messageBrokeringAndServerlessApp

azure functions

serverless compute

- no infrastructure services.
- scaling on load automatically
- azure function and azure logic app could be used
- pros:
    - Avoids over-allocation of infrastructure
    - Stateless logic
    - Event driven
    - Functions can be used in traditional compute environments
- cons:
    - Execution time. Timeout is configurable to a maximum of 10 minutes. HTTP response, the timeout is further restricted to 2.5 minutes. Finally, there's also an option called **Durable Functions** that allows you to orchestrate the executions of multiple functions without any timeout.
    - Execution frequency. For frequently used function, it will cost more than hosing a vm.

function app

- service plan
    - Consumption service plan. Timeout limitation. pay as used.
    - Azure App Service plan. Just app service plan. no timeout limitation.
- storage account needed.
- triggers
    - Blob storage: Start a function when a new or updated blob is detected.
    - Azure Cosmos DB: Start a function when inserts and updates are detected.
    - Event Grid: Start a function when an event is received from Event Grid.
    - HTTP: Start a function with an HTTP request.
    - Microsoft Graph Events: Start a function in response to an incoming webhook from the Microsoft Graph. Each instance of this trigger can react to one Microsoft Graph resource type.
    - Queue storage: Start a function when a new item is received on a queue. The queue message is provided as input to the function.
    - Service Bus: Start a function in response to messages from a Service Bus queue.
    - Timer: Start a function on a schedule.
- binding. The entity that funktion get input and output. Trigger is a kind of binding. There are a lot of different bindings.(https://docs.microsoft.com/en-gb/azure/azure-functions/functions-triggers-bindings#supported-bindings)
- function auth: using the header x-functions-key.

logic apps

- Trigger types: data, time, and manual.

    - polling trigger: cron job that keeps checking if new data comes
    - push trigger: like web hook.
    - trigger parameters and return values based on connector

messaging model in azure

concept: message and event

- mesage
    - A message contains raw data, produced by one component, that will be consumed by another component.
    - A message contains the data itself, not just a reference to that data.
    - The sending component expects the message content to be processed in a certain way by the destination component. The integrity of the overall system may depend on both sender and receiver doing a specific job.
- event
    - An event is a lightweight notification that indicates that something happened.
    - The event may be sent to multiple receivers, or to none at all.
    - Events are often intended to "fan out," or have a large number of subscribers for each publisher.
    - The publisher of the event has no expectation about the action a receiving component takes.
    - Some events are discrete units and unrelated to other events.
    - Some events are part of a related and ordered series.
- how to choose messages or events
    - Does the sending component expect the communication to be processed in a particular way by the destination component? If the answer is yes, choose to use a message. If the answer is no, you may be able to use events.

possible tools from azure

- azure queue storage(messages)
- azure service bus(messages)
- Azure Service Bus Topics(messages/event):a queue can be suscribed by multiple components.
- azure event grid
- azure event hub

Benefits of queues

- Increased reliability
- Message delivery guarantees
    - At-Least-Once Delivery.(Sometime, if there are two nodes, one node takes too long to process the request,the queue can send the request to another node to process.)
    - At-Most-Once Delivery
    - First-In-First-Out (FIFO)
- Transactional support: a serie of actions can be either done or not at all.

how to choose service bus and queue storage.

Choose Service Bus Topics if

- you need multiple receivers to handle each message

Choose Service Bus queues if:

- You need an At-Most-Once delivery guarantee.
- You need a FIFO guarantee.
- You need to group messages into transactions.
- You want to receive messages without polling the queue.
- You need to provide a role-based access model to the queues.
- You need to handle messages larger than 64 KB but less than 256 KB or 1M (premium tier).
- Your queue size will not grow larger than 80 GB.
- You would like to be able to publish and consume batches of messages.

Choose Queue storage if:

- You need an audit trail of all messages that pass through the queue.
- You expect the queue to exceed 80 GB in size.
- You want to track progress for processing a message inside of the queue.

what is Azure Event Grid

 alt

one-event-at-a-time delivery.

Azure Event Hubs

Event Hubs is an intermediary for the publish-subscribe communication pattern. Unlike Event Grid, however, it is optimized for extremely high throughput, a large number of publishers, security, and resiliency.

