Messaging in Azure

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Messaging in Azure

- 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

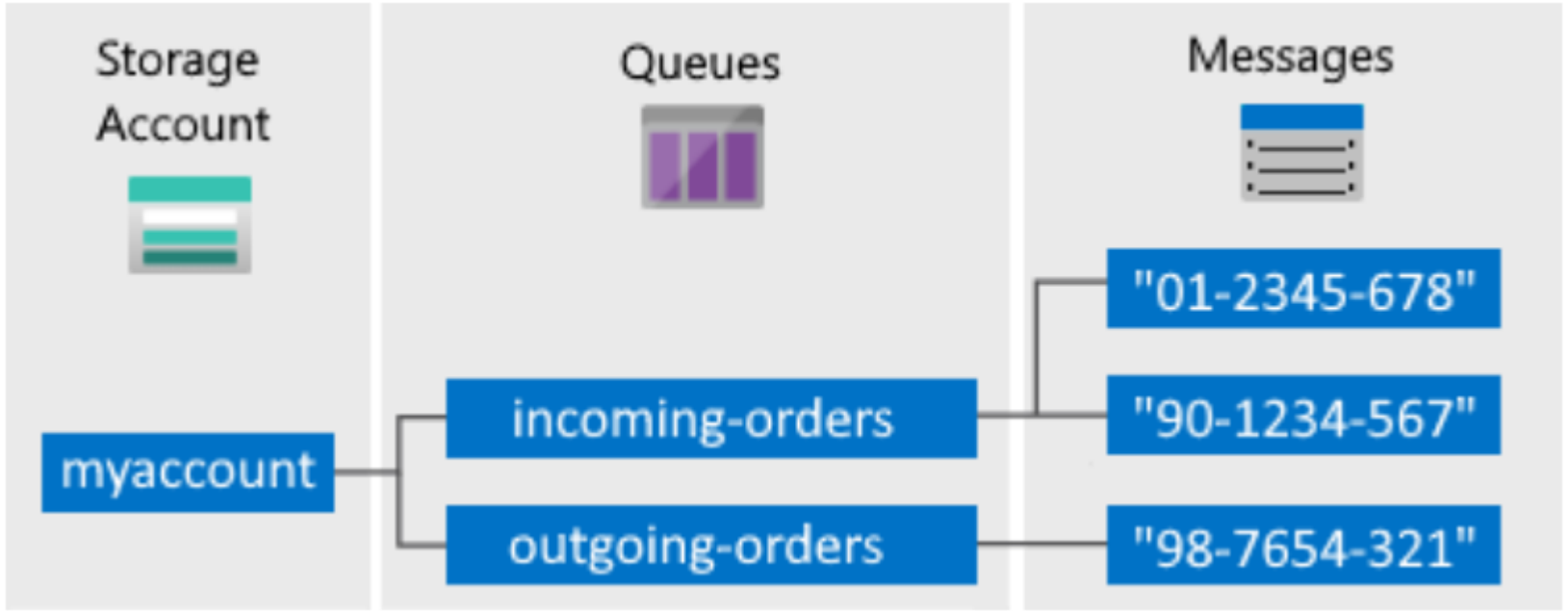
- Part of Azure Storage Account
- The simplest queue implementation
- Create queue -> Send Message -> Receive message
- No special pricing for queue, included in Storage Account
- Same for availability

Storage Queue

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

Storage Queue

- Architecture:



