

# Messaging in Azure

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# Messaging in Azure

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- Messaging is extremely important aspect of Software Architecture
- Must be able to handle load, throughput, and have great latency
- A core part of every Microservices architecture

# Messaging in Azure

- Azure has 4 fully managed messaging services

Storage Queue

Service Bus

Events Grid

Event Hubs

# Storage Queue

- Part of Azure Storage Account
- The simplest queue implementation
- Create queue -> Send Message -> Receive message
- No special pricing for queue, included in Storage Account
- Same for availability

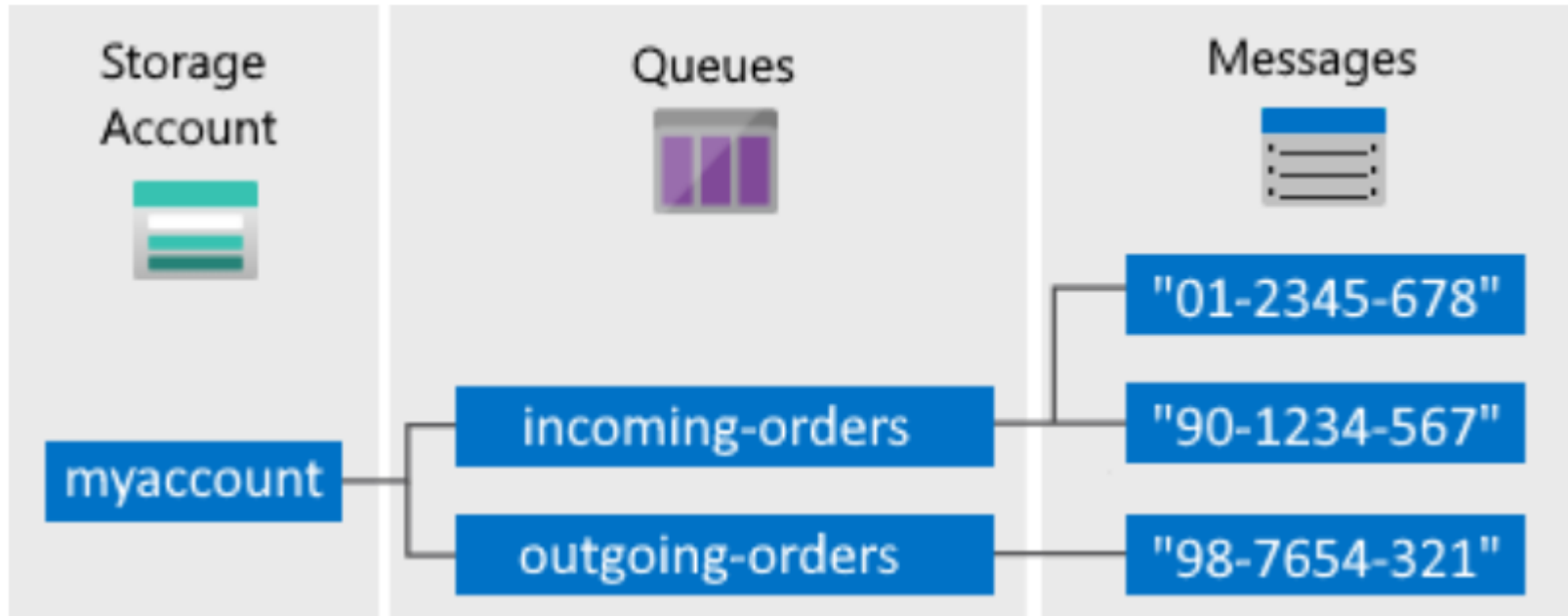
# Storage Queue

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- Performance:
  - Requests (1KB msg)
    - 20K msgs / sec / account
    - 2K msgs / sec / queue
- Max msg size: 64KB

# Storage Queue

- Architecture:



