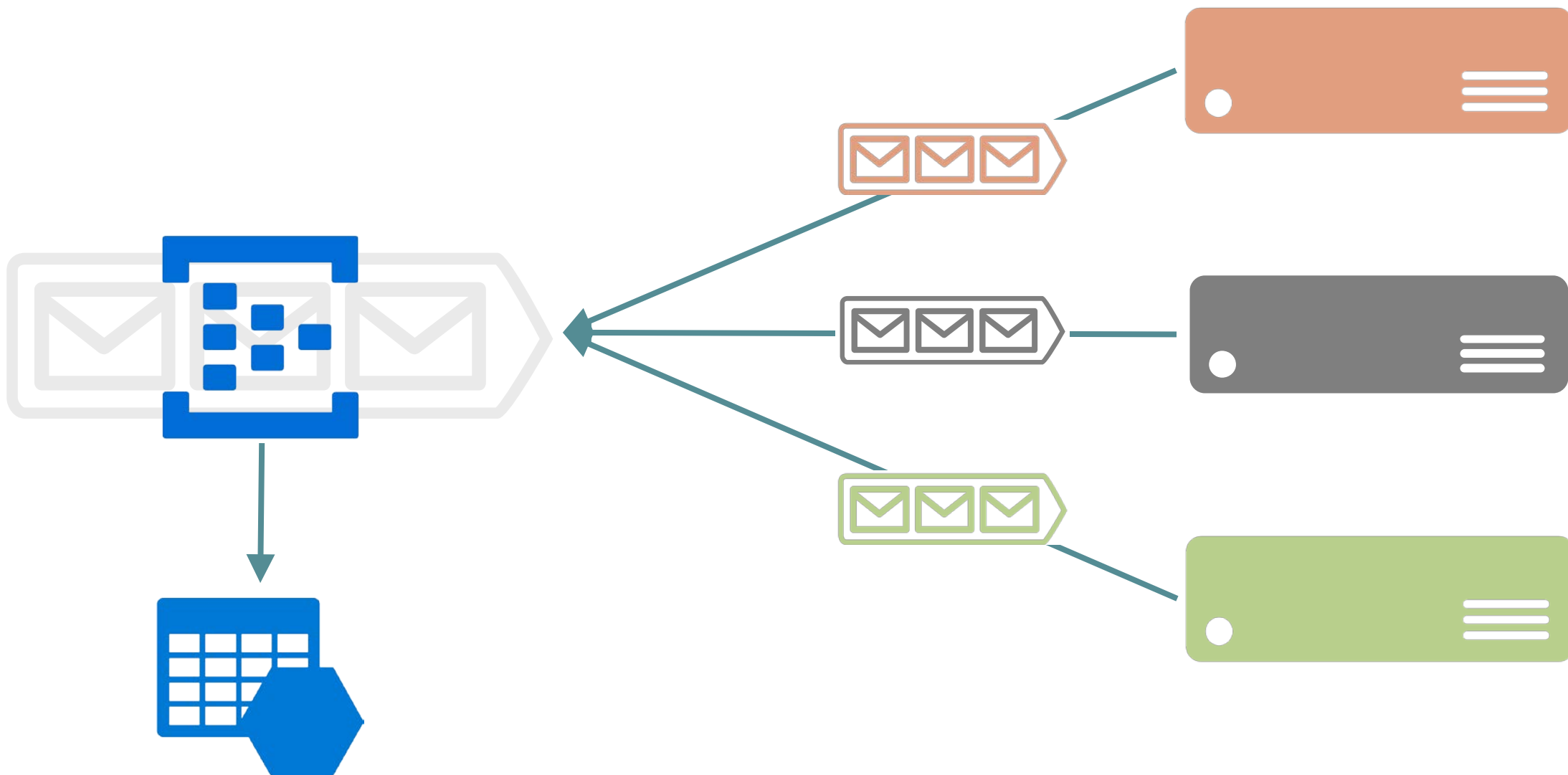
Topics













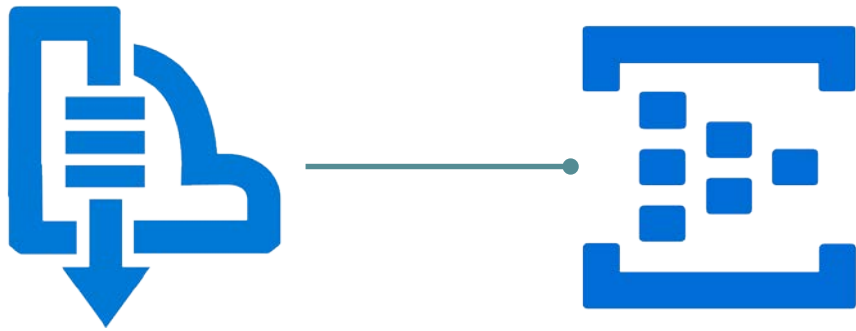
Message Queue Fundamentals in .NET



Elton Stoneman

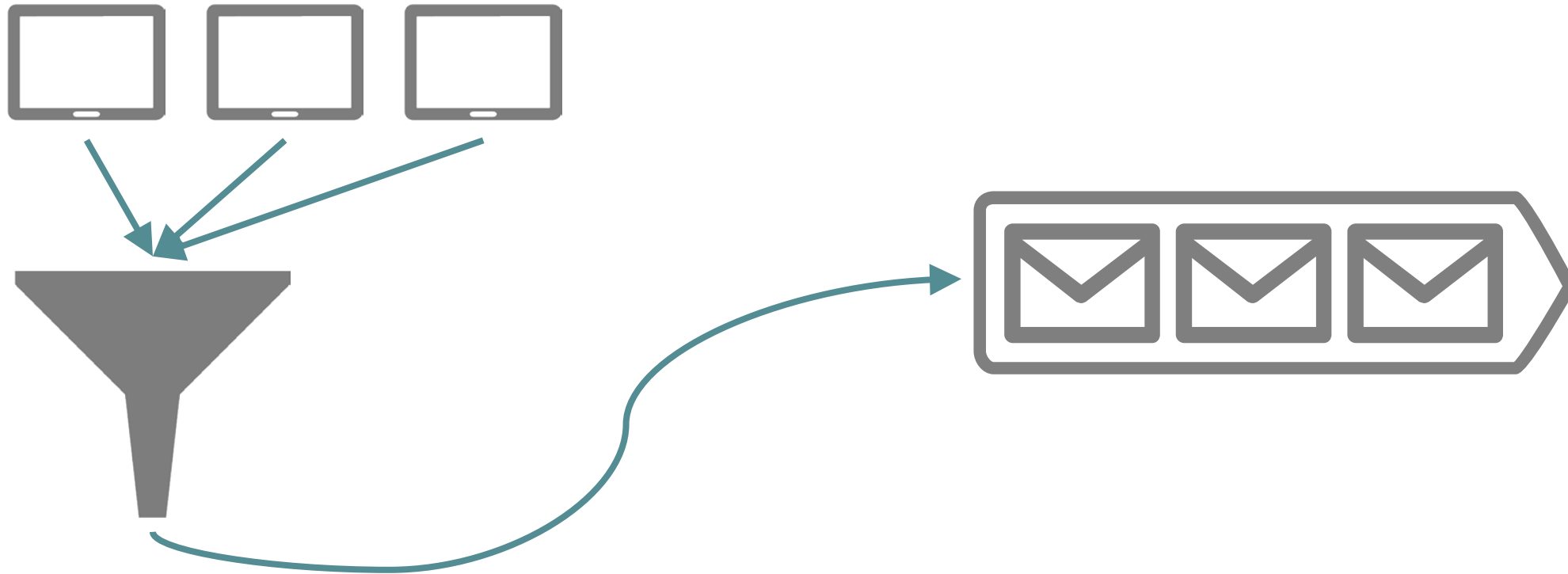
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Event Hub Configuration



- Name
- Region
- Retention Days
- Partitions

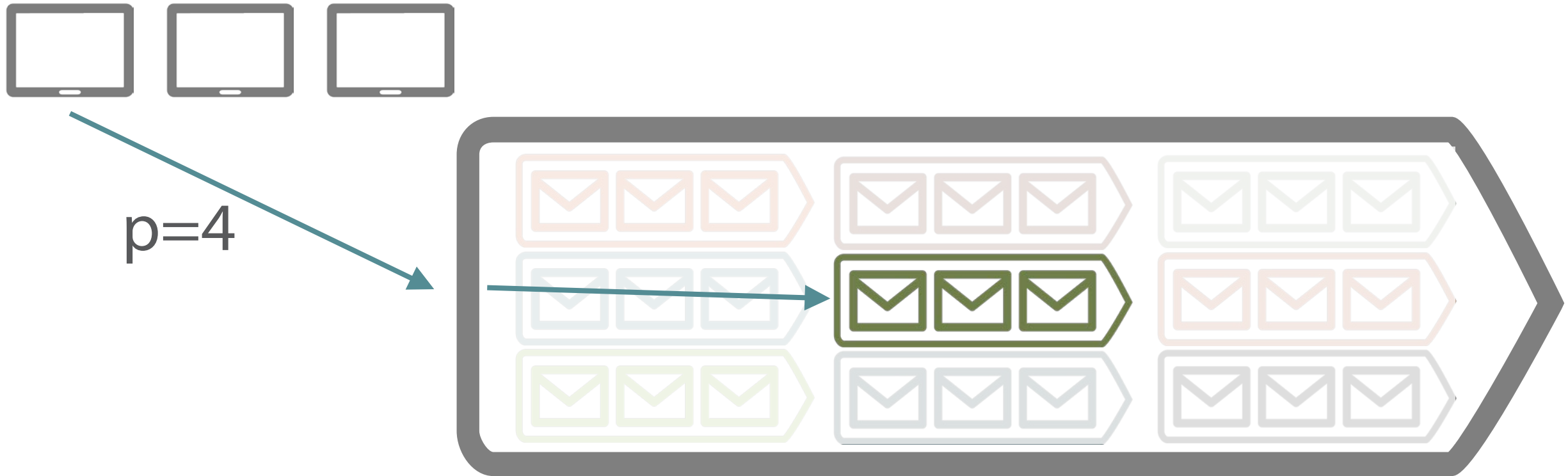
Event Hub Partitions



Event Hub Partitions



Event Hub Partitions



Event Hub Partitions



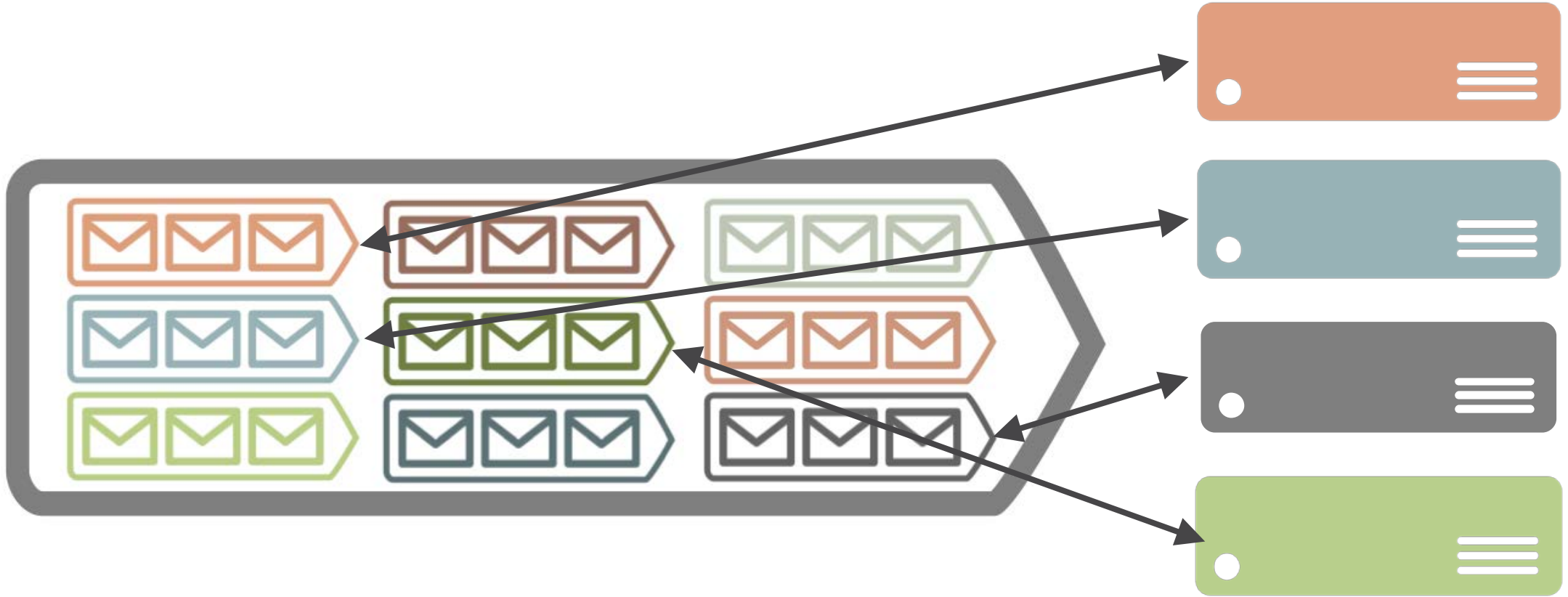
Event Hub Partitions



Event Hub Partitions



Event Hub Partitions



Event Hub Partitions



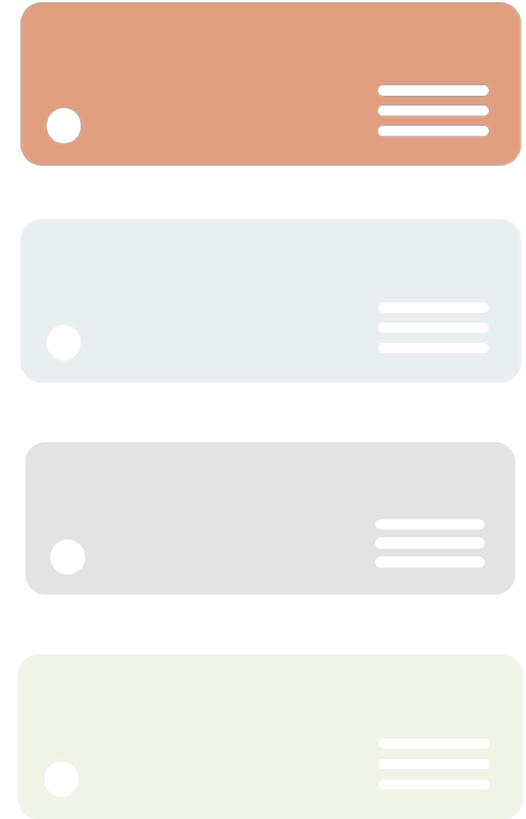
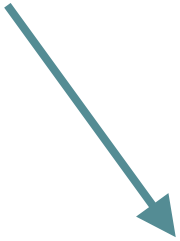
Event Hub Partitions