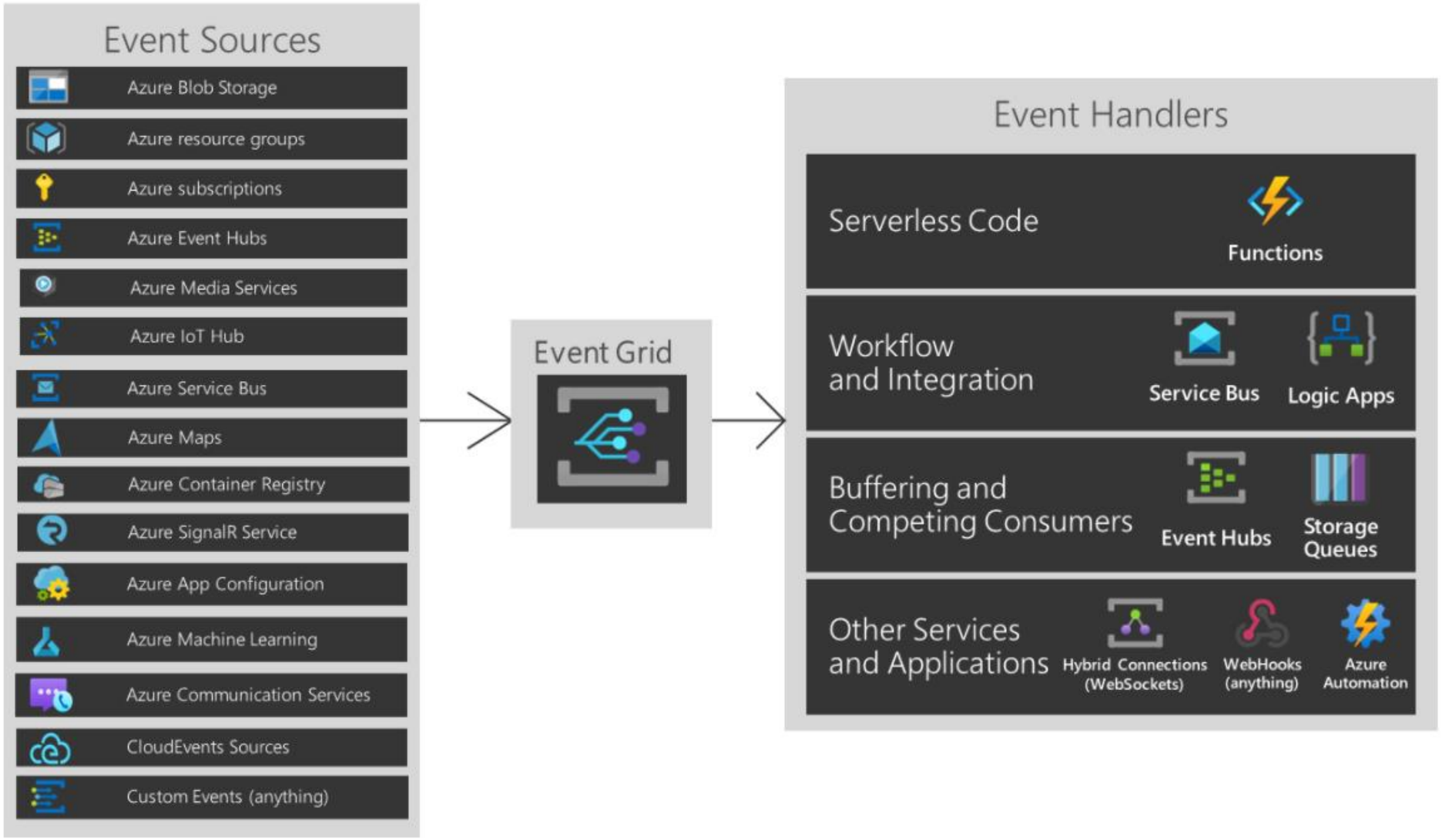
Storage Queue

- 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

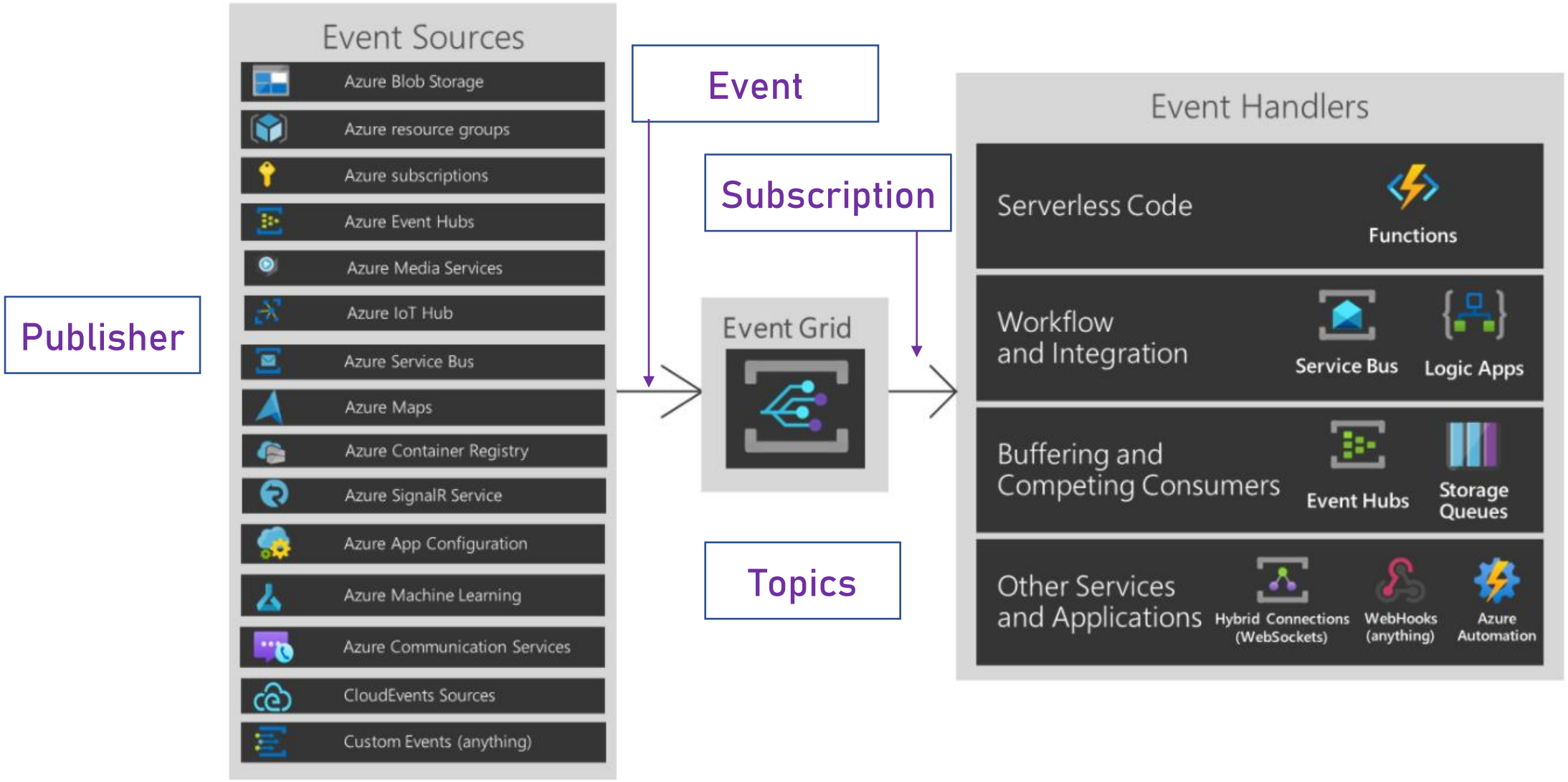
Event Grid


Event Sources
Azure Blob Storage
Azure resource groups
Azure subscriptions
Azure Event Hubs
Azure Media Services
Azure IoT Hub
Azure Service Bus
Azure Maps
Azure Container Registry
Azure SignalR Service
Azure App Configuration
Azure Machine Learning
Azure Communication Services
CloudEvents Sources
