Particular Software

Deep Dive with Azure Service Bus

@danielmarbach

Eventing

Event Grid

Cross cloud reactive eventing

Event Hubs

Big data streaming

Messaging

Storage Queues

Simple task queues

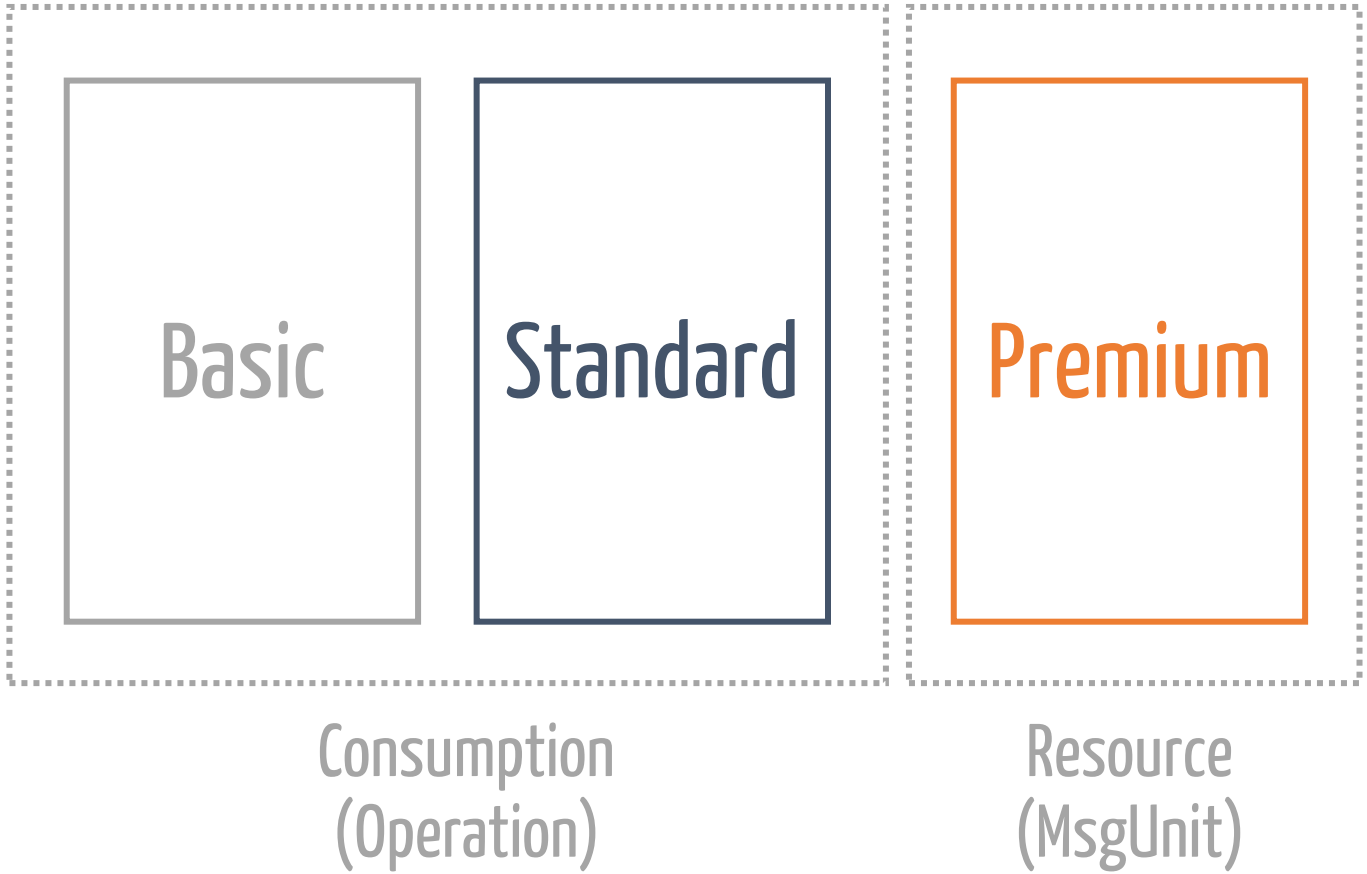
Service Bus

Enterprise messaging

Namespace

Unit of Isolation

Tiers


Basic
Standard
Premium
Consumption
(Operation)
Resource
(MsgUnit)