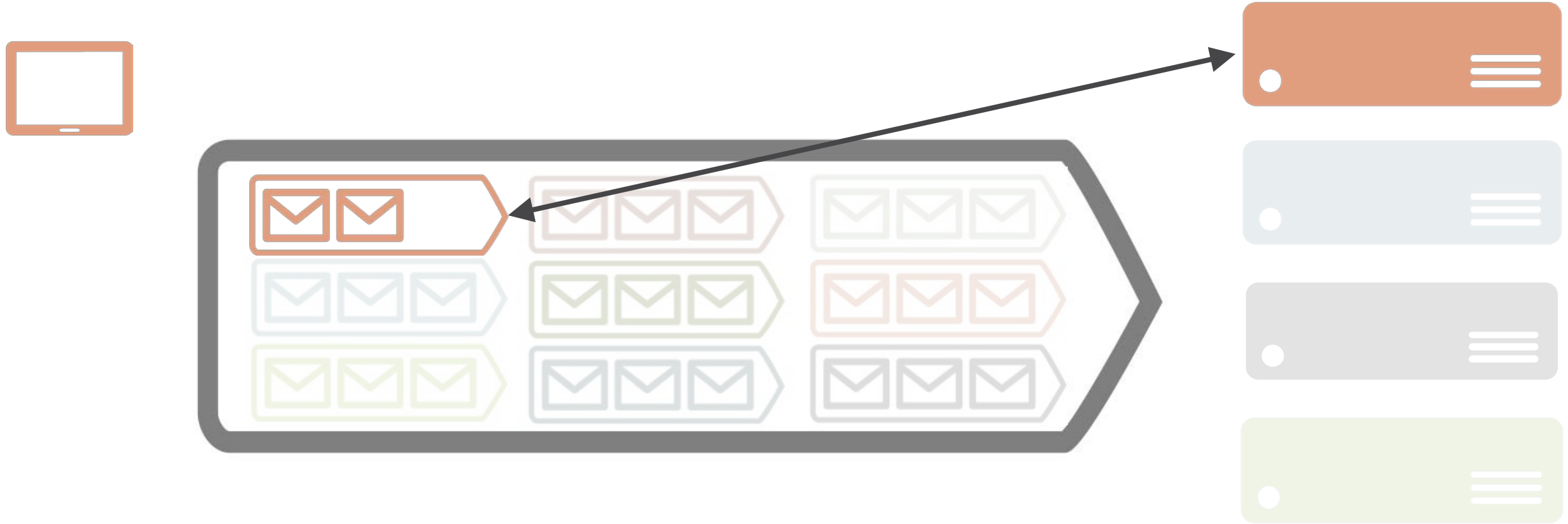
Event Hub Partitions



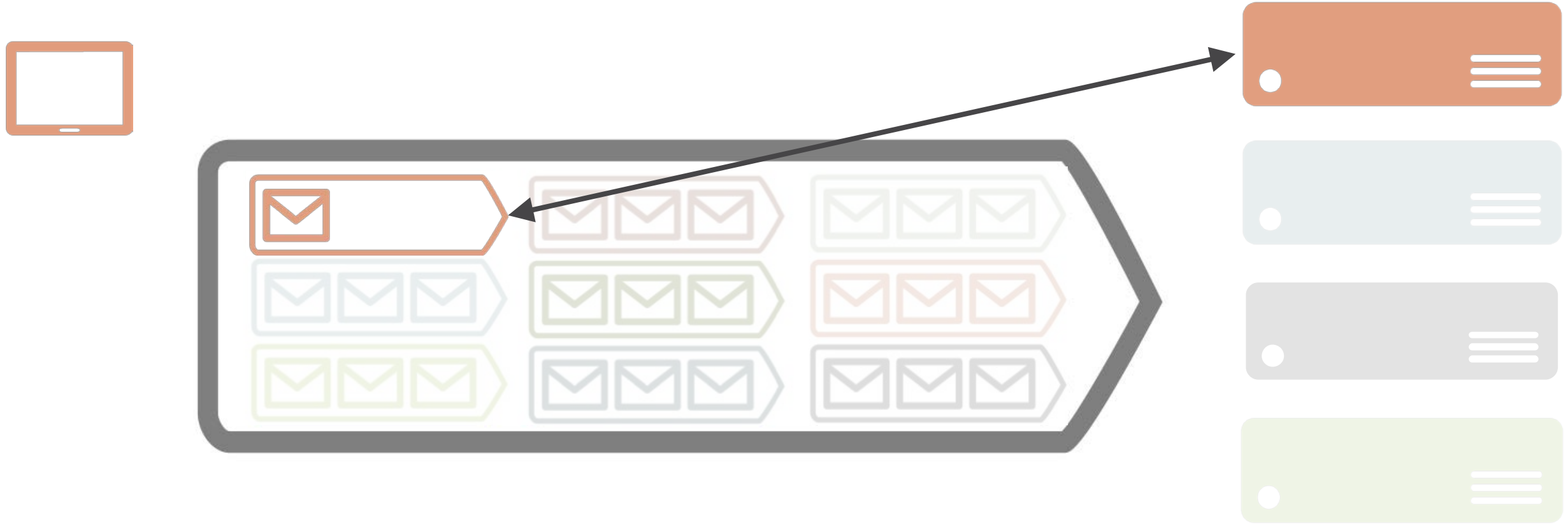
Event Hub Partitions



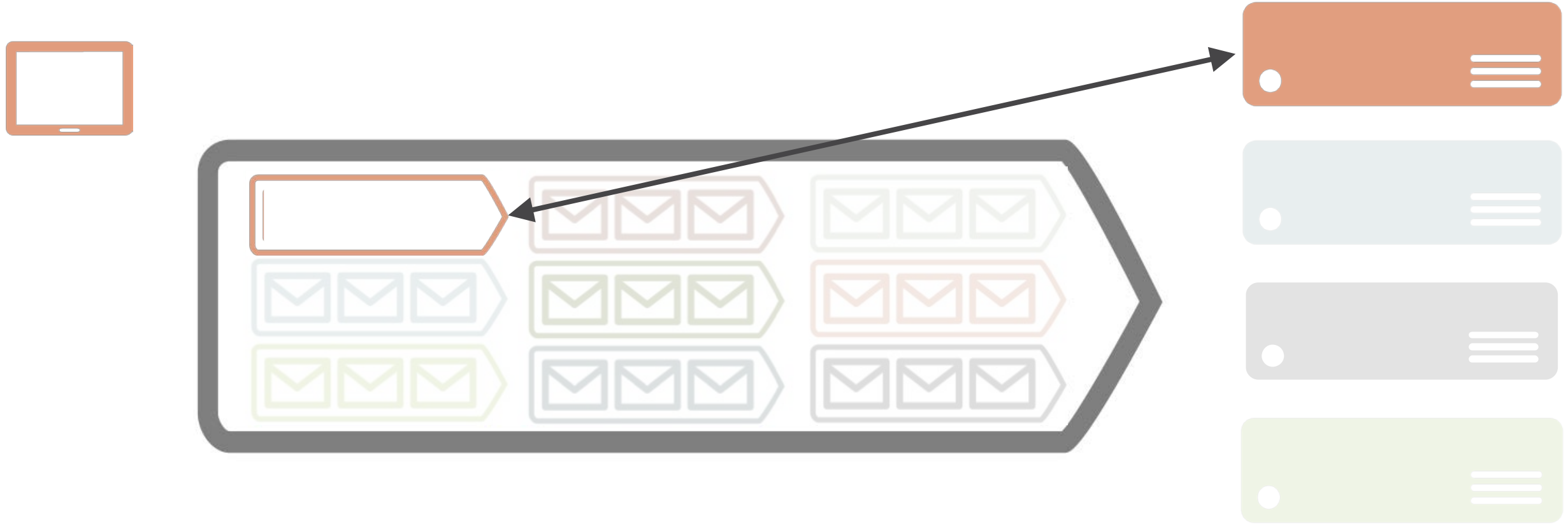
Event Hub Partitions



Event Hub Partitions



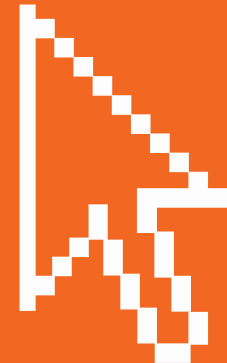
Event Hub Partitions



Demo: Creating Event Hubs

Azure Portal

Service Bus Explorer

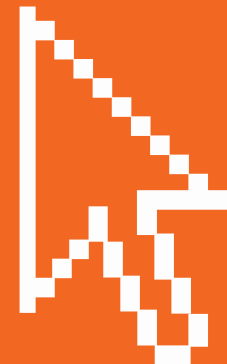


Demo: Scripting Event Hub Creation

PowerShell

Azure Commandlets

ServiceBus NuGet Package



```
New-AzureSBNamespace -Name $Namespace -Location $Location  
$EventHubDescription = New-Object -TypeName  
Microsoft.ServiceBus.Messaging.EventHubDescription  
$NamespaceManager.CreateEventHub($EventHubDescription)
```

PowerShell

Create namespace & Event Hub

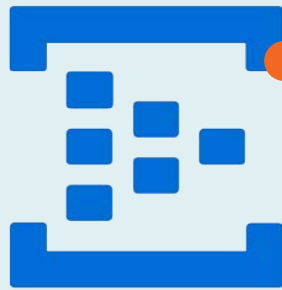

```
$SenderRule = New-Object -TypeName  
Microsoft.ServiceBus.Messaging.SharedAccessAuthorizationRule  
$EventHubDescription.Authorization.Add($SenderRule)  
$NamespaceManager.UpdateEventHub($EventHubDescription)
```

PowerShell

Create authorization rule, update Event Hub



Ingestion



Name: **device-events**
Region: **North Europe**
Retention Days: **7**
Partitions: **16**



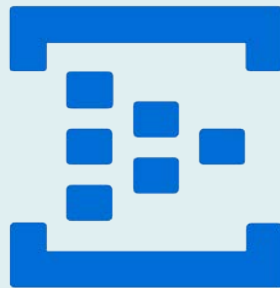
Ingestion

Name: **device-events**

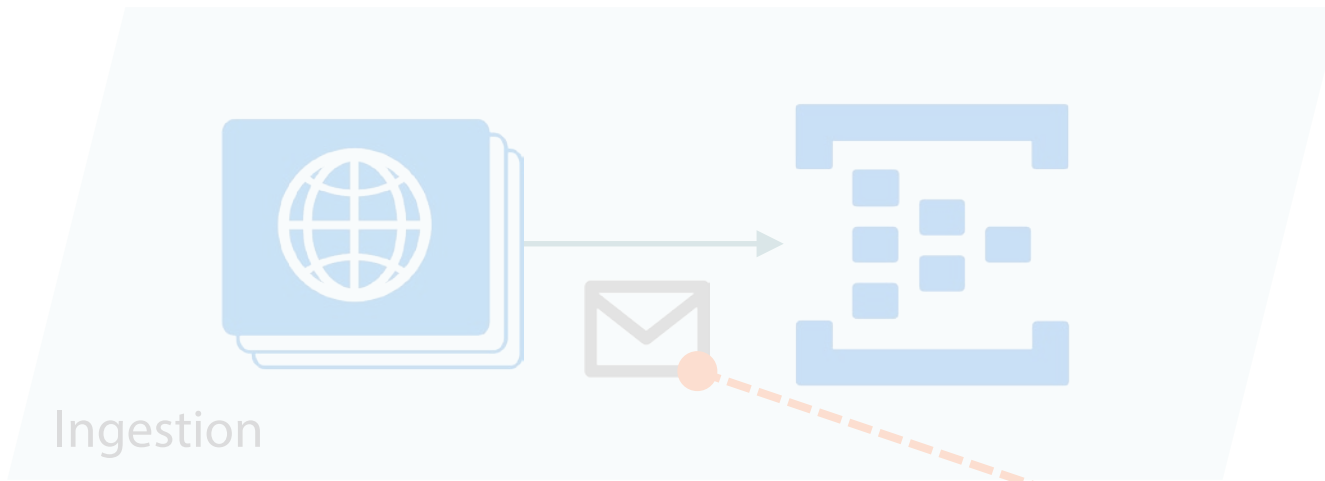
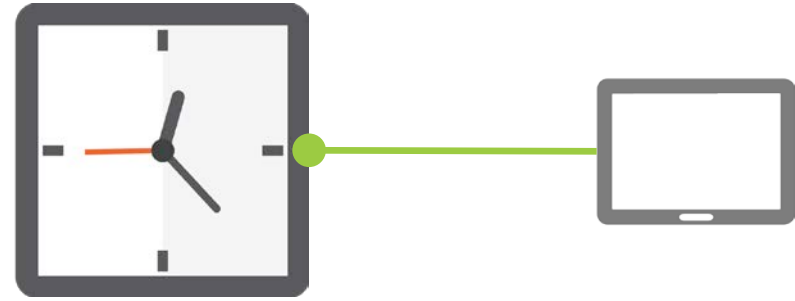
Region: **North Europe**