Custom Events (anything)
Event Grid
Event Handlers
Serverless Code
Functions
Workflow and Integration
Service Bus
Logic Apps
Buffering and Competing Consumers
Event Hubs
Storage Queues
Other Services and Applications
Hybrid Connections (WebSockets)
WebHooks (anything)
Azure Automation

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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Event Grid

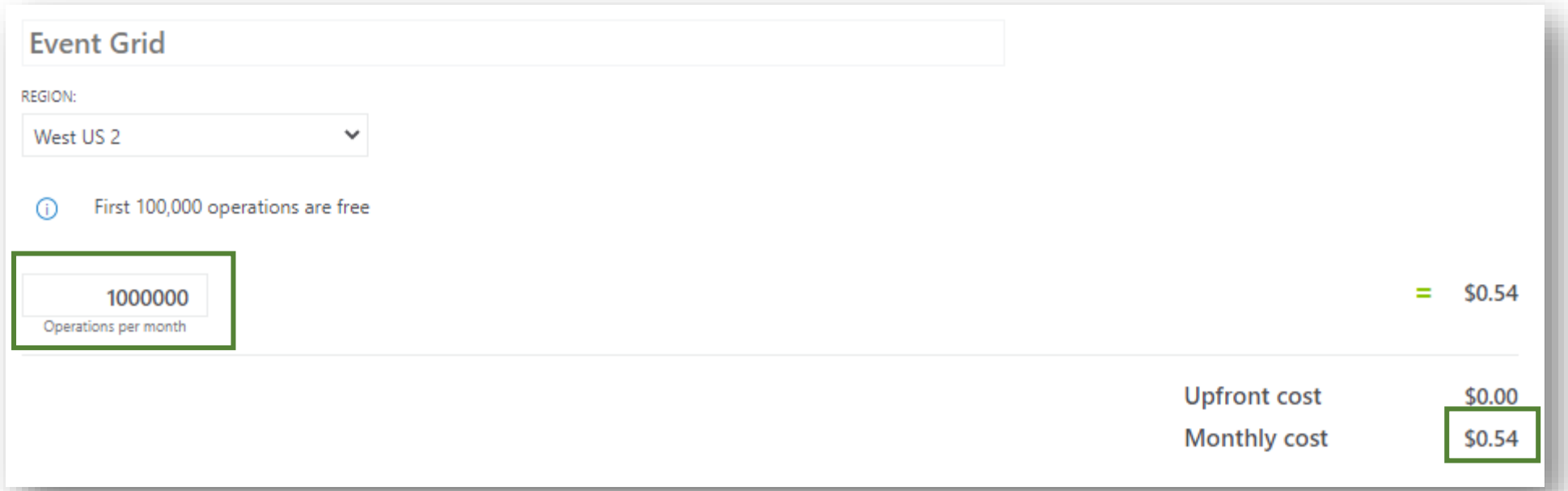
- SLA:
  - 99.99%
- Max event size:
  - 1MB