# Storage Queue

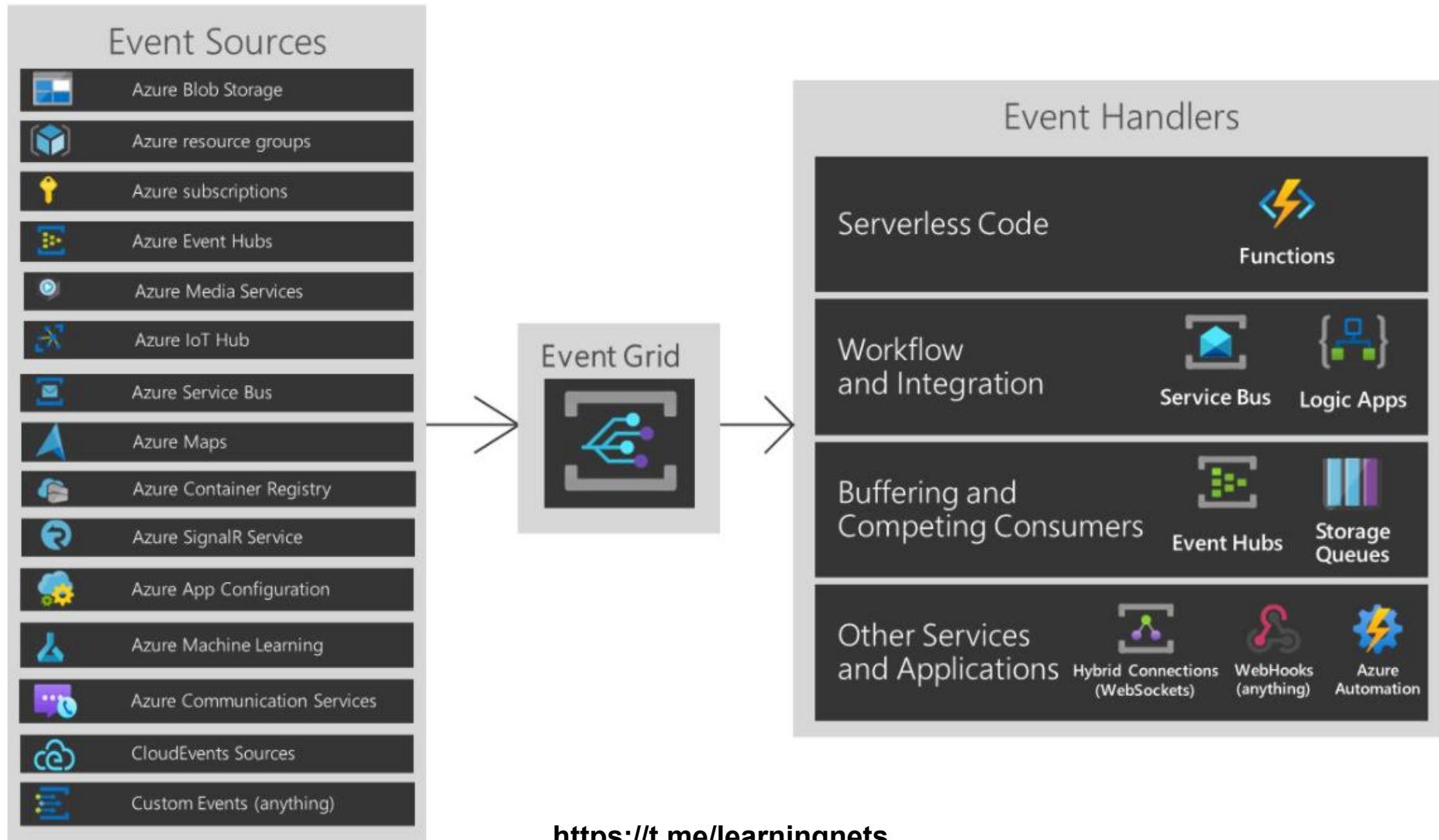
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- **Development:**
  - **Client libraries for many development languages**
    - **.NET, Java, Python, NodeJS, C++, PHP, Ruby**
  - **Extremely simple object model**