Retention Days: **7**

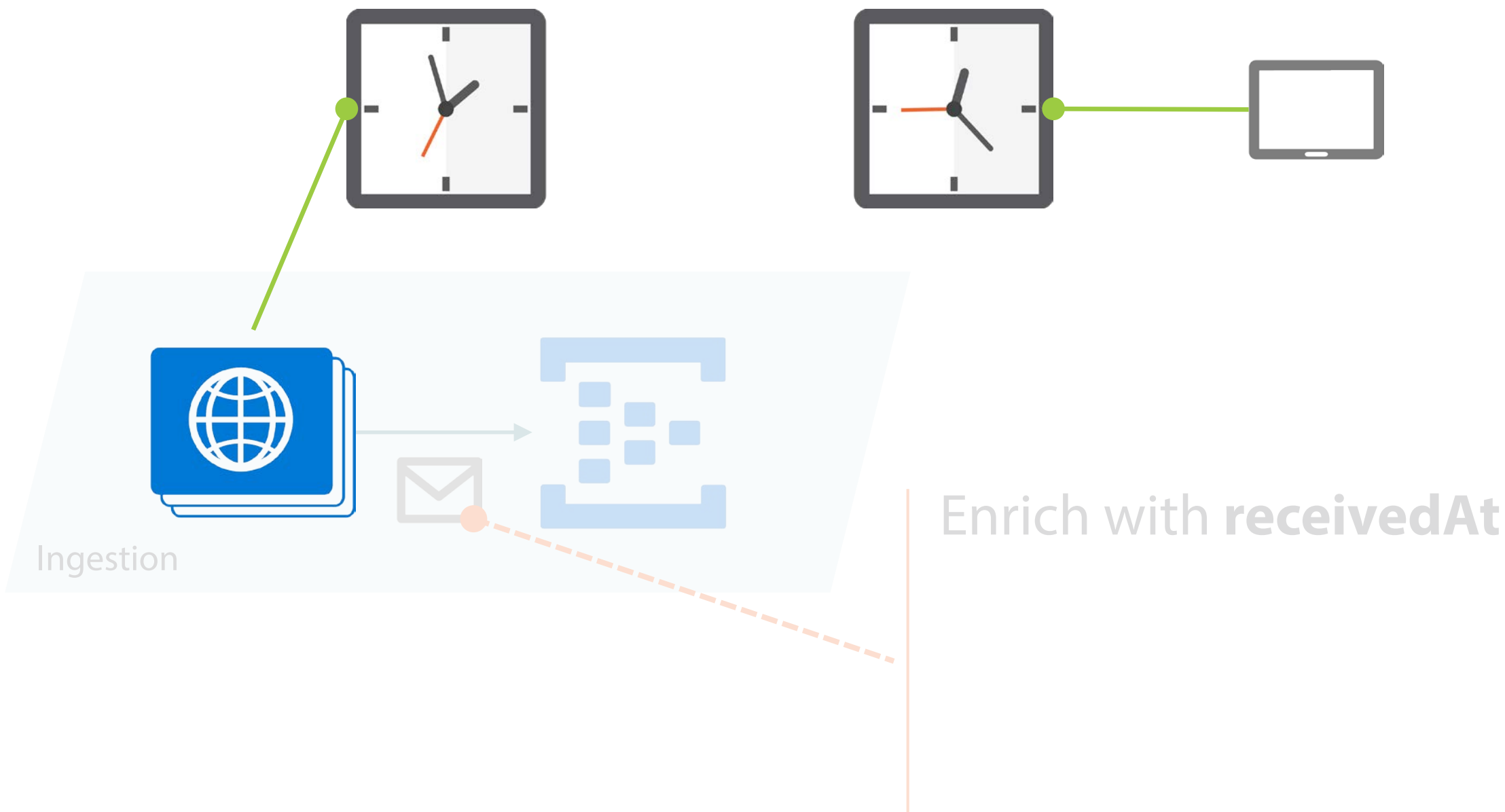
Partitions: **16**

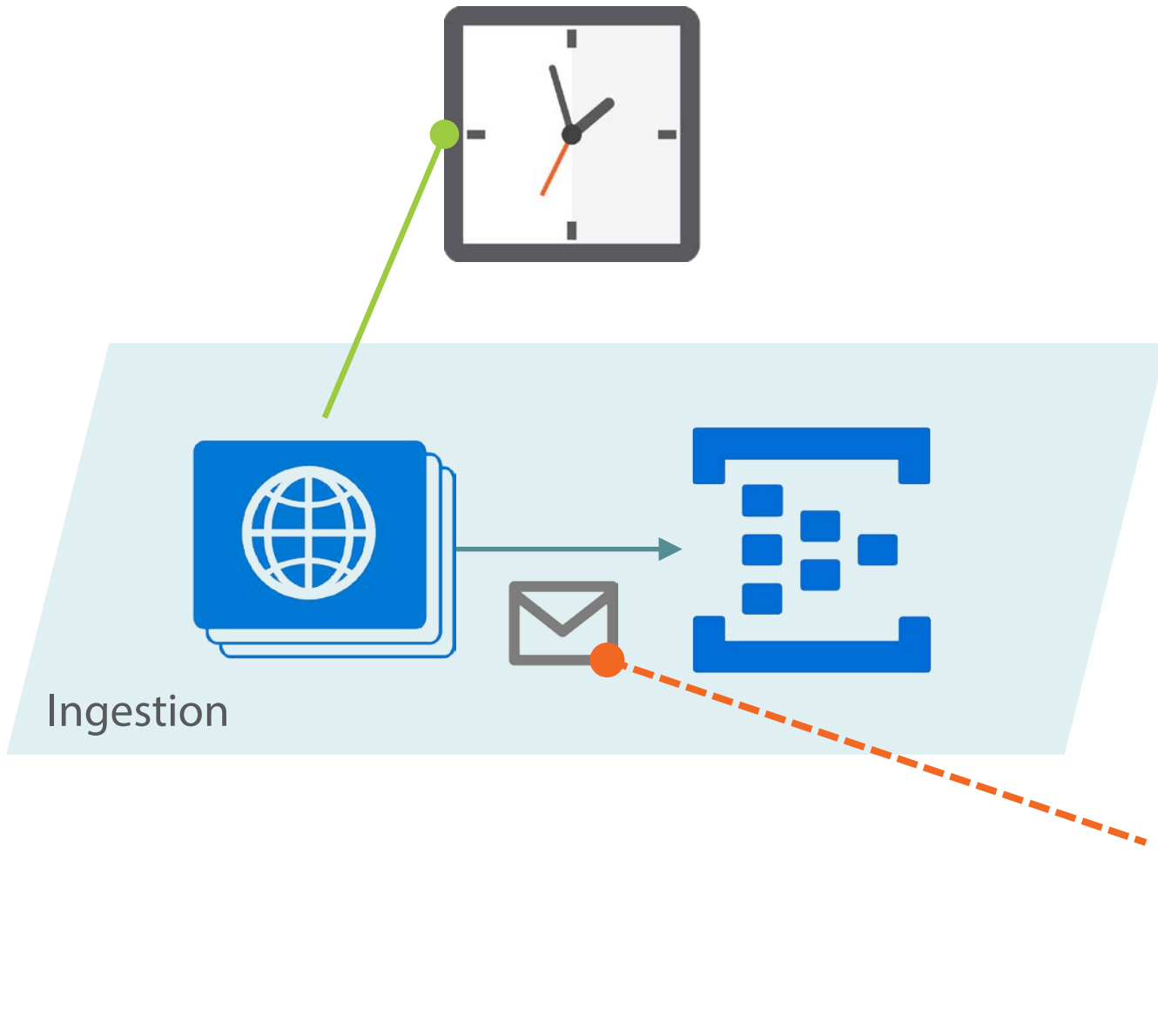


Ingestion

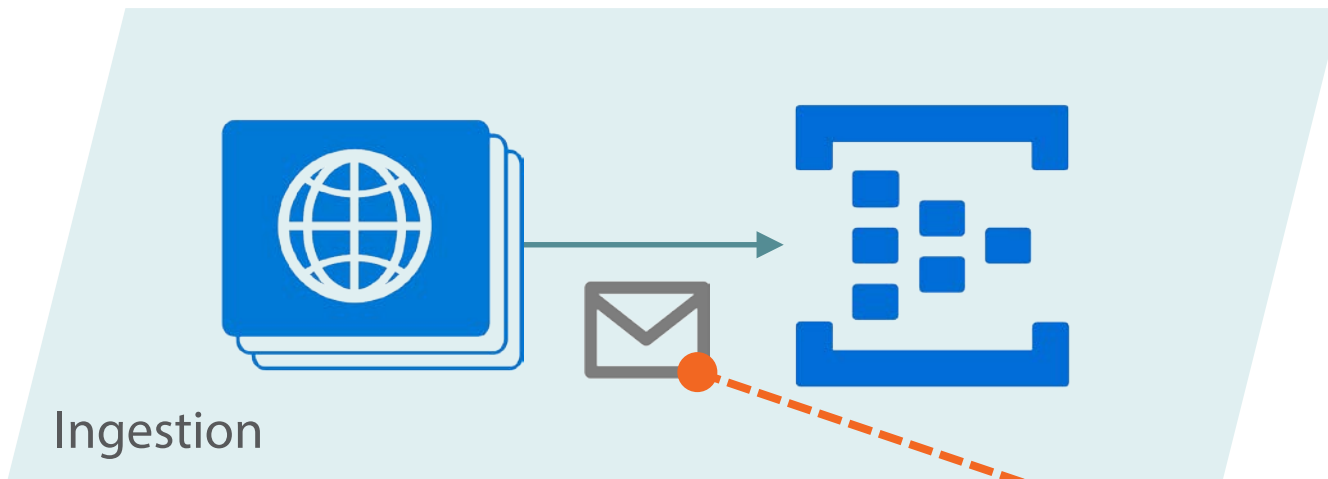


Enrich with **receivedAt**





Enrich with **receivedAt**



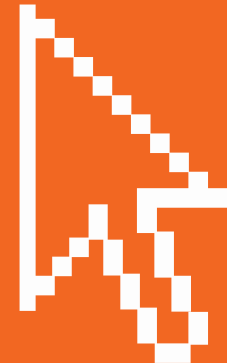
Enrich with **receivedAt**
Promote **eventType**
Promote **receivedAt**
Partition Key = **deviceId**

Demo: EventHubEventSender

Enrich events

Set properties

Send to EventHubClient



```
foreach (dynamic eventObject in events)
{
    eventObject.receivedAt = DateTime.UtcNow.ToUnixMilliseconds();
    var json = eventObject.ToString(Formatting.None);
}
```

Iterate incoming events

Enrich with timestamp

```
var eventData = new EventData(Encoding.UTF8.GetBytes(json))
{
    PartitionKey = (string)eventObject.deviceId
};
eventData.SetEventName((string)eventObject.eventName);
eventData.SetReceivedAt((long)eventObject.receivedAt);
```

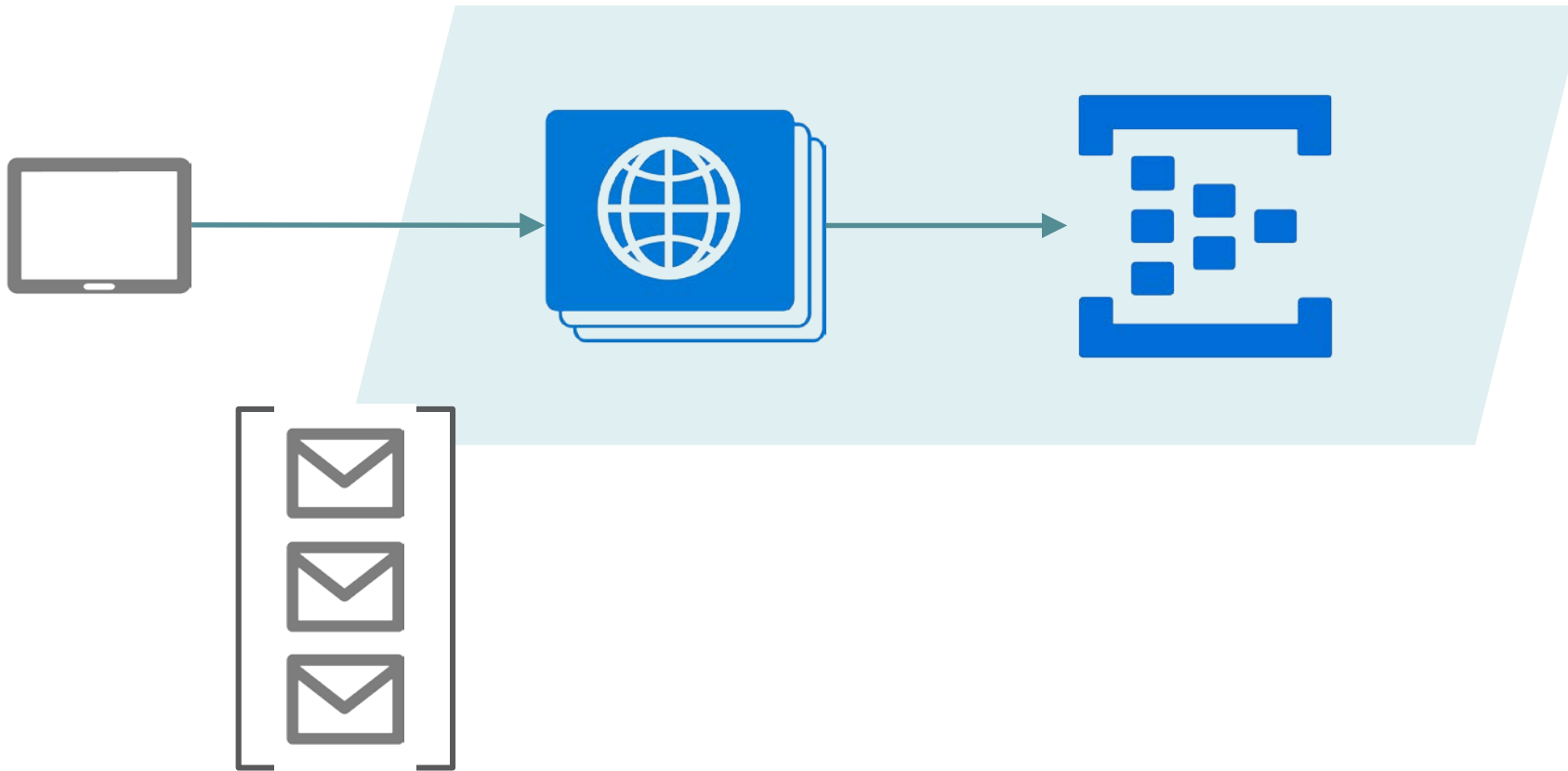
Create EventData object

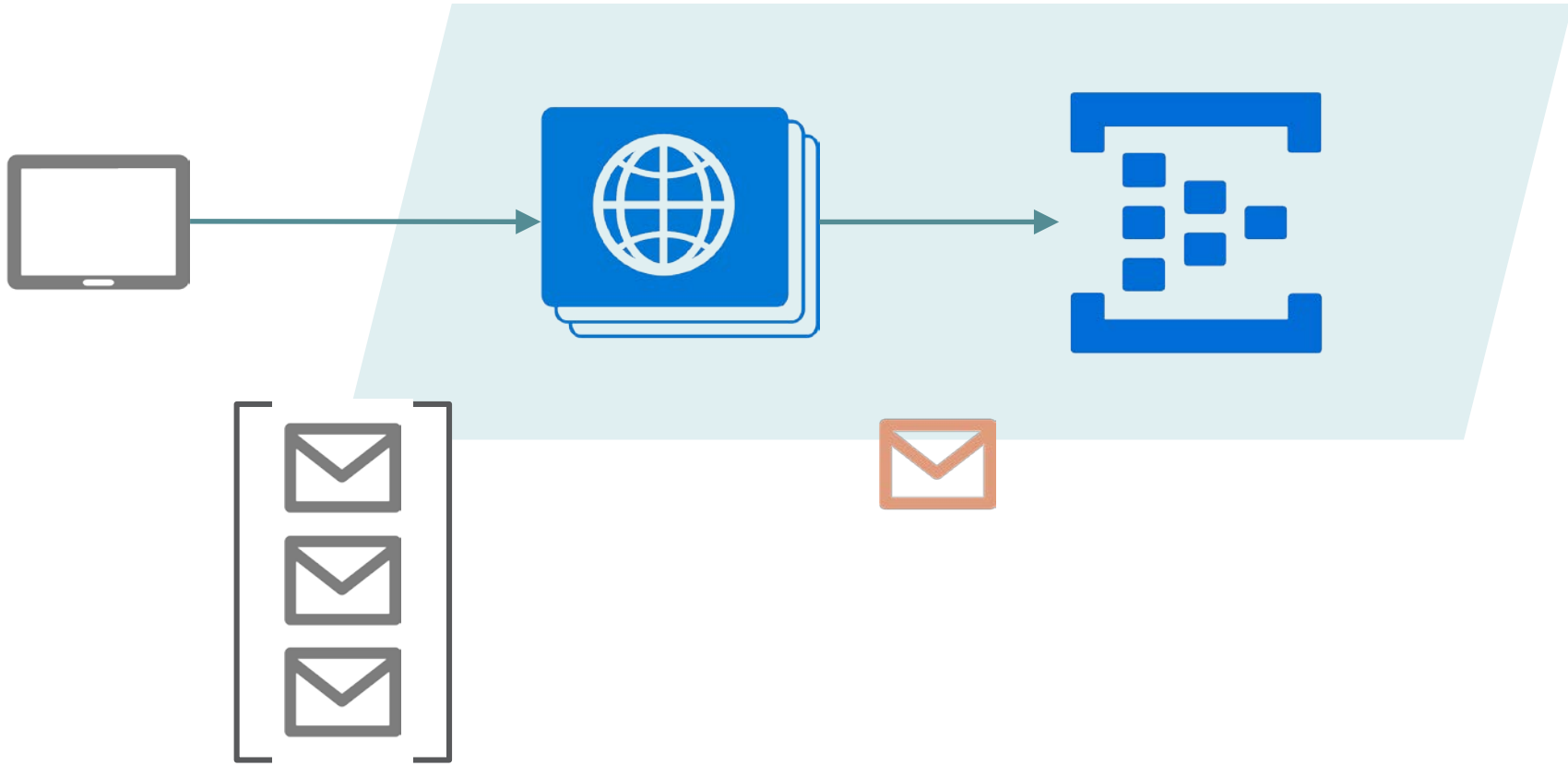
From JSON, set partition key & properties

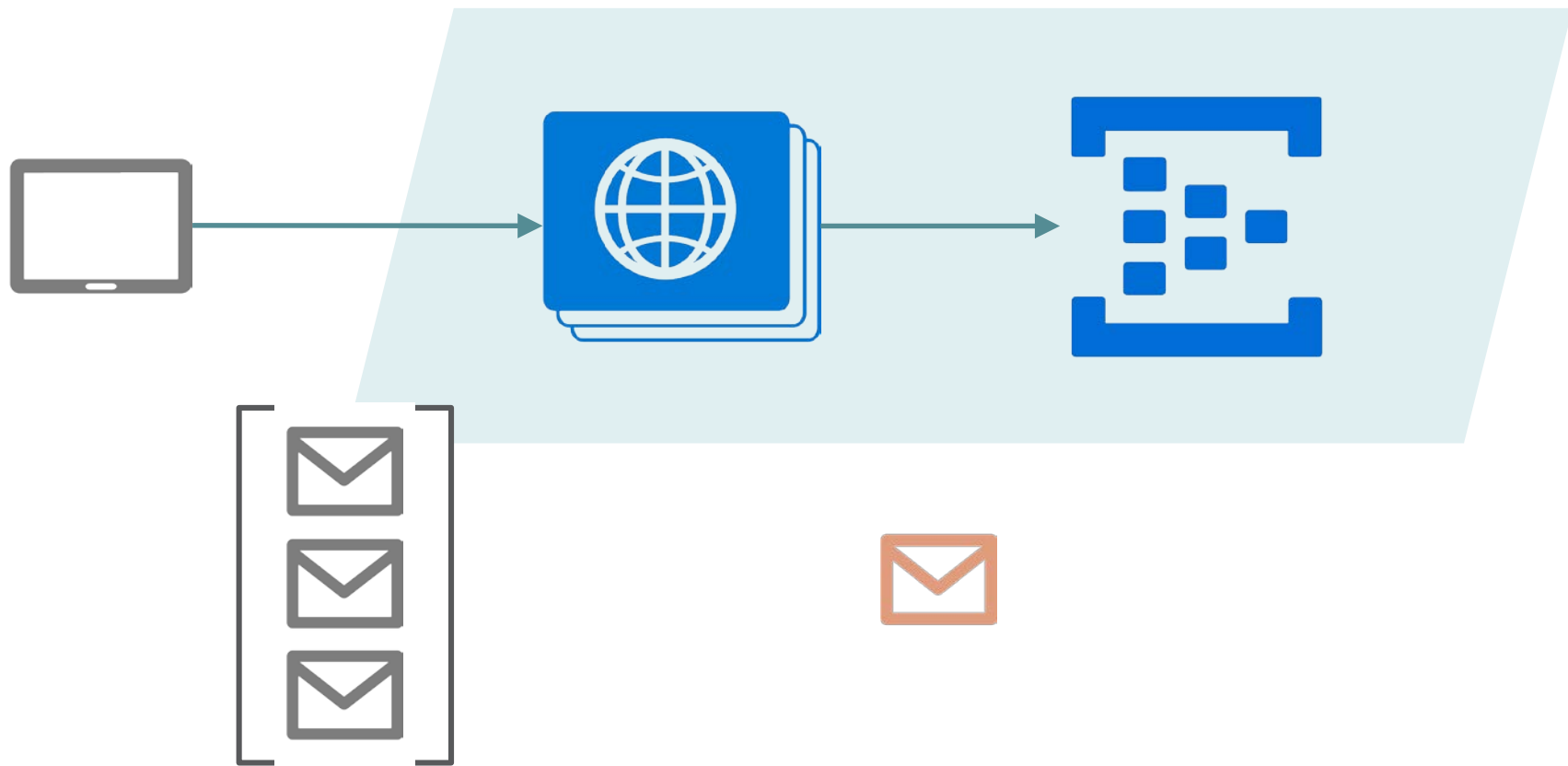
```
await client.SendAsync(eventData);
```