nuget

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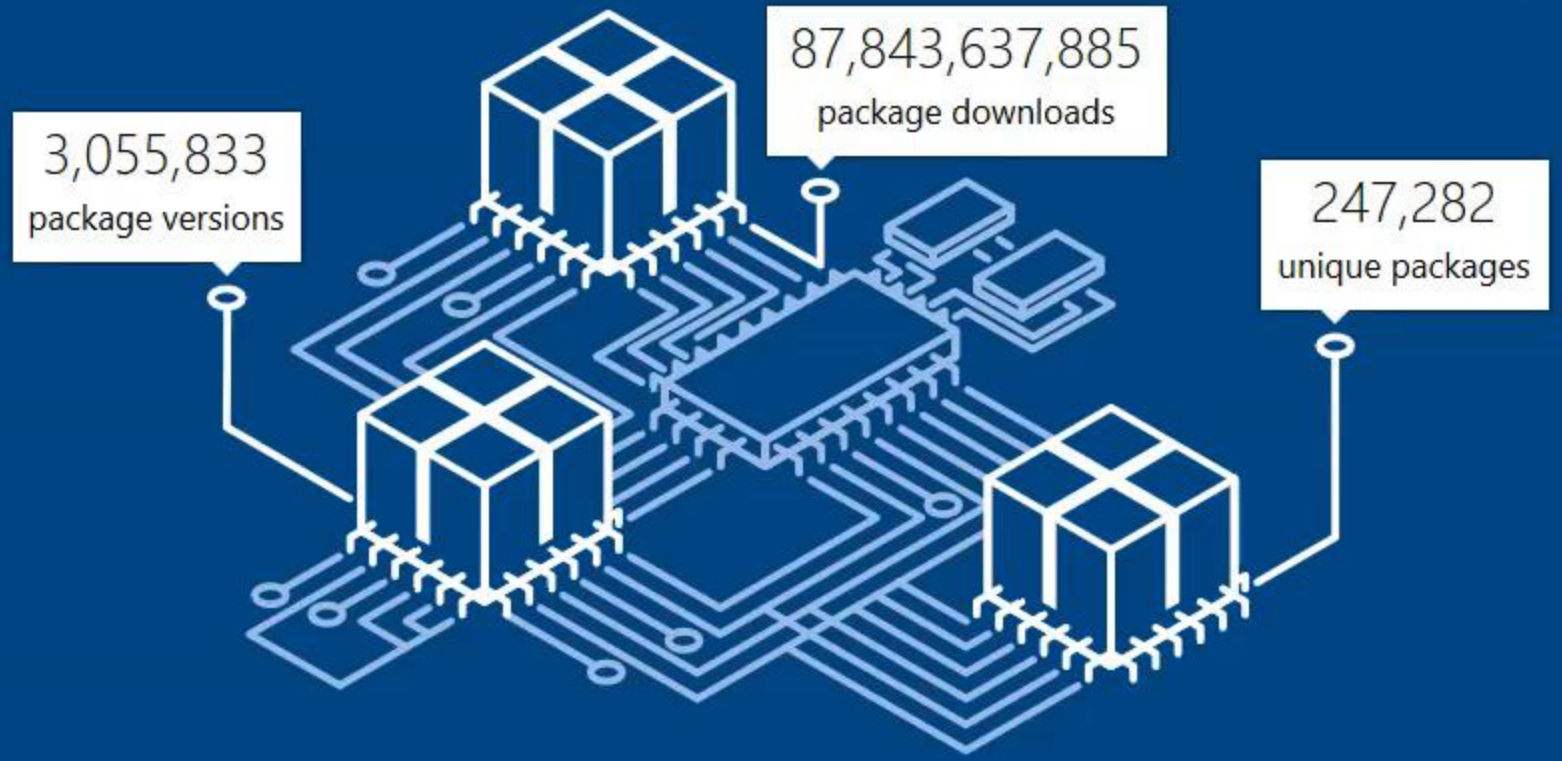

NuGet Gallery | Azure.Messag

https://www.nuget.org/packages/Azure.Messaging.ServiceBus/

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Azure.Messag

Azure Service Bus is a fully manag
applications and services. Service
data and state. This client library a
For more information about Servi
messaging/service-bus-messaging