# Event Grid

- Allows building event-based architectures
- Publishes events to interested parties
- No queue / no order
- Strong integration with many Azure services
- Cost effective, simple pricing
- No tiers, HA is built in

# Event Grid



# Terminology

Event



What happened. Examples: Storage blob added, IOT telemetry received

Publisher



Who created the event. Examples: Microsoft, my organization

Event Source



Where the event happened. Examples: Storage account, IOT Hub

Topic



Where the event is sent. Used to group related events.

Subscription



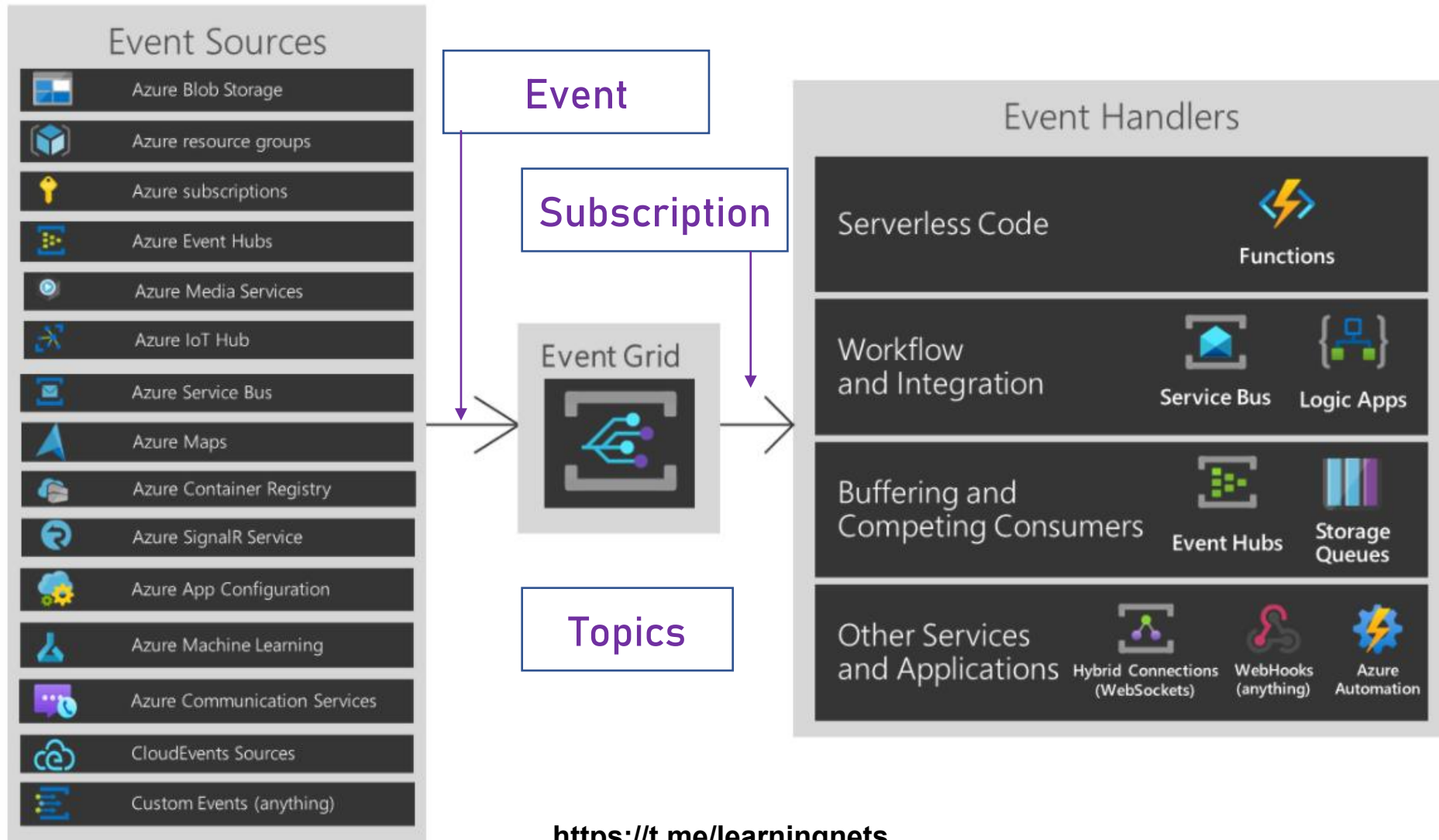
Which events interest me. Examples: Storage blob added, IOT telemetry received