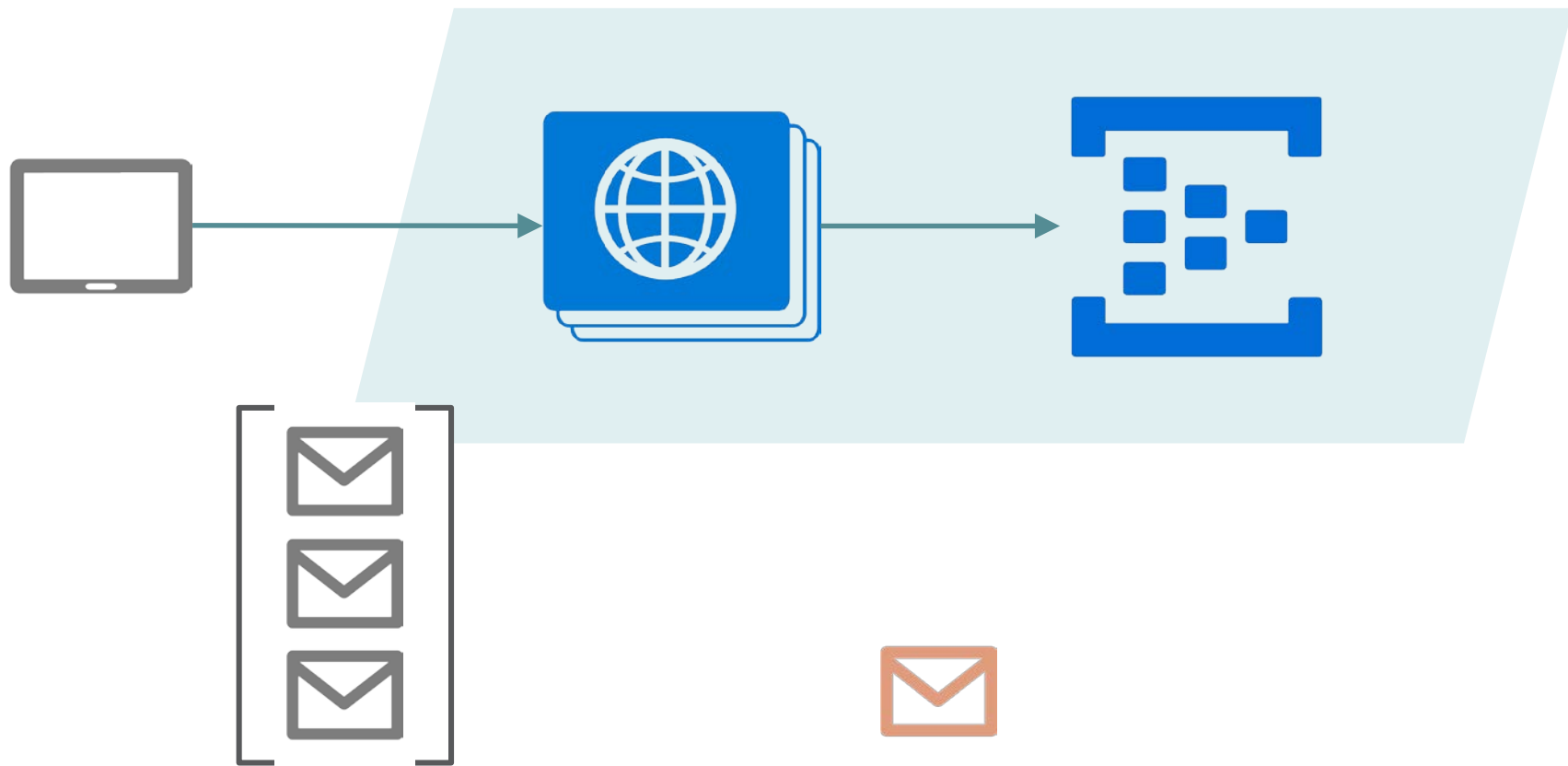
Send event

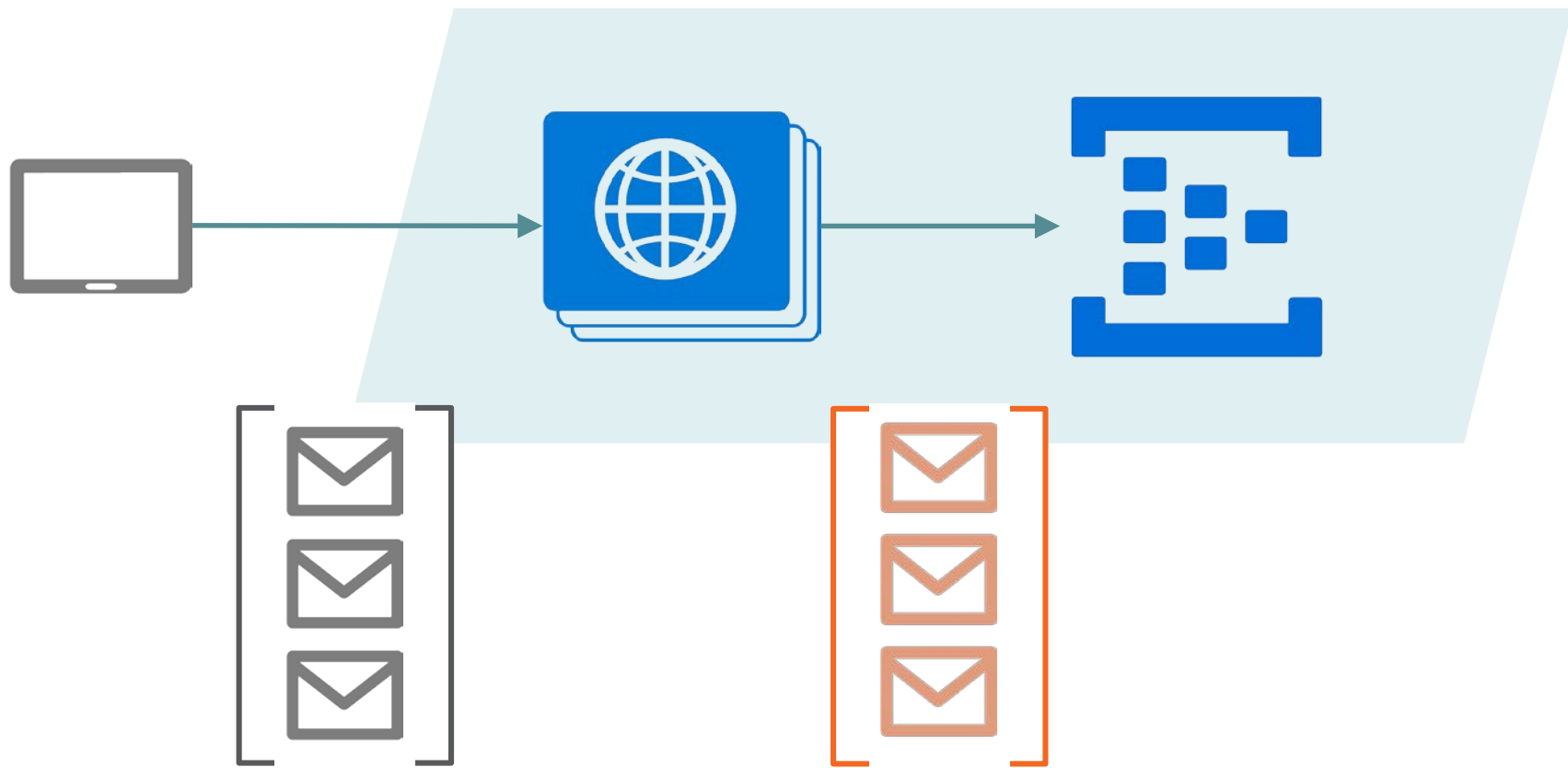
Individually (1 send per event)