Event Grid

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

Event Grid Pricing

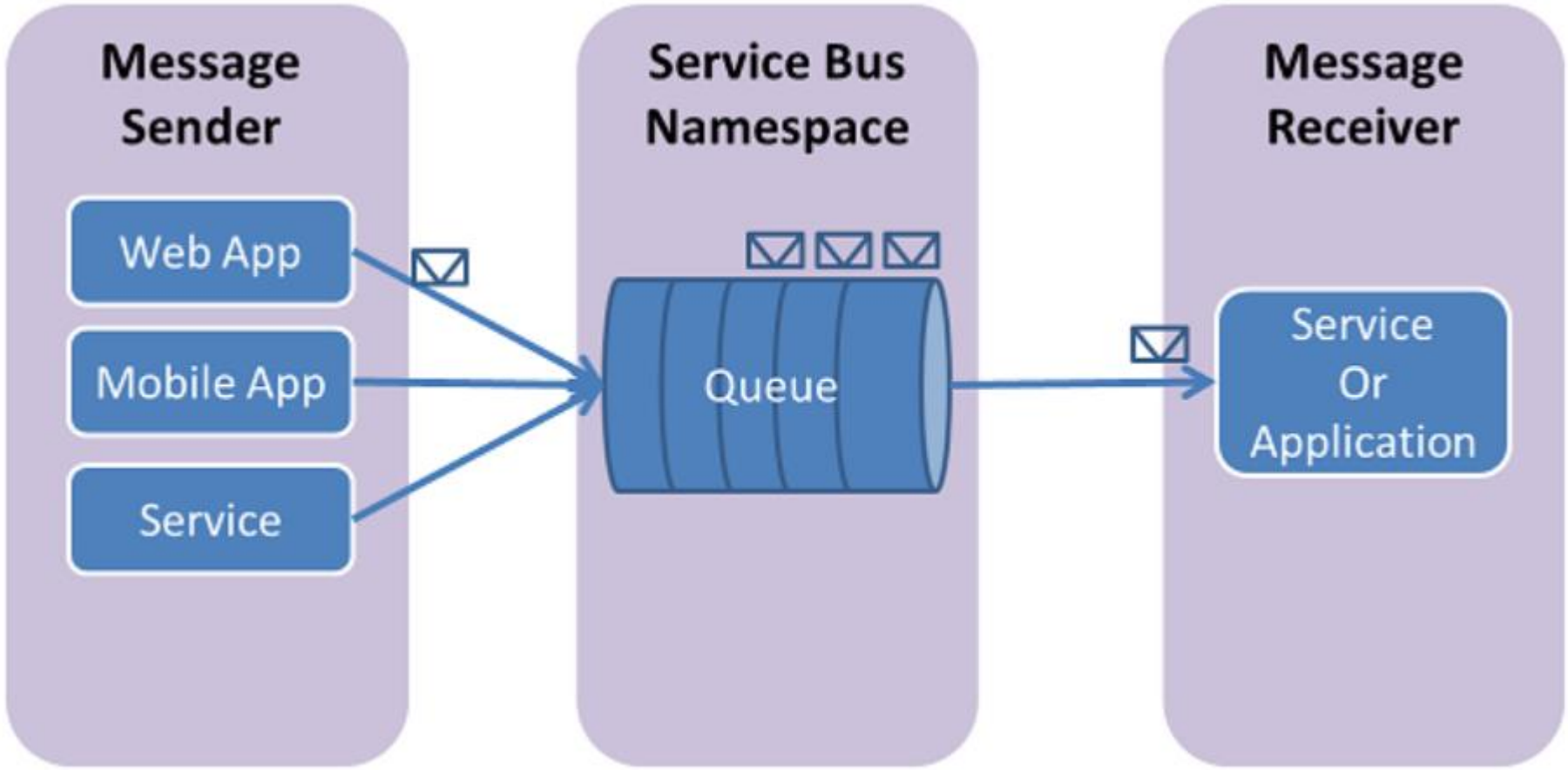
- Based on:
  - Number of operations
    - First 100K operations are free