Event Handler



Where the event is sent. Examples: Azure Function, Event Hubs etc.

# Event Grid



# Event Grid

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- SLA:
  - 99.99%
- Max event size:
  - 1MB

# Event Grid

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- Performance:
  - 10,000,000 events / sec
  - 5,000 events / sec / topic
- Latency:
  - Subsecond end-to-end latency in the 99<sup>th</sup> percentile

# Event Grid Pricing

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- Based on:
  - Number of operations
    - First 100K operations are free

## Event Grid

REGION:

West US 2



First 100,000 operations are free

1000000

Operations per month

= \$0.54

Upfront cost

\$0.00

Monthly cost

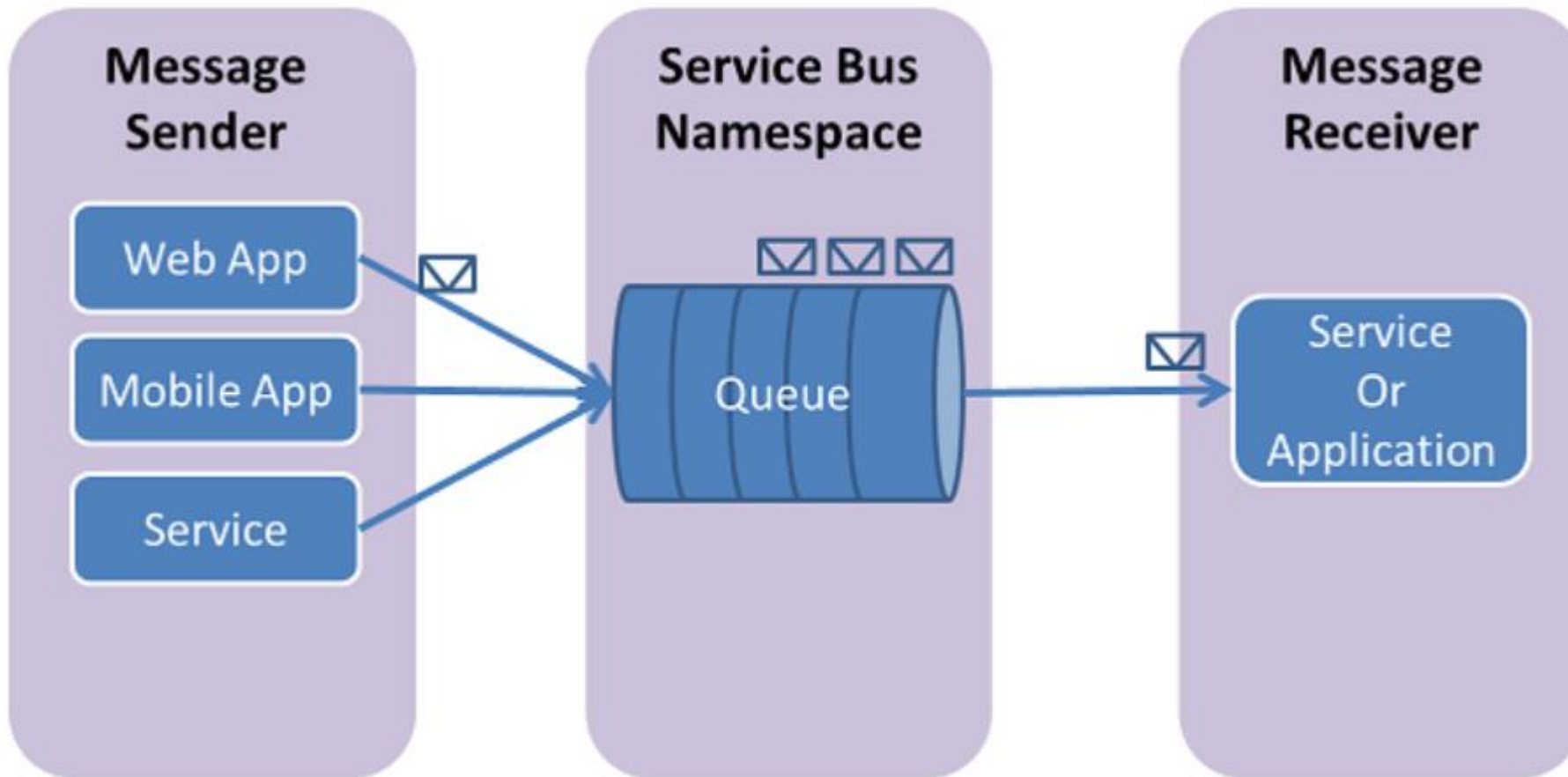
\$0.54

# Service Bus

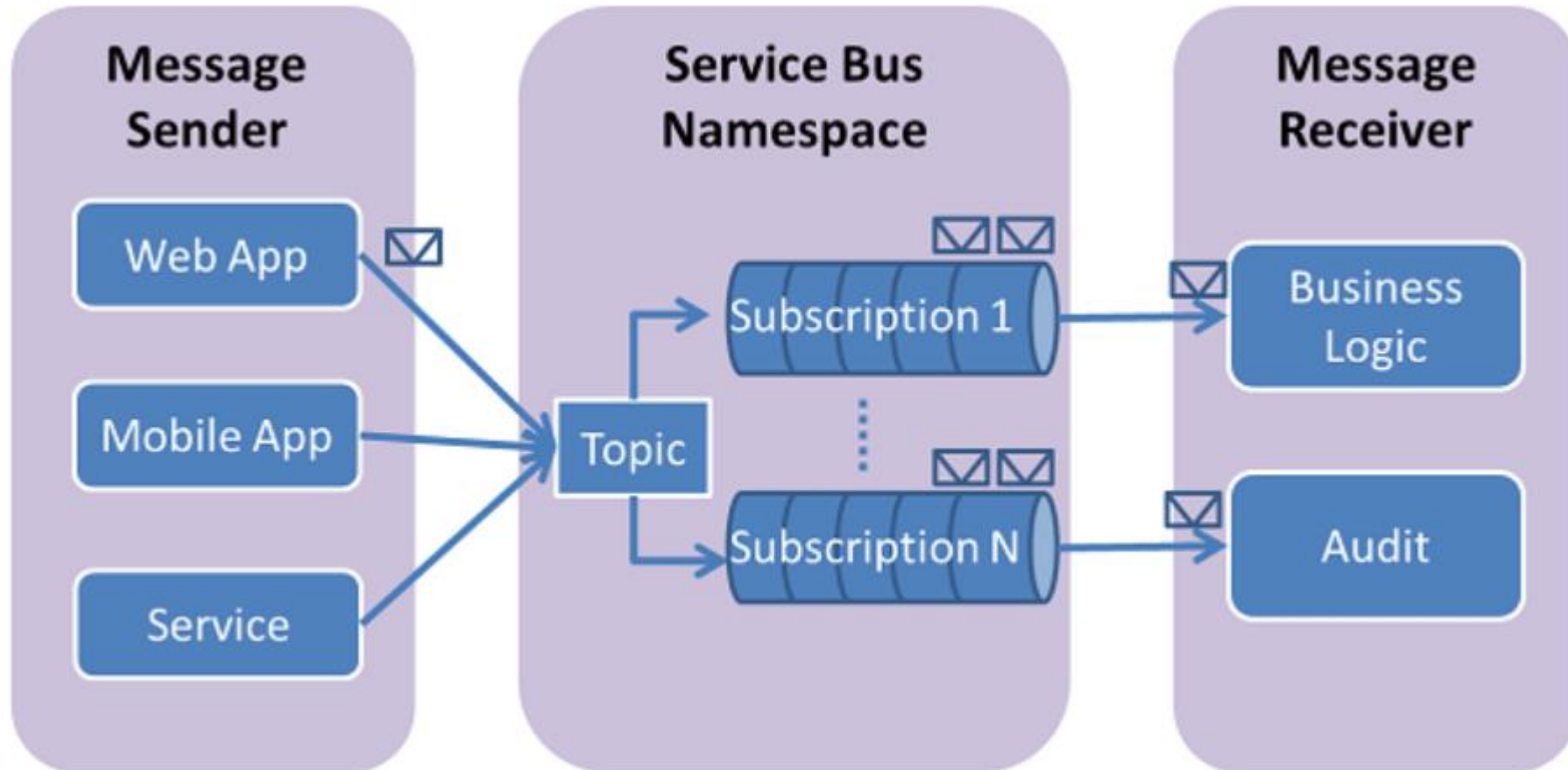
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- Fully managed, full blown message queueing service
- Durable
- Supports point-to-point (Queue) and pub/sub (Topic) scenarios
- Compatible with AMQP protocol
- Compatible with JMS 2.0 API (Premium only)