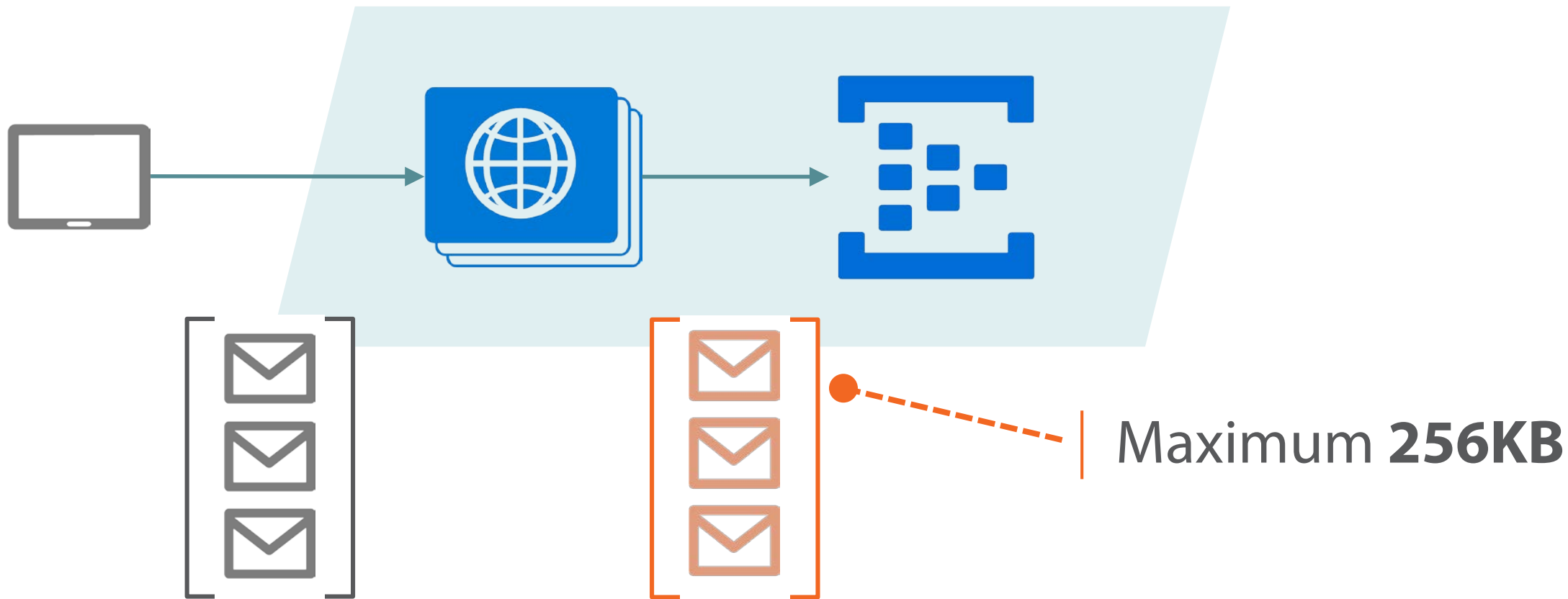




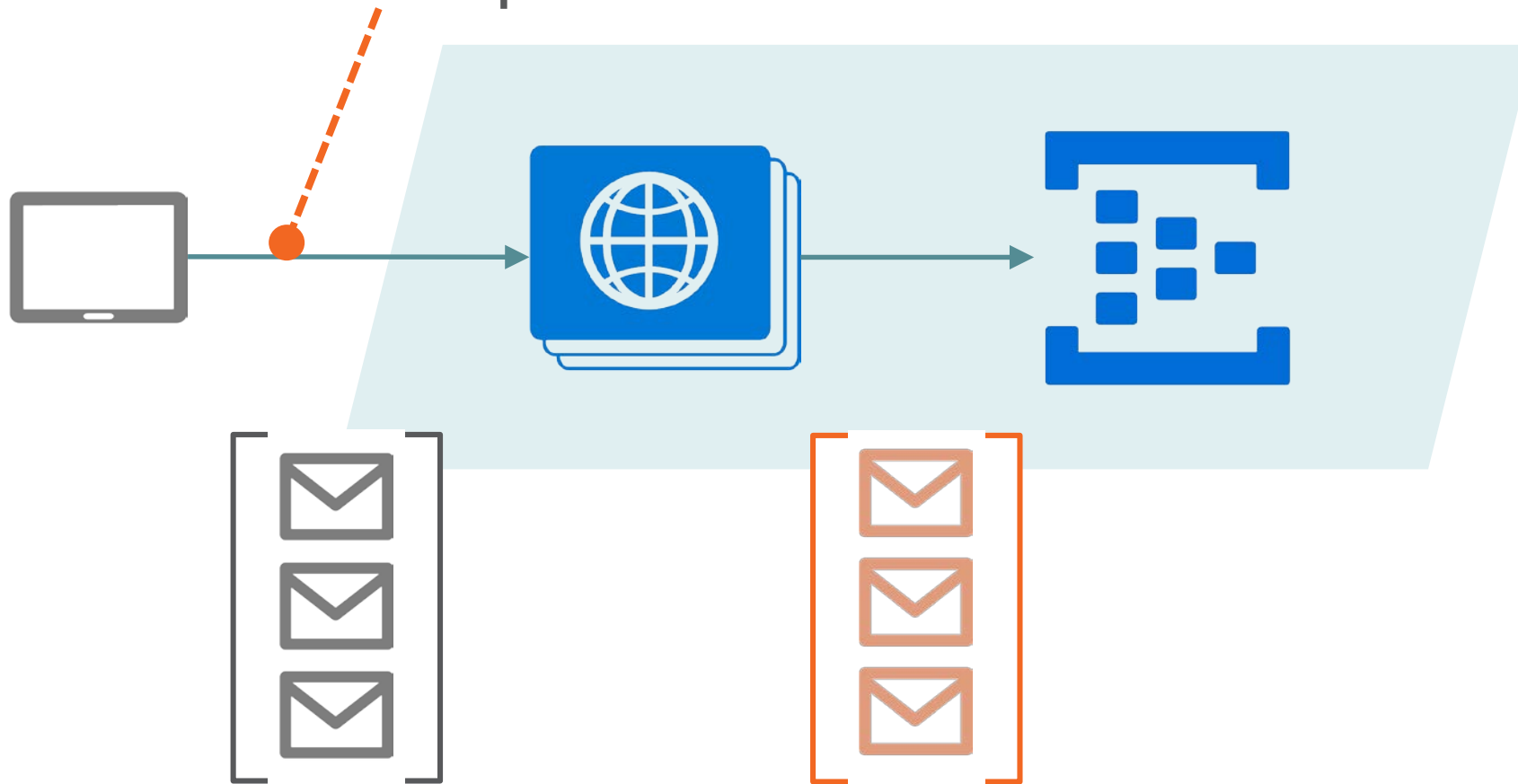


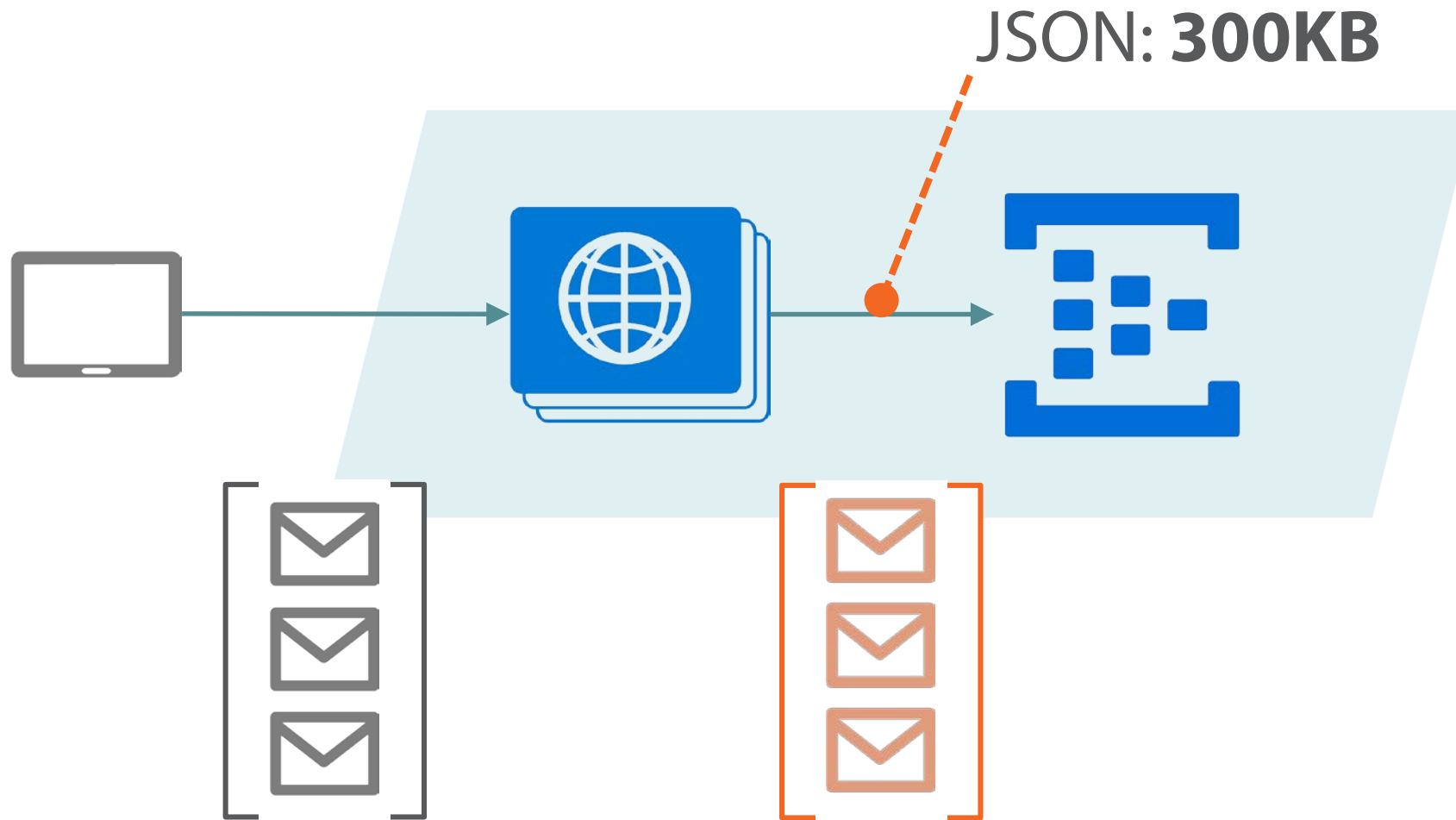


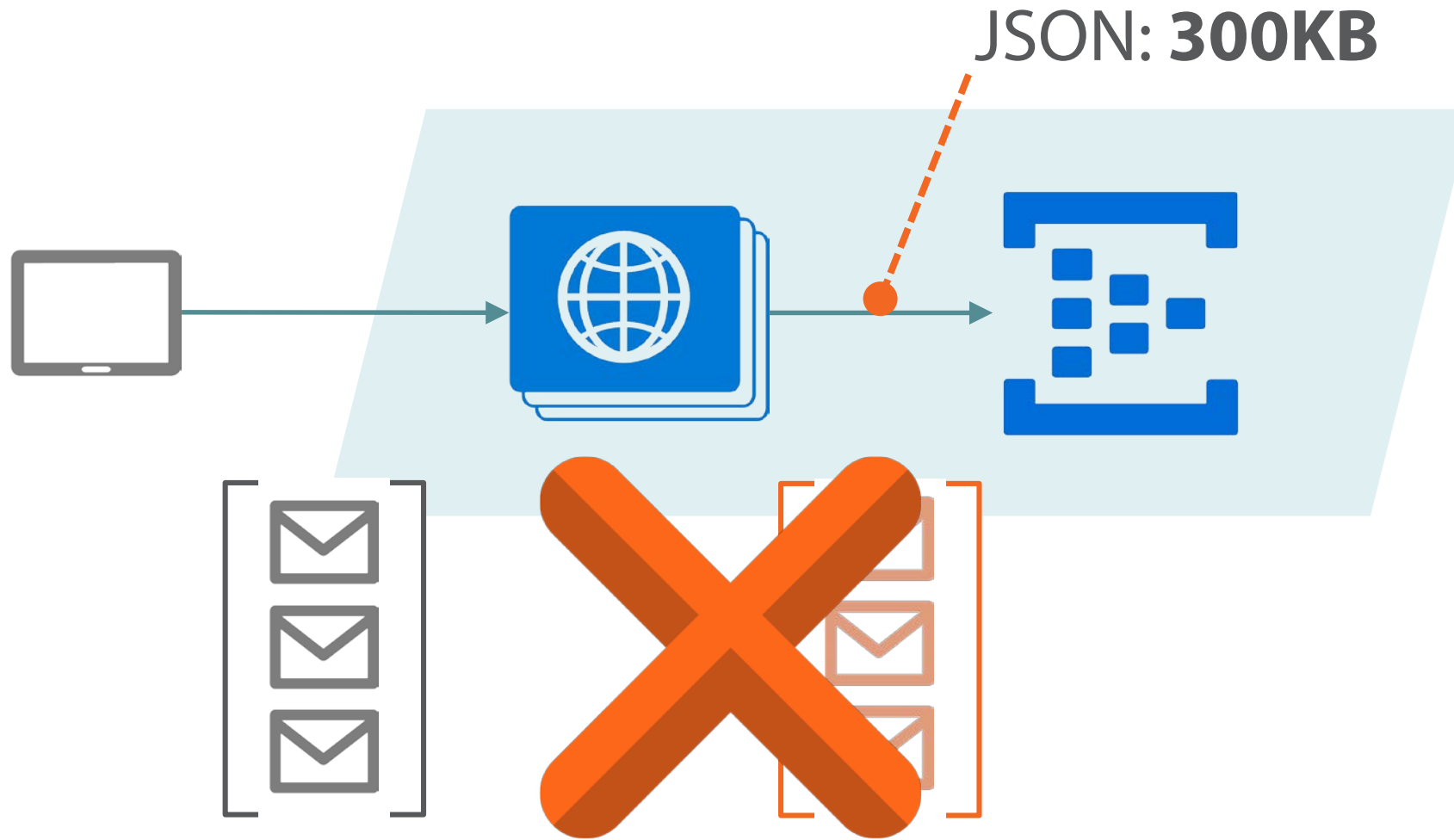




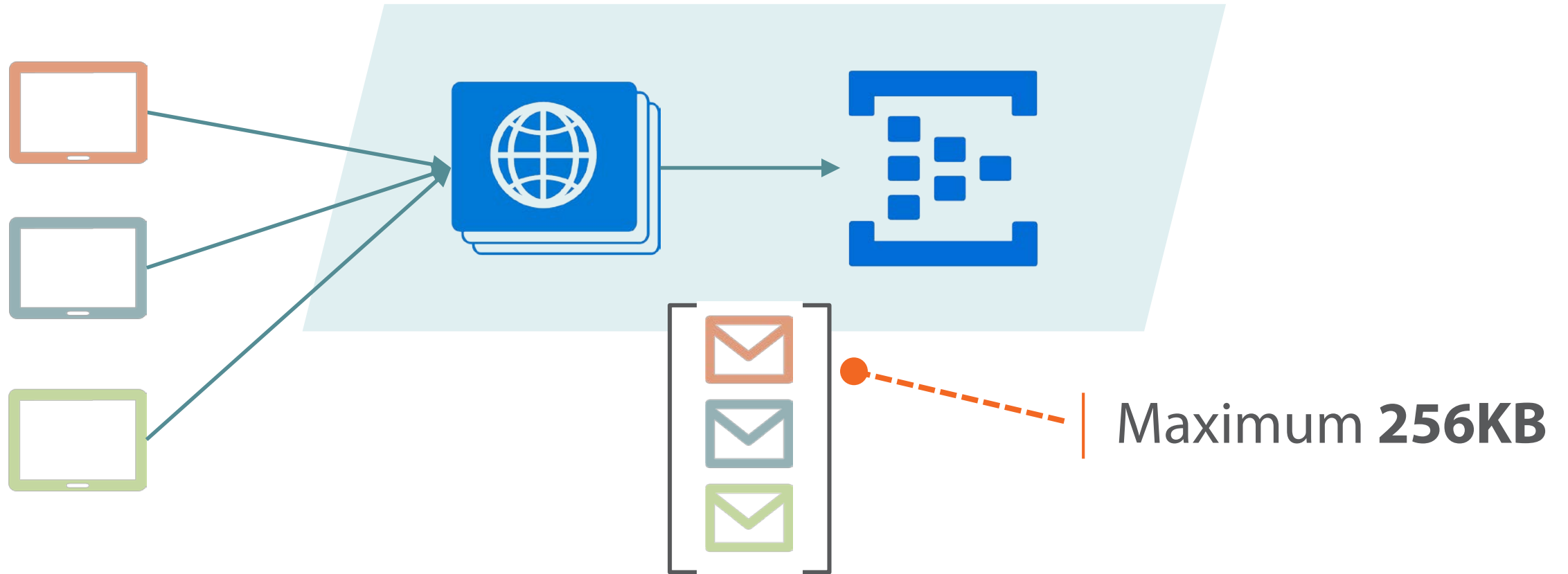
GZip: **30KB**

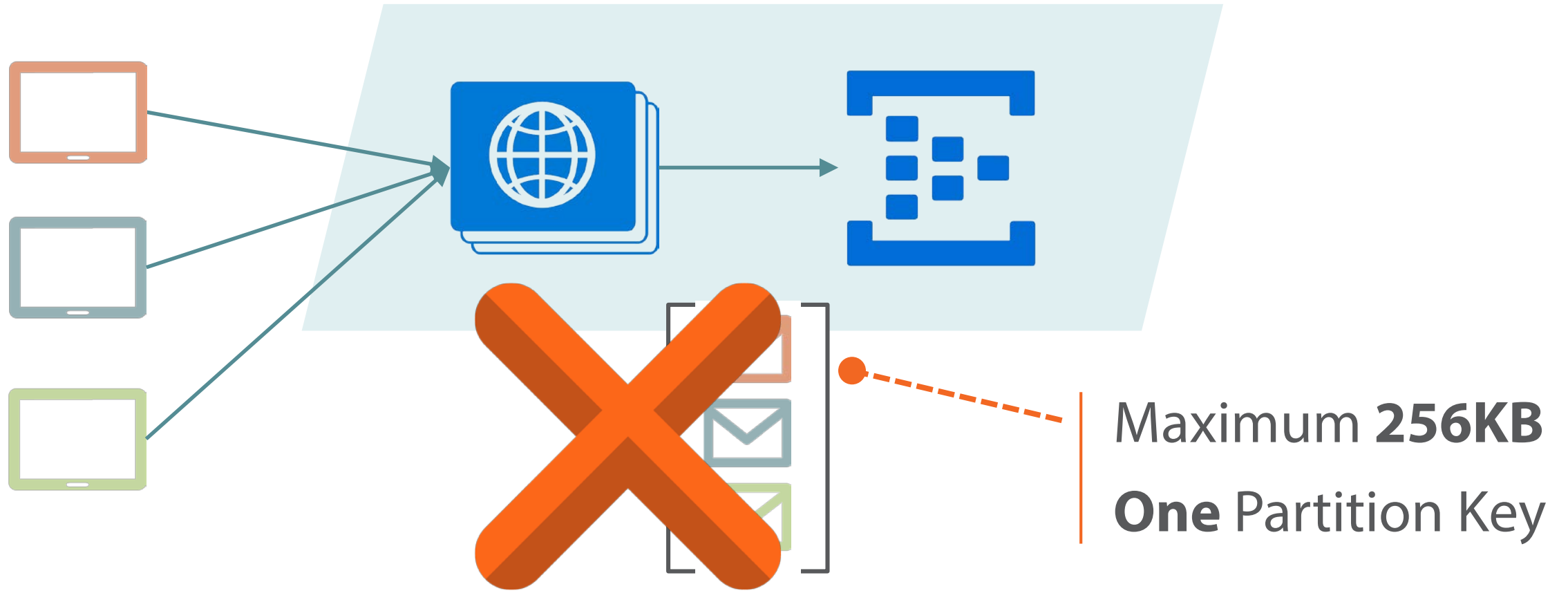


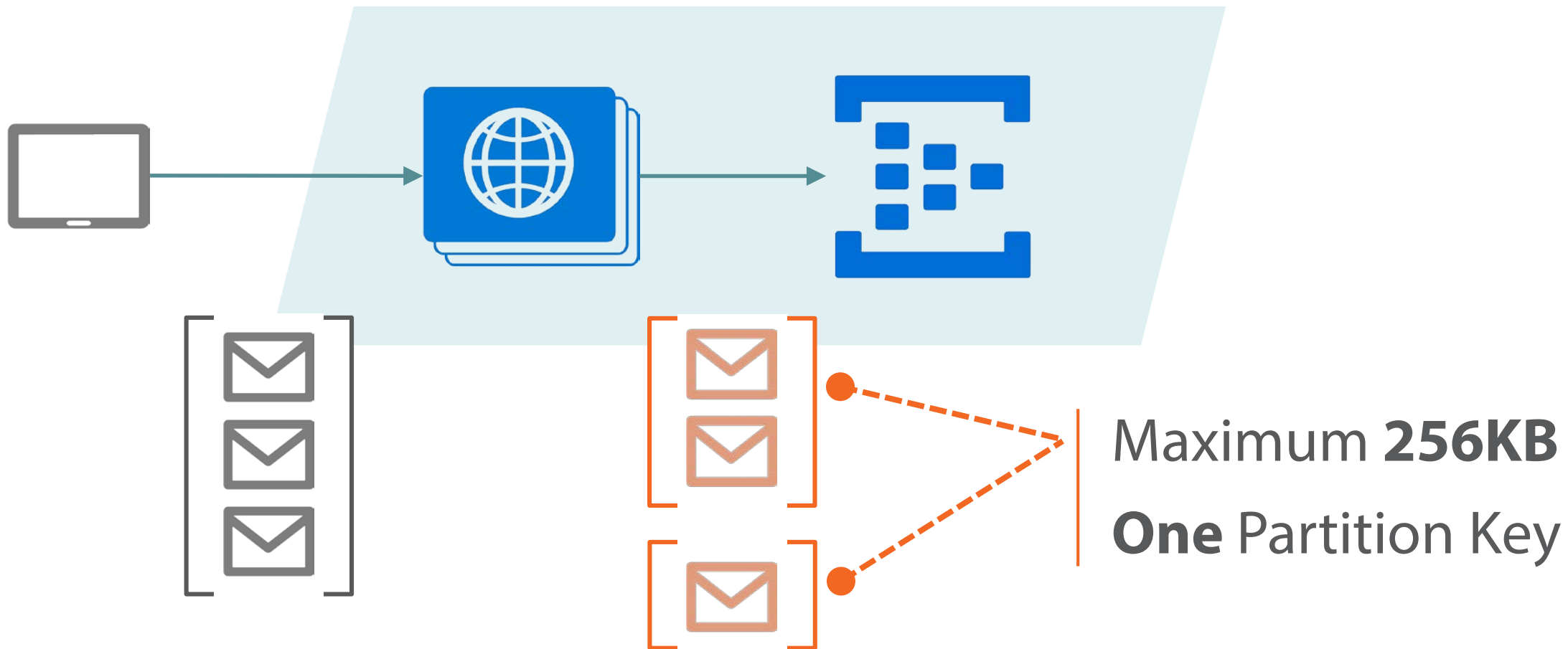




MessageSizeExceededException







Demo: EventBatchIterator

Split incoming array

(Maximum) 256KB batches

Send batch to EventHubClient



```
var iterator = new EventBatchIterator(events);  
foreach (var batch in iterator)  
{  
    await client.SendBatchAsync(batch);  
}
```

Event batch iterator

Split incoming array to valid batches

```
var eventData = EventDataTransform.ToEventData(evt, out
payloadSize);
var eventSize = payloadSize + EventDataOverheadBytes;
if (batchSize + eventSize > MaxBatchSizeBytes)
{
    break;
}
```

Event batch iterator

Ensure payload < 256KB

```
<appSettings>
  <add key="Telemetry.EventHubs.MaxMessageSizeBytes"
    value="262144" />
  <add key="Telemetry.EventHubs.EventDataOverheadBytes"
    value="165" />
</appSettings>
```

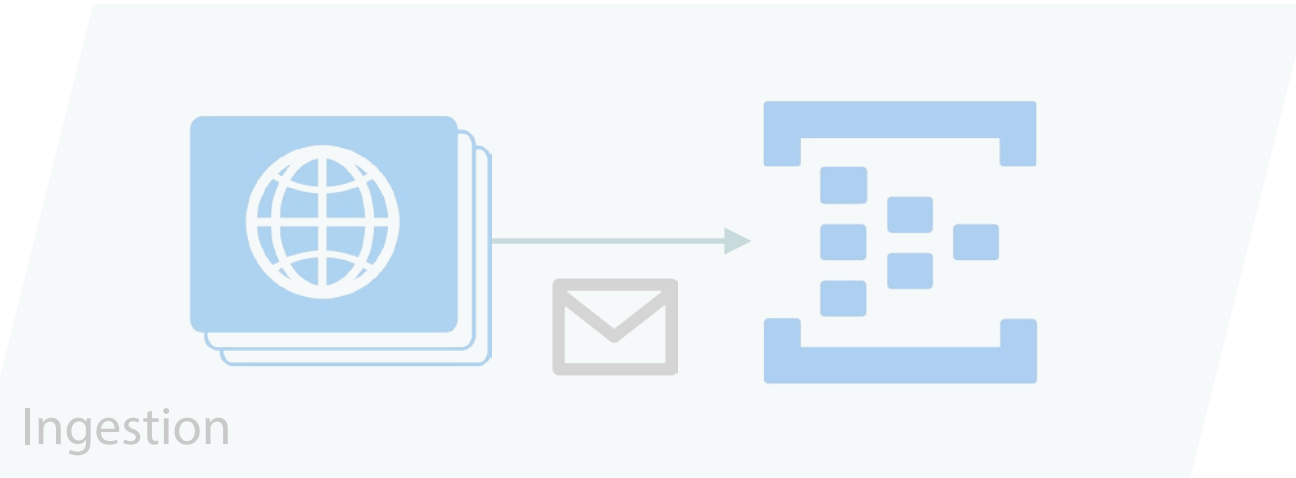
Event batch iterator

Configurable payload sizes

Telemetry.Api.Tests.Acceptance

PostEventsFeature

Iterate_EmptyArray()
Iterate_SmallArray_OneBatch()