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

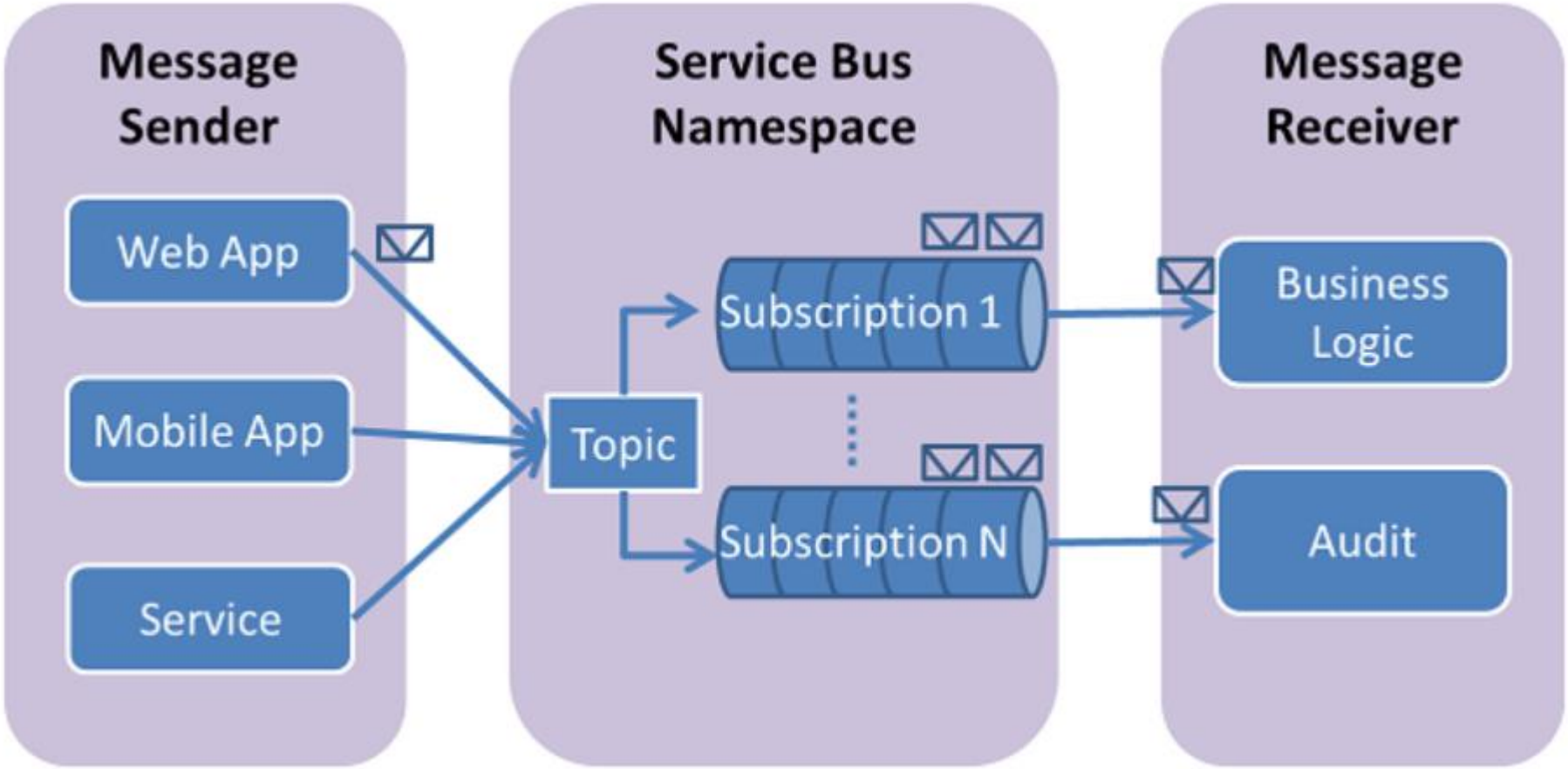
Service Bus

- 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

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

Service Bus

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

Service Bus

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

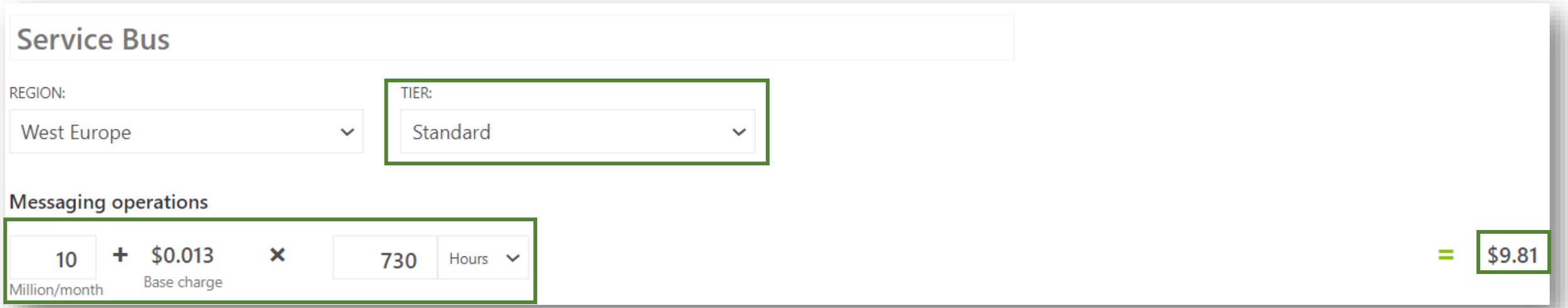
Service Bus Tiers

- 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)			✓ *Requires additional Service Bus Premium namespaces in another region.