# Service Bus Queues



# Service Bus Topics



# Service Bus

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- Advanced features:
  - Message sessions (guarantees FIFO)
  - Dead-letter queue
  - Scheduled delivery
  - Transactions
  - Duplicate detection
  - And more...

# Service Bus

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- Availability:
  - SLA: 99.9%
  - Can be configured for geo-disaster recovery

# Service Bus

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- Security:
  - IP Firewall rules
  - Service endpoints
  - Private endpoints

# Service Bus Tiers

- Basic, Standard, Premium

FEATURE	BASIC	STANDARD	PREMIUM
Queues	✓	✓	✓
Scheduled messages	✓	✓	✓
Topics		✓	✓
Transactions		✓	✓
De-duplication		✓	✓
Sessions		✓	✓
ForwardTo/SendVia		✓	✓
Message Size	256 KB	256 KB	1 MB
Resource isolation			✓
Geo-Disaster Recovery (Geo-DR)			✓ <small>*Requires additional Service Bus Premium namespaces in another region.</small>
Availability Zones (AZ) support		<a href="https://t.me/learningnets">https://t.me/learningnets</a>	✓

# Service Bus Pricing

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- Based on:
  - Tier
  - No. of operations

## Service Bus

REGION:

West Europe

TIER:

Standard

### Messaging operations

10

+

\$0.013

×

730

Hours

▼

=

\$9.81

Million/month

Base charge

## Service Bus

REGION:

West Europe



TIER:

Premium



Service Bus Premium runs in dedicated resources to provide higher throughput and more consistent performance.