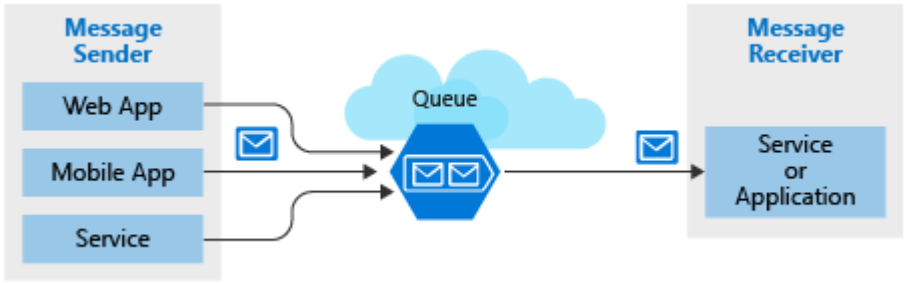
Decouple the event publisher and event consumer. real time and batch processing

- Partitions. It is in fact that event hubs saves event into cache(persistent). A event hubs has at least 2 partitions. default is 4.
- Capture. Save data somewhere.
- Authentication. Event Hubs has support for pipelining event streams to other Azure services

Choose Event Hubs if:

- You need to support authenticating a large number of publishers.
- You need to save a stream of events to Data Lake or Blob storage.
- You need aggregation or analytics on your event stream.
- You need reliable messaging or resiliency.

Communicate between applications with Azure Queue storage



why queue storage.

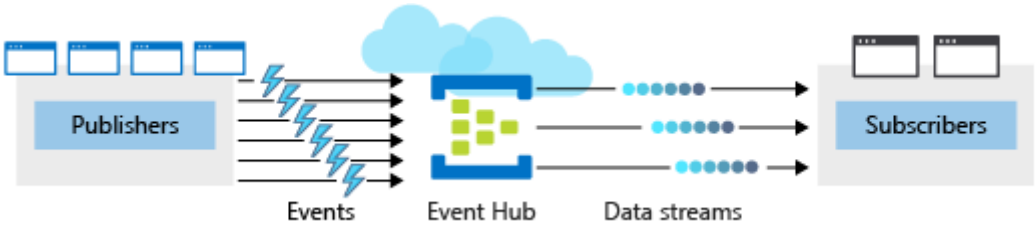
A single queue can be up to 500 TB in size, so it can potentially store millions of messages. The target throughput for a single queue is 2000 messages per second, allowing it to handle high-volume scenarios.

- A message in a queue is a byte array of up to 64 KB.
- Data is always replicated to multiple servers to guard against disk failures and other hardware problems.

Access authorization

Authorization Type	Description
Azure Active Directory	You can use role-based authentication and identify specific clients based on AAD credentials.
Shared Key	Sometimes referred to as an **account key**, this is an encrypted key signature associated with the storage account. Every storage account has two of these keys that can be passed with each request to authenticate access. Using this approach is like using a root password - it provides *full access* to the storage account.
Shared access signature	A shared access signature (SAS) is a generated URI that grants limited access to objects in your storage account to clients. You can restrict access to specific resources, permissions, and scope to a data range to automatically turn off access after a period of time.

event hub



- it supports https or advanced message queuing protocol(AMQP).
- a single publication (individual or batch) can't exceed 1 MB.
- creation of event hub:
    - The first step is to define the Event Hubs namespace.
        1. Define namespace-level settings.You can't change the throughput unit once you set it.
        2. Select a unique name for the namespace.
        3. Defining the following optional properties:
    - The second step is to create an Event Hub in that namespace.
        1. Event Hub name

2. Partition count(between 2 and 32)
3. message retention. (between 1 and 7 day,default is 7)

- authorization for app to send messages to event hub
  - Event Hub namespace name
  - Event Hub name
  - Shared access policy name
  - Primary shared access key
- authorization for app to receive messages to event hub
  - Event Hub namespace name
  - Event Hub name
  - Shared access policy name
  - Primary shared access key
  - Storage account name
  - Storage account connection string
  - Storage account container name