Telemetry.Api

EventBatchIterator

MoveNext()

Telemetry.Api.Tests.Unit

EventBatchIteratorTests

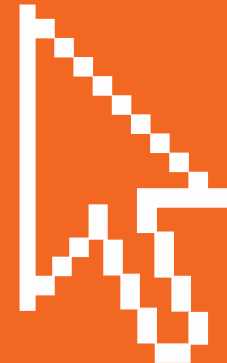
Iterate_EmptyArray()
Iterate_SmallArray_OneBatch()

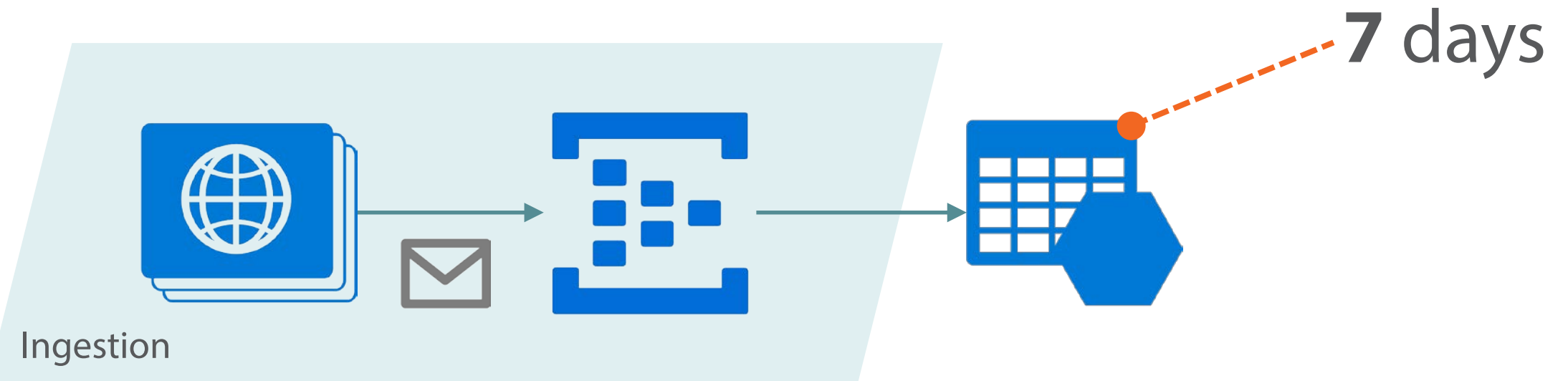
Demo: Acceptance Tests

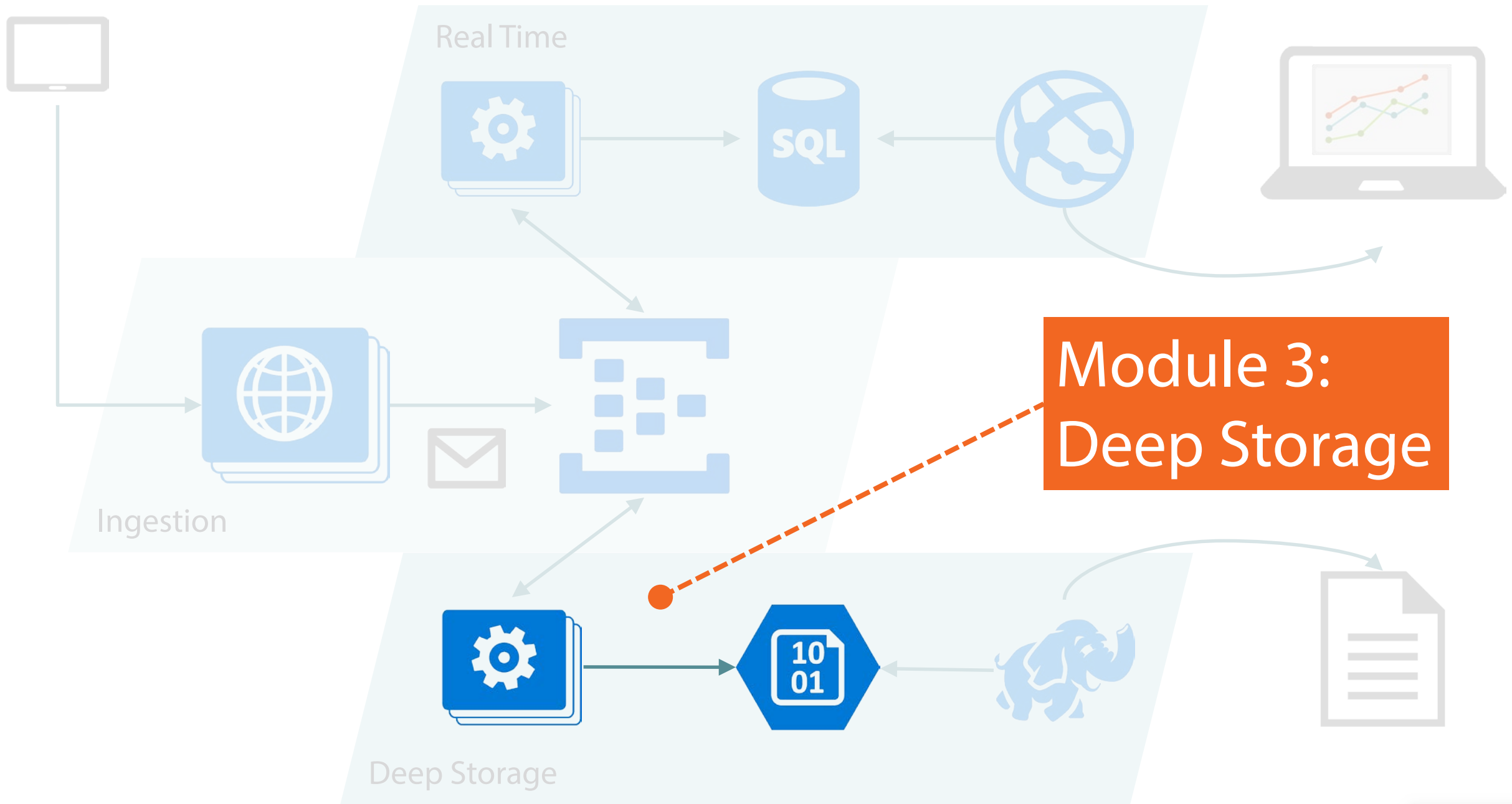
SpecFlow tests

Stub event ingestion API

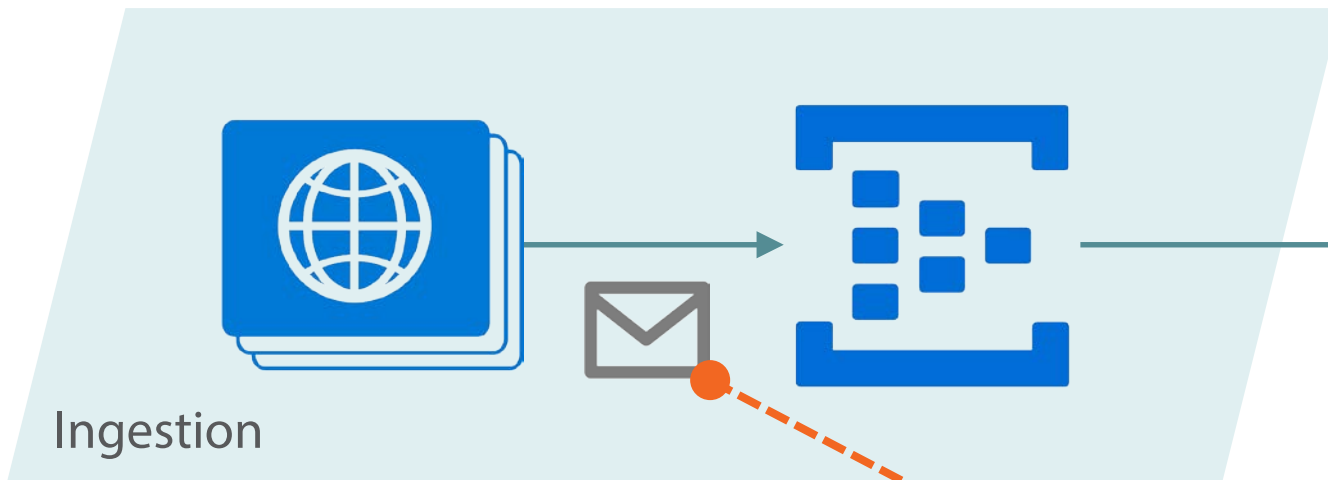
Full API stack tests







Module 3: Deep Storage



1K per second
Per throughput unit

Throughput Units



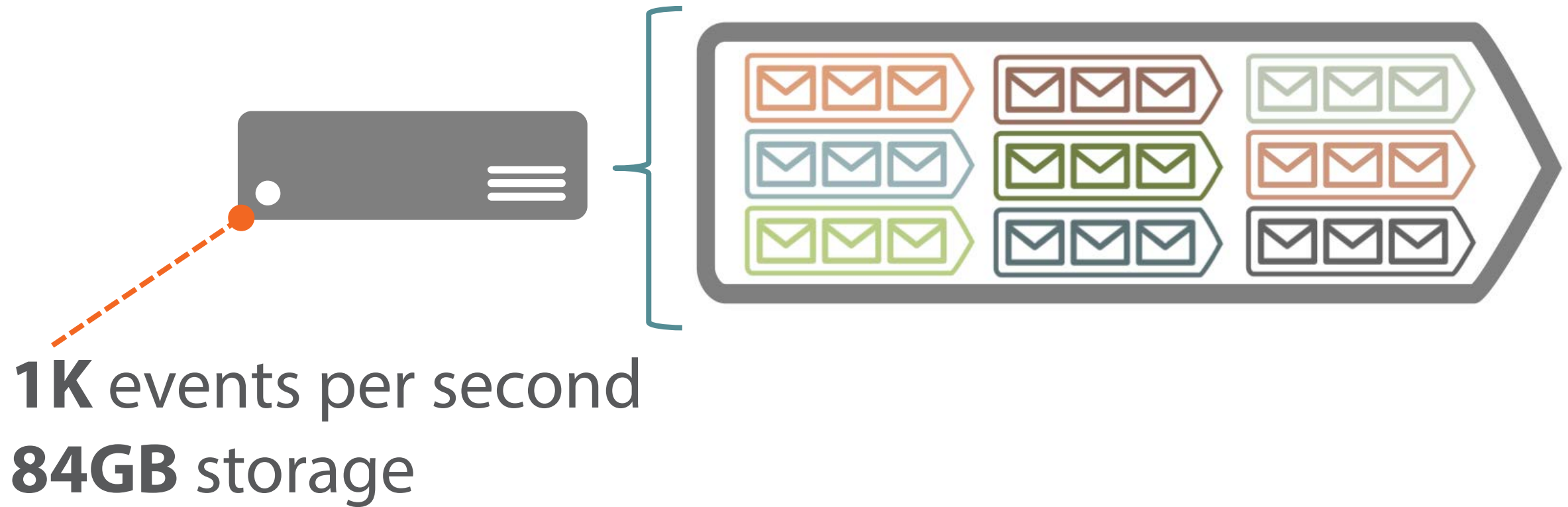
1 throughput unit
1K events per second
84GB storage

Throughput Units



5 throughput units
5K events per second
420GB storage

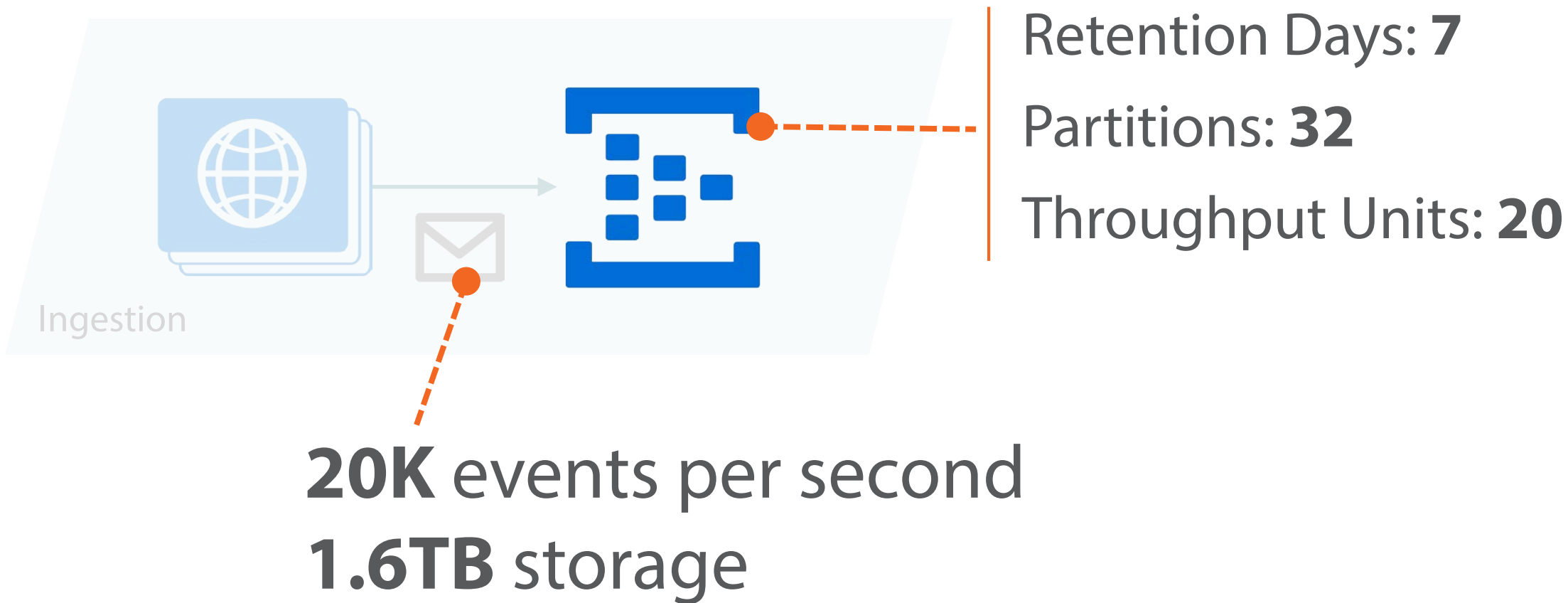
Throughput Units



Throughput Units



2K events per second
168GB storage



Throughput Units



Maximum **1 throughput unit** per partition

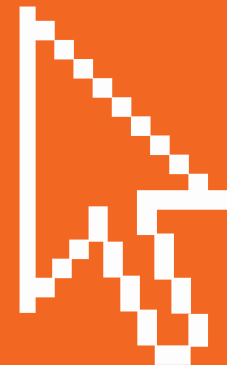
Choose your partition count wisely

Demo: Deploying & Scaling

Continuous deployment scripts

Deployment to Azure

Testing, logging & scaling




```
<MSBuild Projects="$(ApiProject)"  
  Targets="Publish"  
  Properties="TargetProfile=%  
              (CloudServiceEnvironments.Identity);  
              PublishDir=$(BinPath)$(ApiServiceName)\"/>
```

Build deployment packages

One for each environment

```
<AssemblyInfo CodeLanguage="CS"  
    OutputFile="AssemblyVersionInfo.cs"  
    AssemblyInformationalVersion="Commit: $(commit)"  
    AssemblyVersion="$(major).$(minor).$(rev).$(build)"  
    AssemblyFileVersion="$(major).$(minor).$(rev).$(build)" />
```

Version assemblies

With build number and commit ID

Jenkins

search

Elton Stoneman | log out

Jenkins

Elton Stoneman

My Views

Telemetry-API

ENABLE AUTO REFRESH

add description

New Item

People

Build History

Edit View

Delete View

Project Relationship

Check File Fingerprint

Build Queue

No builds in the queue.