Daily message units:

2



\$0.93

Per message unit



730

Hours



\$1,354.15

Upfront cost

\$0.00

Monthly cost

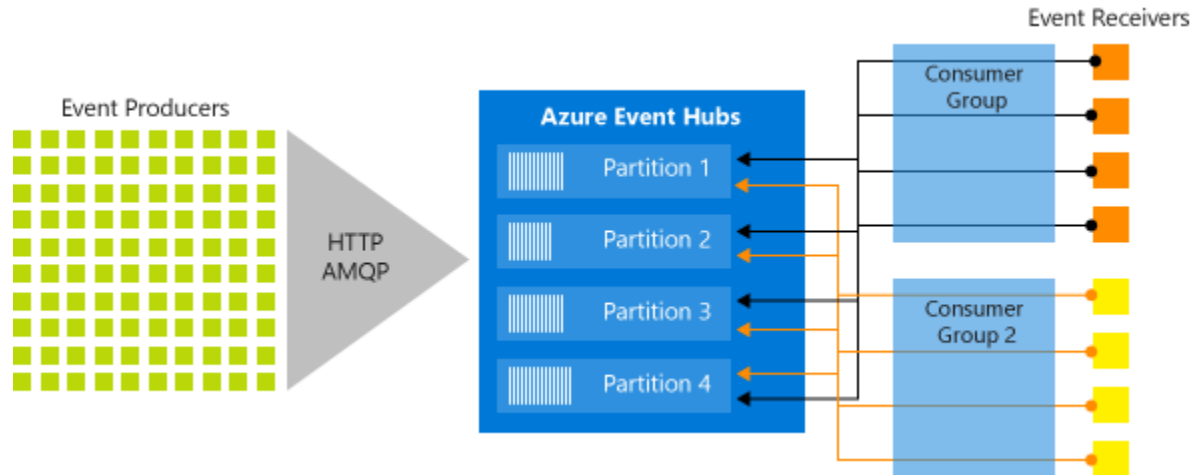
\$1,354.15

# Event Hubs

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- Big Data streaming platform and event ingestion service
- Note: No “messaging” in the description
- Basically a managed Kafka implementation
- Can receive millions of events per second

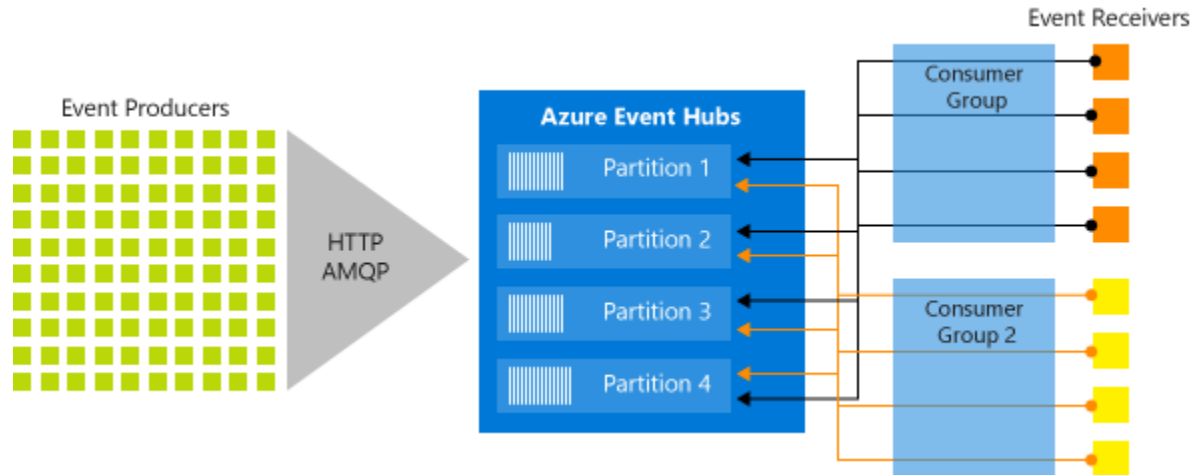
# Event Hubs Architecture



## Event Producers

- Components generating the events
- Can be done by anyone with the client / HTTP client
- Simple connection and API