azure service bus

service bus queue

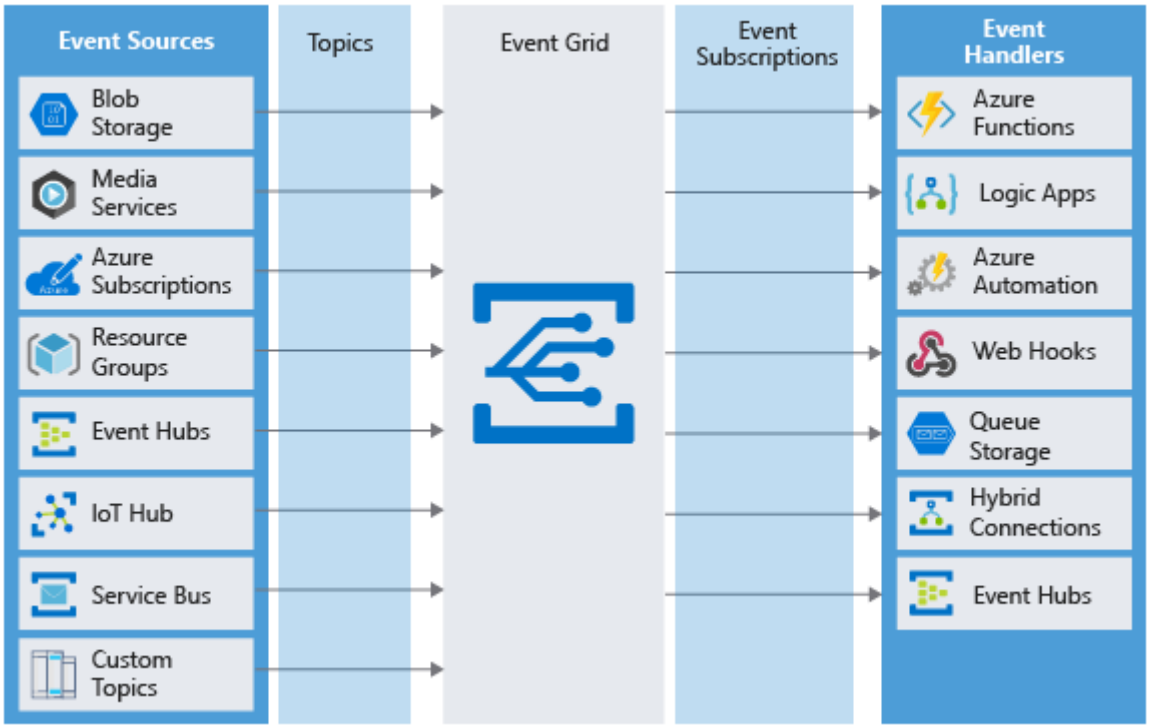
service bus topic Filter could be used to select which messages go to which subscriber. Three types of filters:

- bool filter
- sql filter:flexible but computationally expensive.
- correlation filters

relay

A relay is an object that performs synchronous, two-way communication between applications. no message cache and no storage of the message. Use a relay when you want direct communications between components as if they were located on the same network segment but separated by network security devices.

event grid



Capabilities

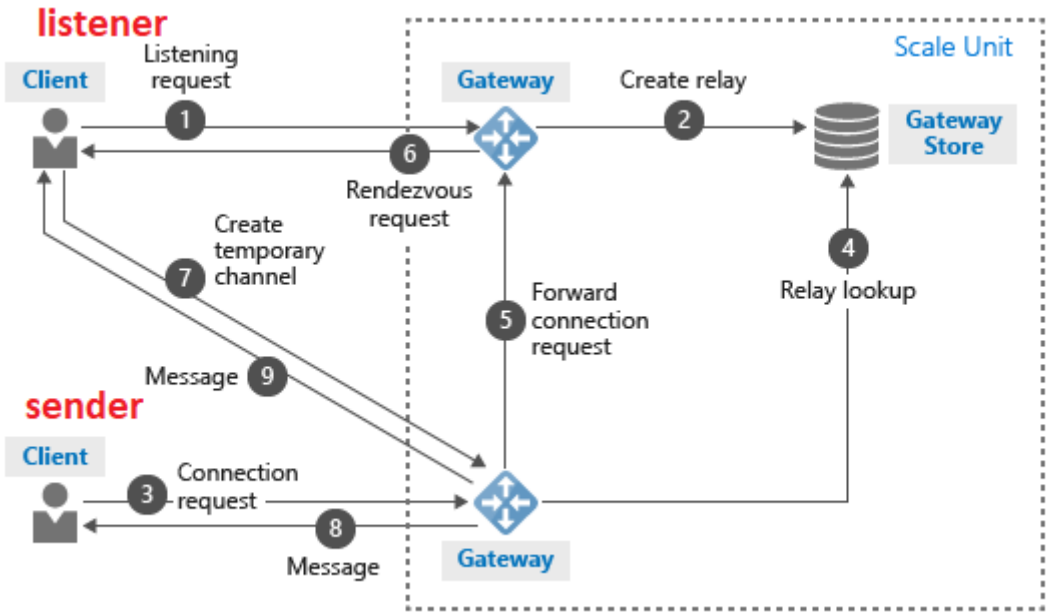
Event Grid doesn't require provisioning or managing. It's native to Azure, with the ability to be extended and customized. Some of the main advantages are:

- It's simple. Point and click in the Azure portal to add and collect your events from Azure resources.
- It can filter events. Filter events so that handlers receive only relevant events.
- It supports multiple subscribers. Attach multiple handlers to a single event from a single source.
- It's reliable. Take advantage of 24-hour retries to ensure events are delivered.
- Its throughput is high. Handle a high volume of events, in the range of millions per second.
- It has built-in events. Use built-in events to get started quickly and easily.
- It supports custom events. Use Event Grid to reliably deliver events for your custom components.

azure relay

Azure Relay establishes a connection between two components, such as an Azure function and an on-premises service. You can make two types of connections in Azure Relay:

- Hybrid connections: Hybrid connections are two-way streams of binary data that use either WebSocket or HTTP standards.
    - http
    - websocket
- WCF connections: Some developers use Windows Communication Foundation (WCF) to enable remote procedure calls.



how relay works