Availability Zones (AZ) support			✓

Service Bus Pricing

- Based on:
  - Tier
  - No. of operations


Service Bus
REGION:
West Europe
TIER:
Standard
Messaging operations
10
Million/month
+
$0.013
Base charge
×
730
Hours
=
$9.81

Service Bus

REGION: West Europe

TIER: Premium

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

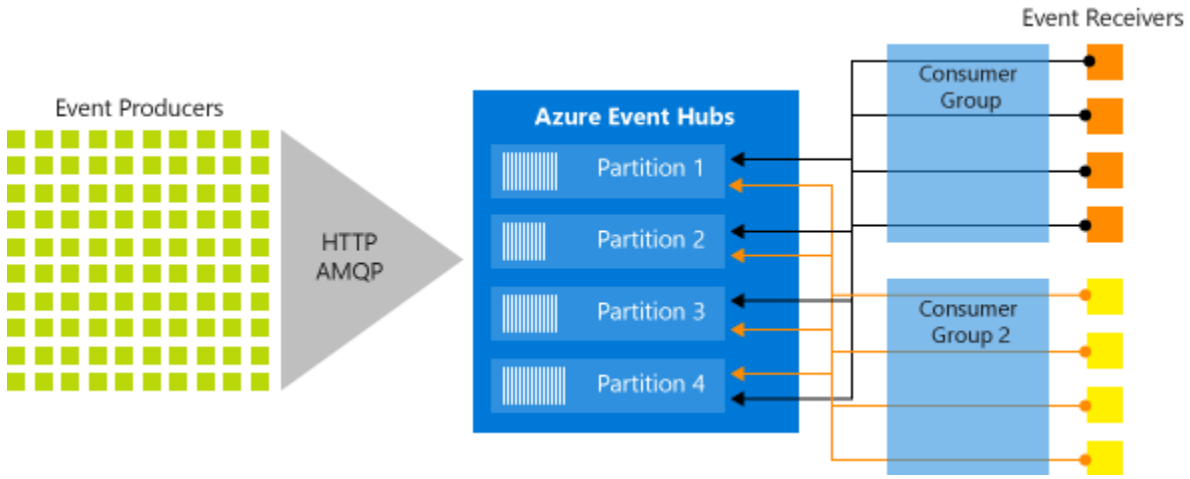
Daily message units: 2 × $0.93 Per message unit × 730 Hours = $1,354.15