Build Executor Status

| # | Status |
|---|----------------|
| | CI-Slave-Web01 |
| 1 | Idle |
| 2 | Idle |
| 3 | Idle |
| 4 | Idle |

All

Telemetry-API

Telemetry-API (Pipeline)

+

| S | W | Name ↓ | Last Success | Last Failure | Last Duration | |
|---|---|--|-----------------------------------|--------------|---------------|--|
| | | Telemetry-API dev Build | 30 sec - #19 | N/A | 46 ms | |
| | | Telemetry-API dev Deploy-Integration | 5.6 sec - #18 | N/A | 40 ms | |
| | | Telemetry-API master Build | 1 min 4 sec - #12 | N/A | 40 ms | |
| | | Telemetry-API master Deploy-PreProd | 1 min 25 sec - #8 | N/A | 31 ms | |
| | | Telemetry-API master Deploy-Test | 55 sec - #12 | N/A | 40 ms | |

Icon: [S](#) [M](#) [L](#)

Legend

[RSS for all](#)

[RSS for failures](#)

[RSS for just latest builds](#)

PowerShell deployment

Run via Jenkins

```
PublishCloudService.ps1
```

```
-DeploymentLabel '%DeploymentLabel%'  
-Environment 'Staging'  
-PackageLocation 'Telemetry.Api.PreProd.cspkg'  
-CloudConfigLocation 'Telemetry.Api.cscfg'
```

PowerShell deployment

Run via Jenkins

Microsoft Azure | CREDIT STATUS elton@sixeyed.com

devicetelemetry

ALL QUEUES TOPICS RELAYS EVENT HUBS **SCALE** CONFIGURE

capacity

MESSAGING TIER BASIC STANDARD ?

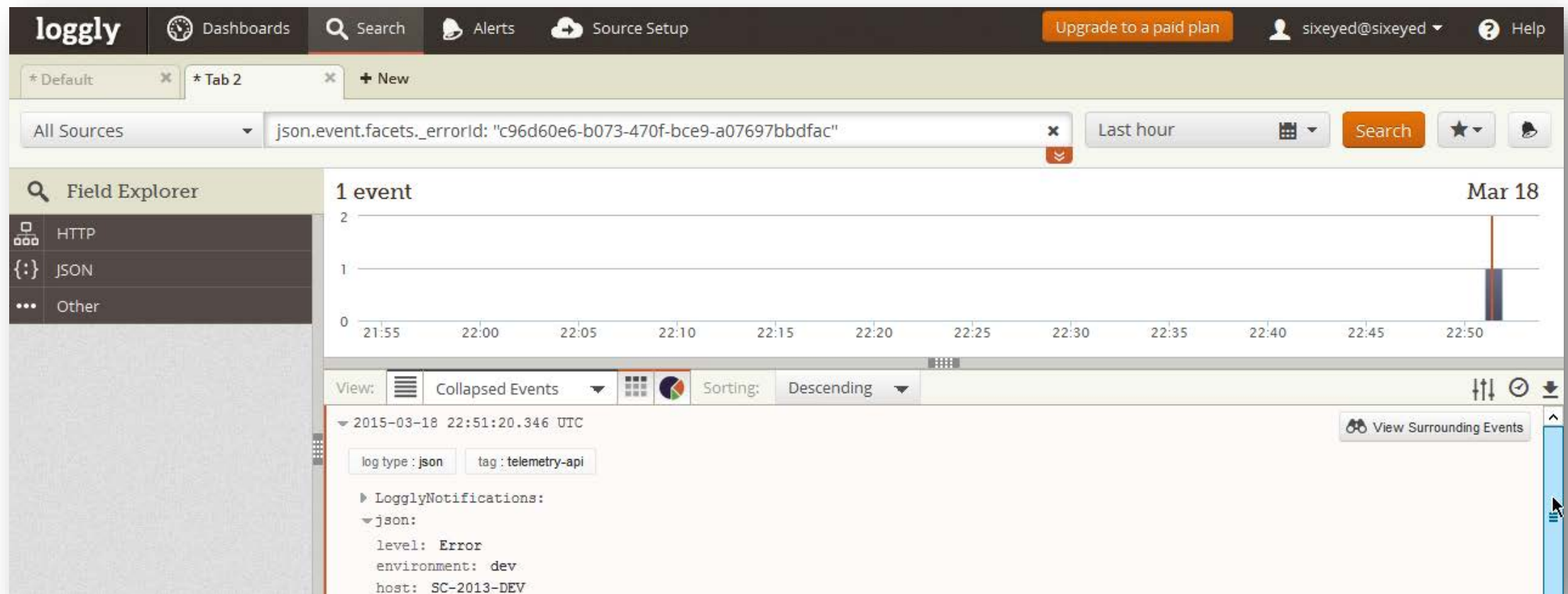
EVENTHUB THROUGHPUT UNITS

2 unit(s) ?

EVENTHUB THROUGHPUT UNITS MAXIMUM AVAILABLE

Throughput units

Scale in Azure Portal



Centralized logging
With filter & search in Loggly

q

Getting Started With Jenkins Continuous Integration



John Sonmez

@jsonmez | <http://simpleprogrammer.com>

q

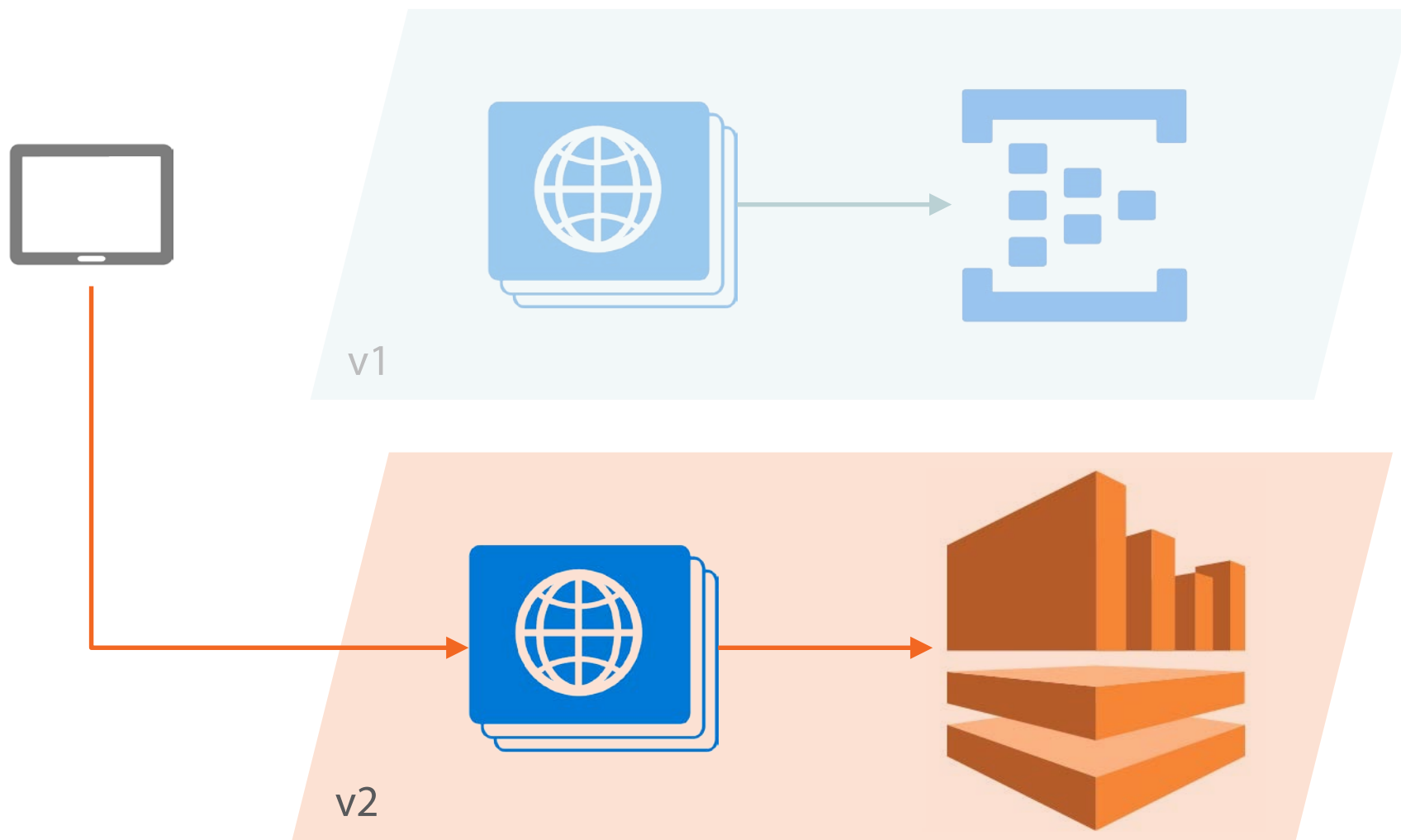
Five Essential Tools for Building REST APIs

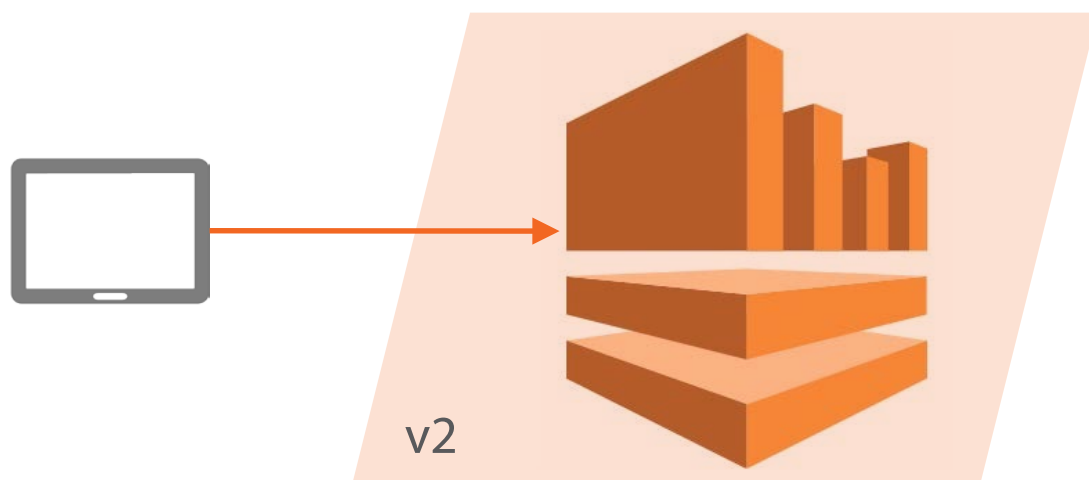
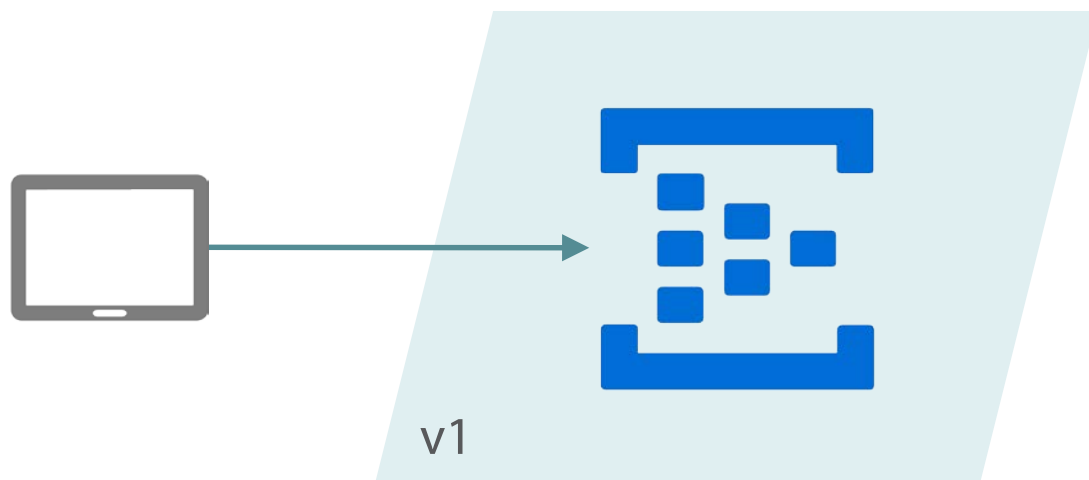


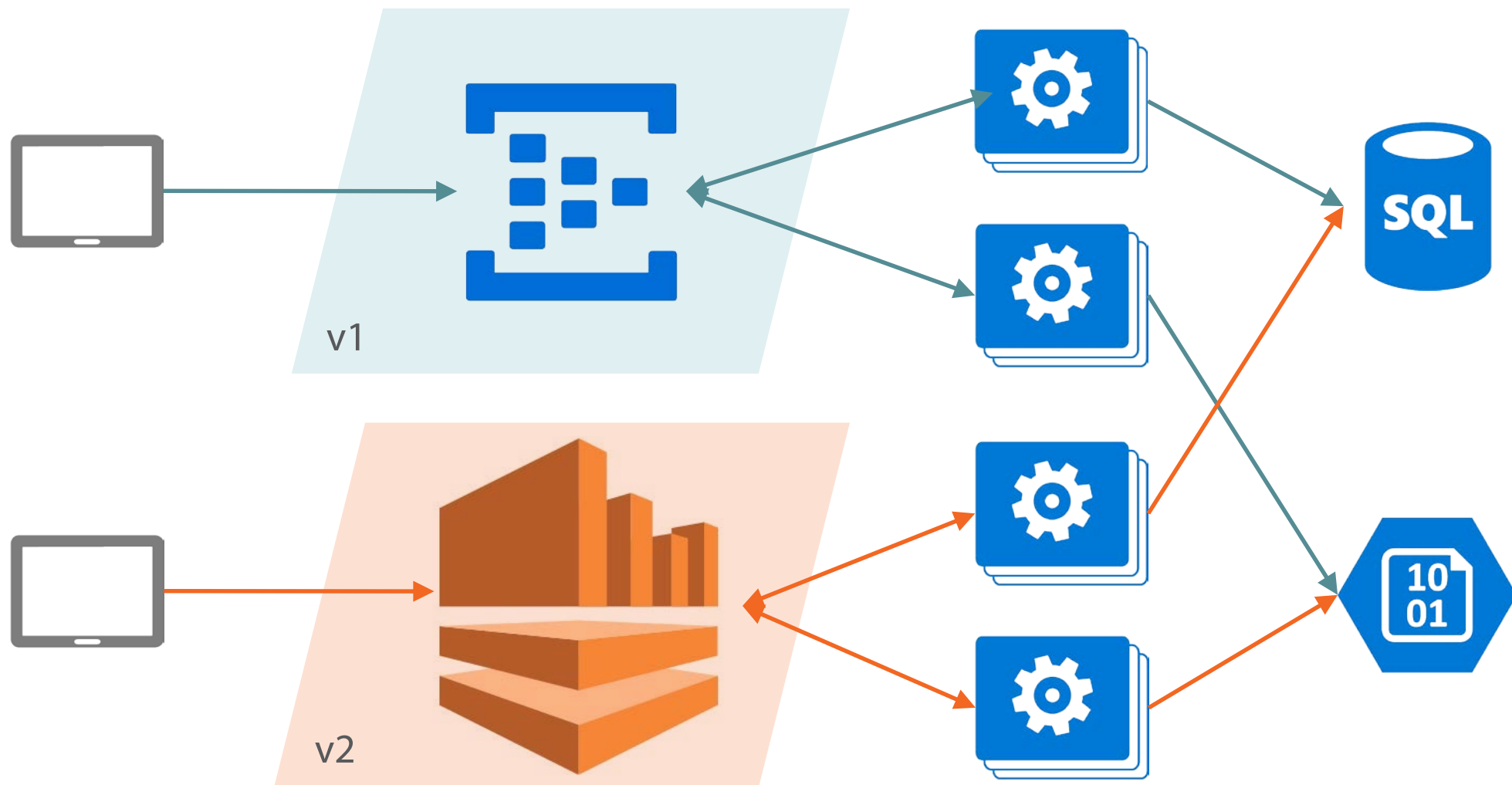
Elton Stoneman

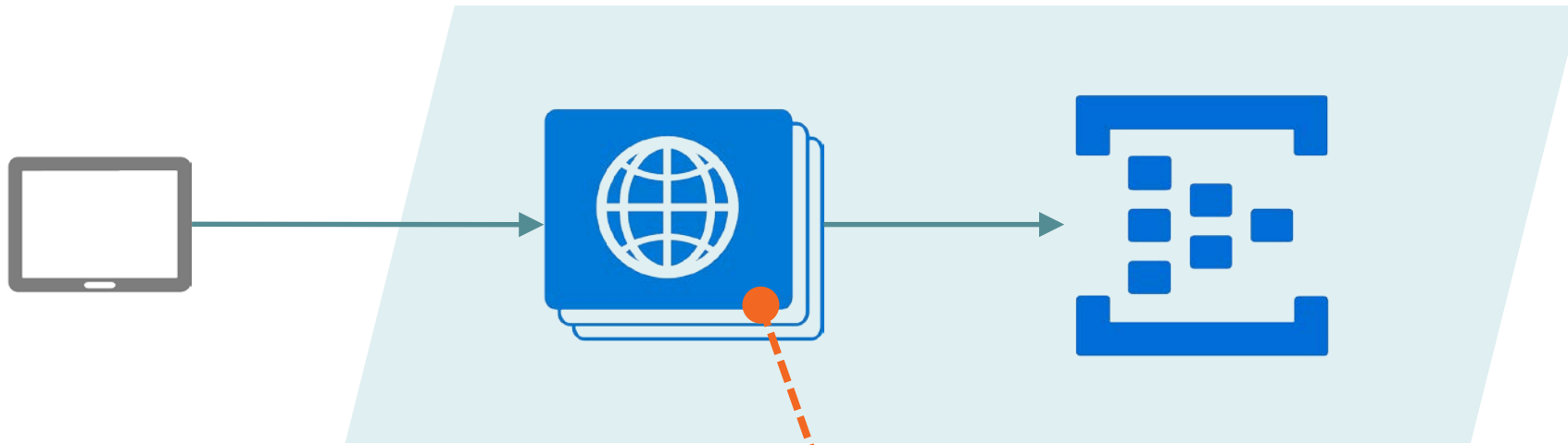
@EltonStoneman | www.geekswithblogs.net/eltonstoneman