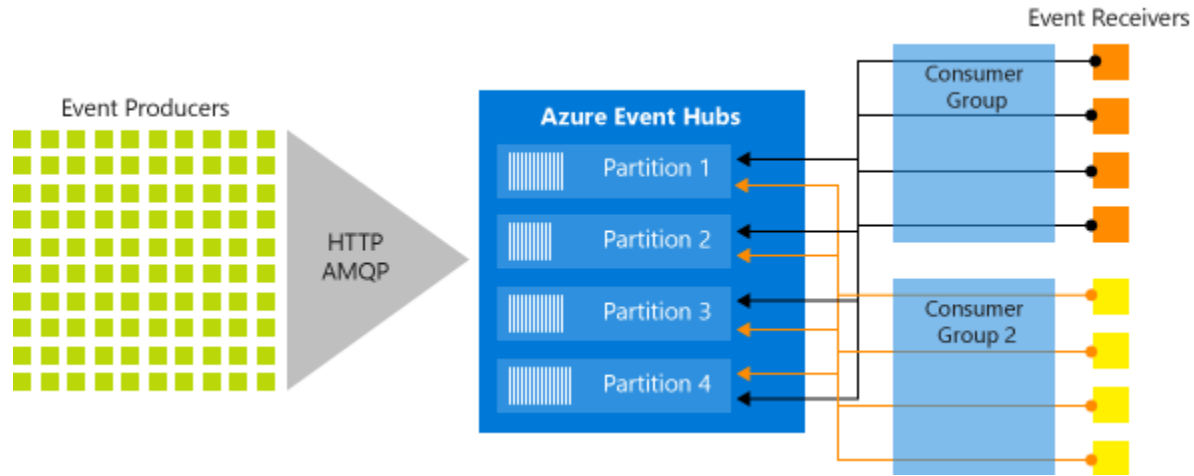
# Event Hubs Architecture



## Partition

- Single event stream
- Can think of it as a single queue
- Guarantees order
- Limited availability
- Better to spread messages across partitions to improve availability
- ...but then order is not guaranteed
- Max 32 partitions on a single Event Hubs

# Event Hubs Architecture



## Consumer Group

- Logical group of receivers, belong to the same application
- Example:
  - Receivers for processing telemetry = Consumer Group
  - Receivers for storing the telemetry = Consumer Group
- Event receiving is done via AMQP protocol

# Event Hubs

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- SLA:
  - Basic and Standard tier: 99.95%
  - Dedicated: 99.99%

# Event Hubs Throughput Units

- Throughput is measured in Throughput Units (TU)
- 1 TU =
  - Ingress (Input) – 1MB / sec or 1000 events / sec
  - Egress (Output) – 2MB / sec or 4096 events / sec
- Prepurchased, billed by the hour

# Event Hubs Pricing

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- Based on:
  - Tier
  - Ingress
  - TU

## Event Hubs

REGION:

East US

TIER:

Basic



Maximum throughput units: 20. Up to 1 MB per second of ingress events. Up to 2 MB per second of egress events.

### Ingress

10

Million  
events

×

\$0.028  
Per million

=

\$0.28

### Throughput

1

Throughput  
units

×

730

Hours

▼

×

\$0.015  
Per unit/hour

=

\$10.95

Upfront cost

\$0.00

Monthly cost

\$11.23

## Event Hubs

REGION:

East US

TIER:

Dedicated



Minimum hours charged are 4. Ingress and throughput charges are included.

730

Hours

×

4

Capacity  
Units

×

\$6.849

Per hour

= \$19,999.080

Upfront cost

\$0.00

Monthly cost

\$19,999.08

# Selecting Messaging Solution

Service	Used For...	Guarantees Order	Max Msg Size	And also...
Storage Queue	Dead simple queueing	Yes	64KB	Extremely simple, no additional cost
Event Grid	Event driven architectures	No	1MB	Great integration with other services
Service Bus	Advanced queueing solutions	Yes	256KB	Advanced messaging features, durable
Event Hubs	Big data streaming	Yes	1MB	Low latency, designed for heavy load

*ReadIt!*

# Cloud Architecture