Upfront cost	$0.00
Monthly cost	$1,354.15

Event Hubs

- 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

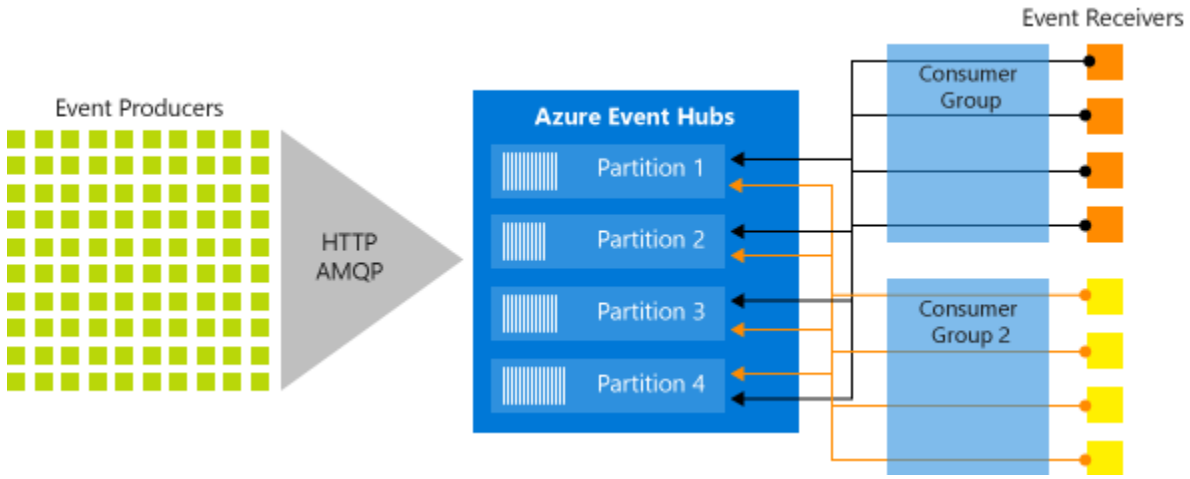
Event Hubs Architecture



Event Producers

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

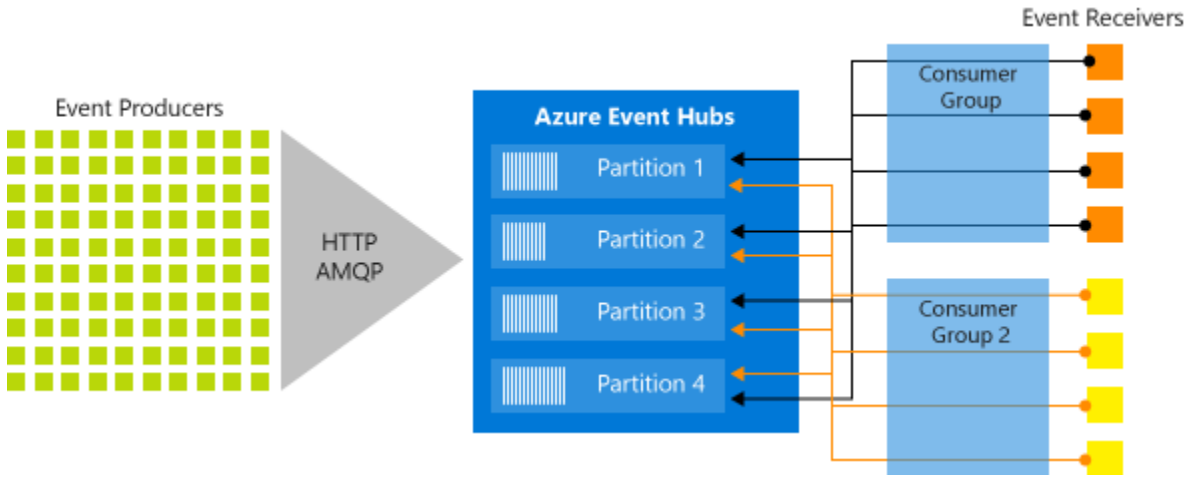
Event Hubs Architecture