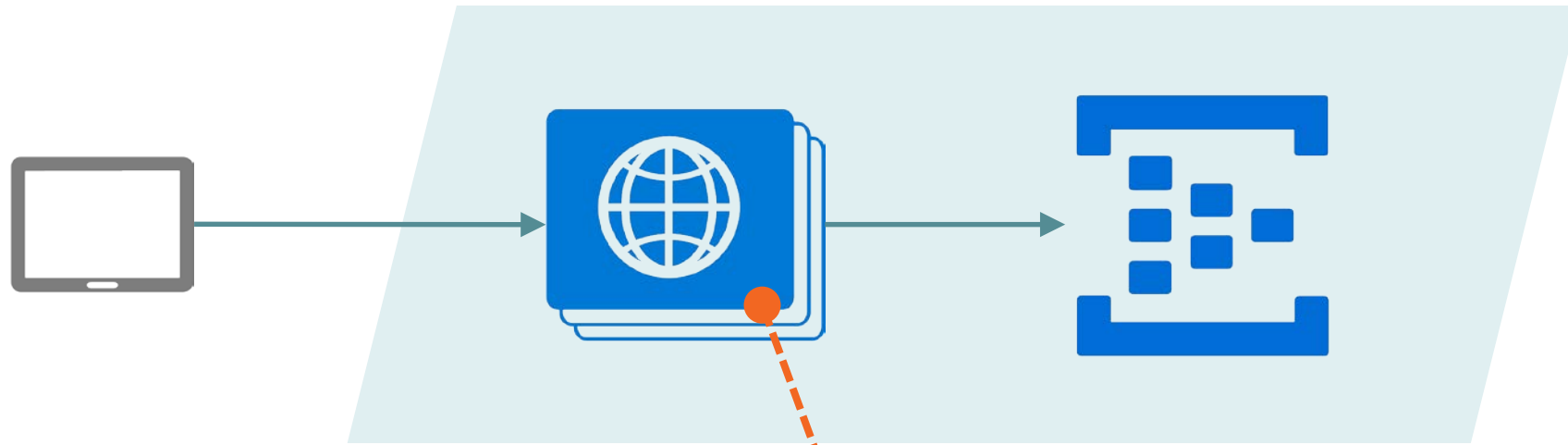




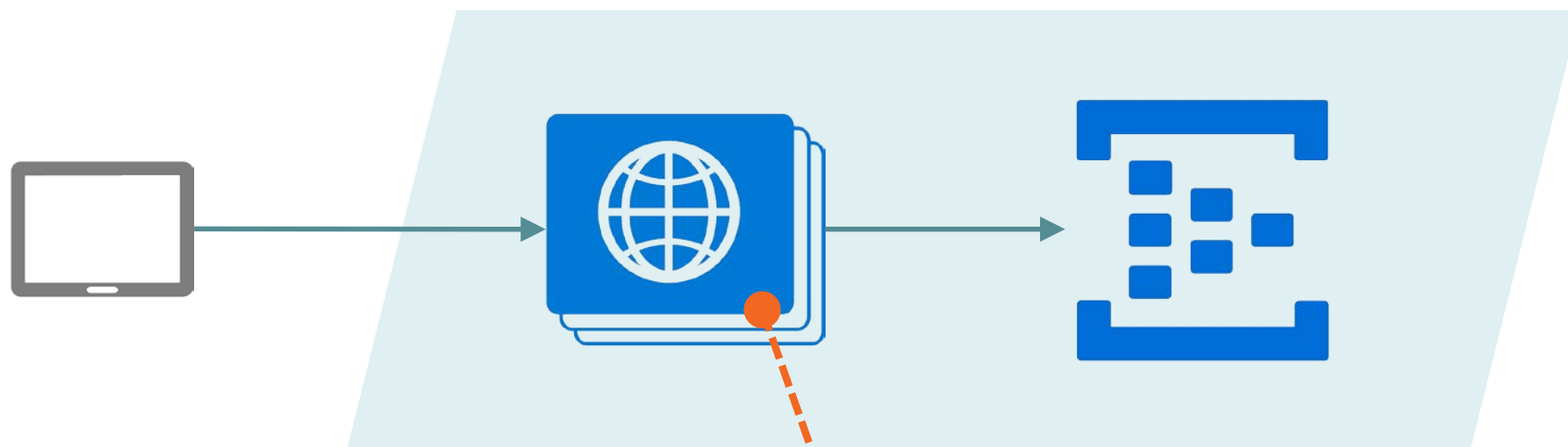




Add **receivedAt**
Support **GZip**
No 256KB limit

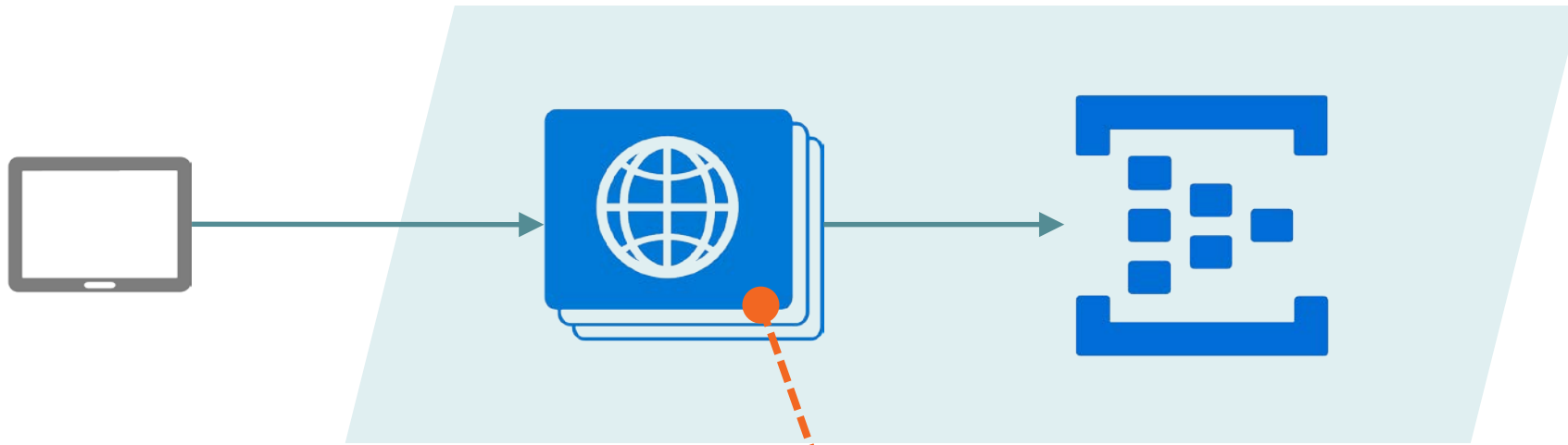


POST /events
GET /config



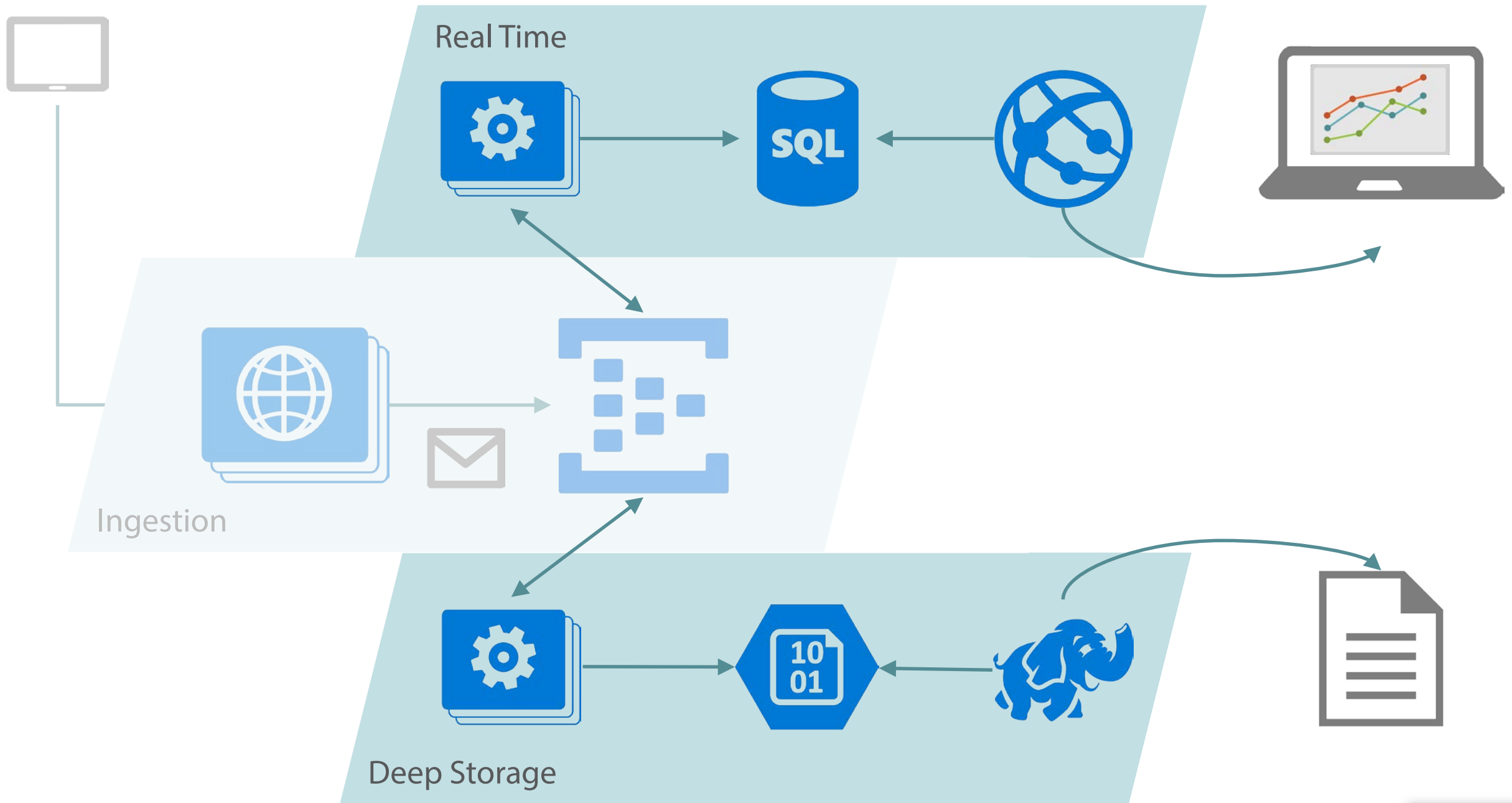
Event and
Count by

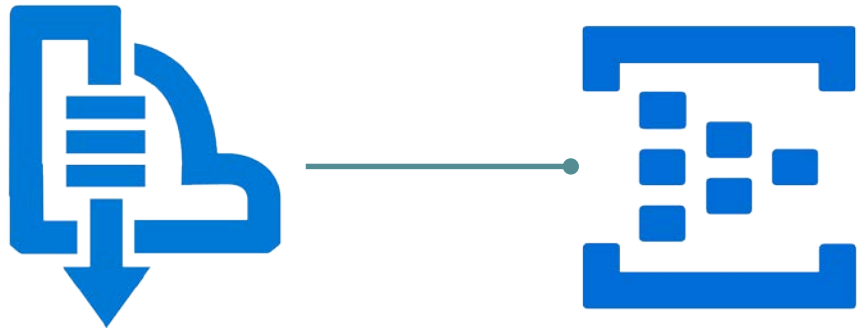




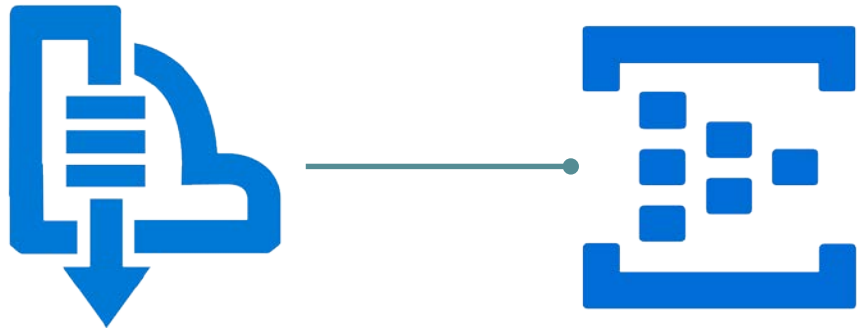
Add **receivedAt**
Support **GZip**
No 256KB limit

Absolute minimum extra logic



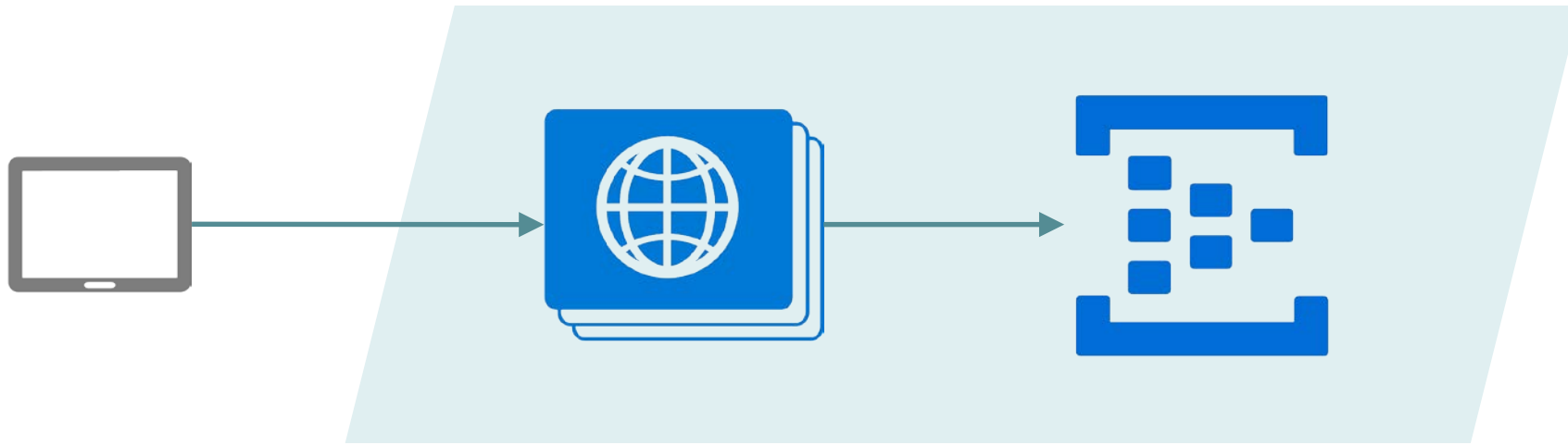


- Name
- Region
- Retention Days
- Partitions



- Name
- Region
- Retention Days
- **Partitions**





- Batch events
- Max 256KB
- One partition key



- Default limit 20
 - 20K events per second
- 1.2M** per minute
72M per hour
1.7Bn per day



- By request – 1,000+
 - 1M events per second
- 86Bn** per day