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

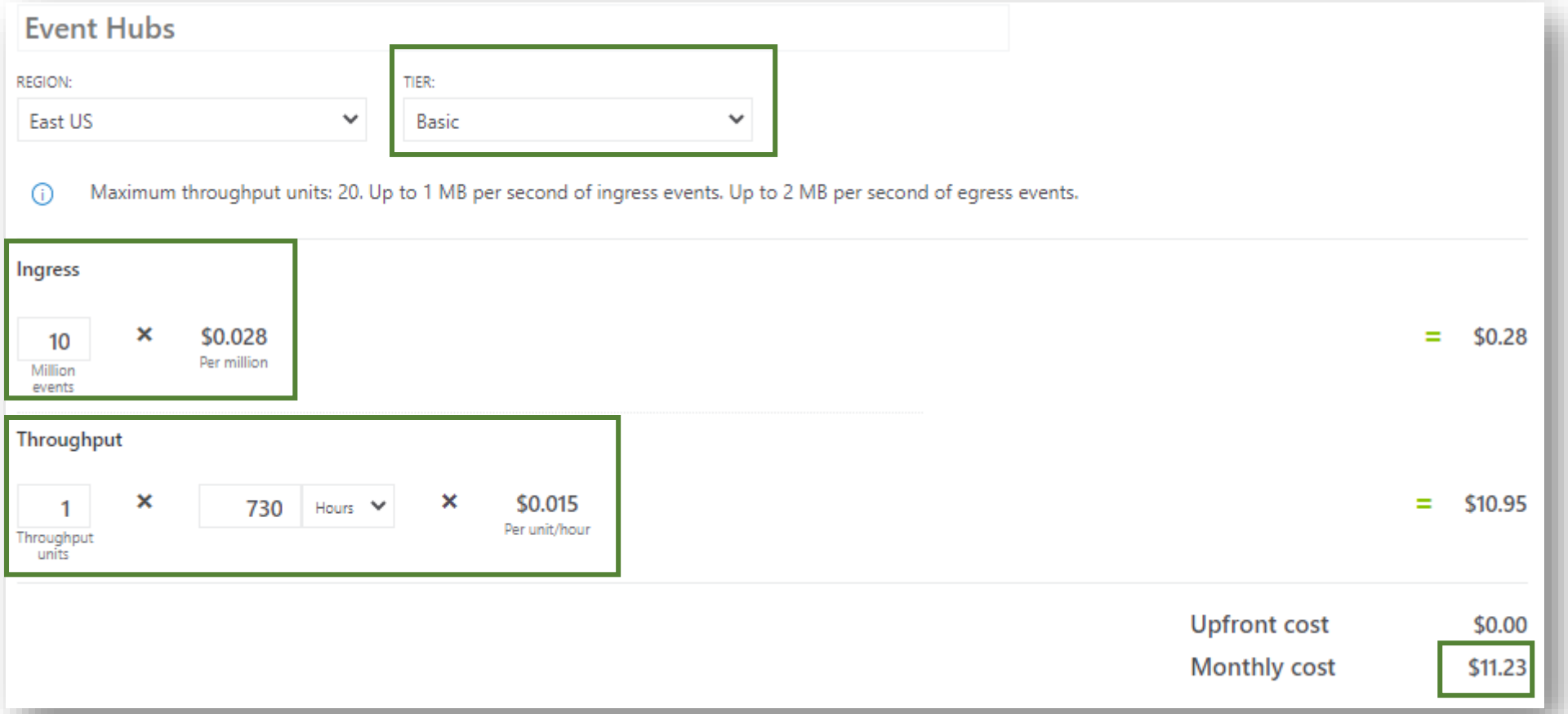
- SLA:
  - Basic and Standard tier: 99.95%
  - Dedicated: 99.99%

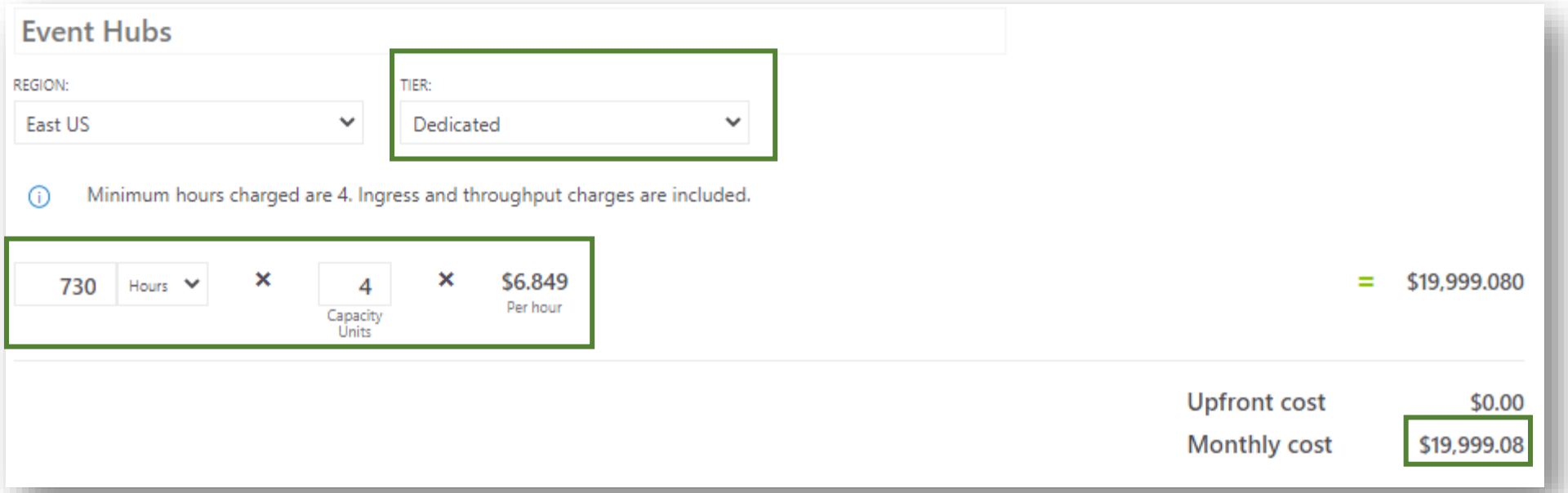
Event Hubs Throughput Units

- 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

- 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