Package Manager .NET CLI Pack

> dotnet add package Azure.Messa

Release Notes

https://github.com/Azure/azure-sdk-for-net/blob/Azure.Messaging.ServiceBus_7.1.0/sdk/servicebus/Azure.Messaging.ServiceBus/CHANGELOG.md

Dependencies

Info

last updated a month ago

Project Site

Source repository

License: MIT

Contact owners

Report

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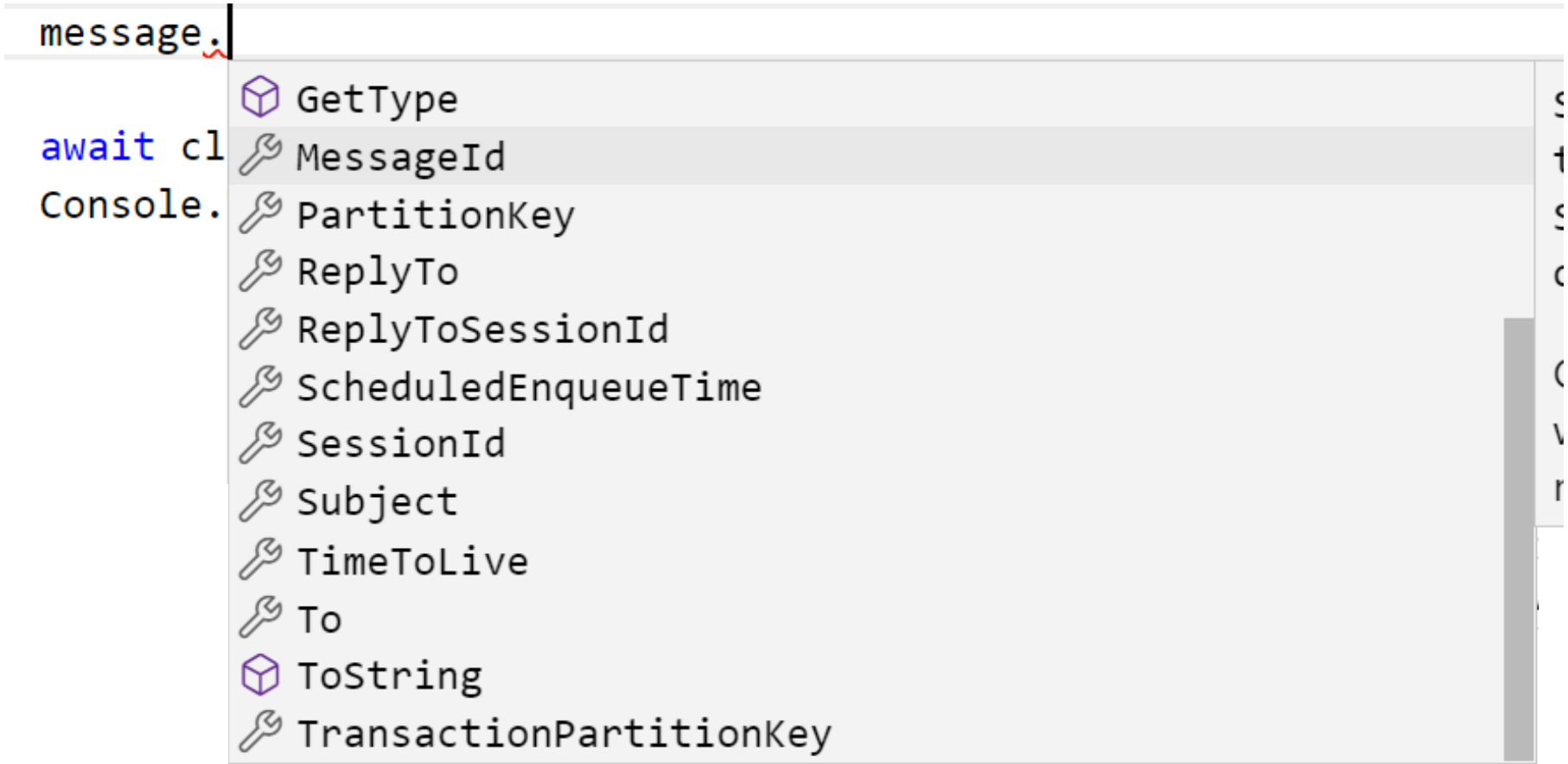
Statistics

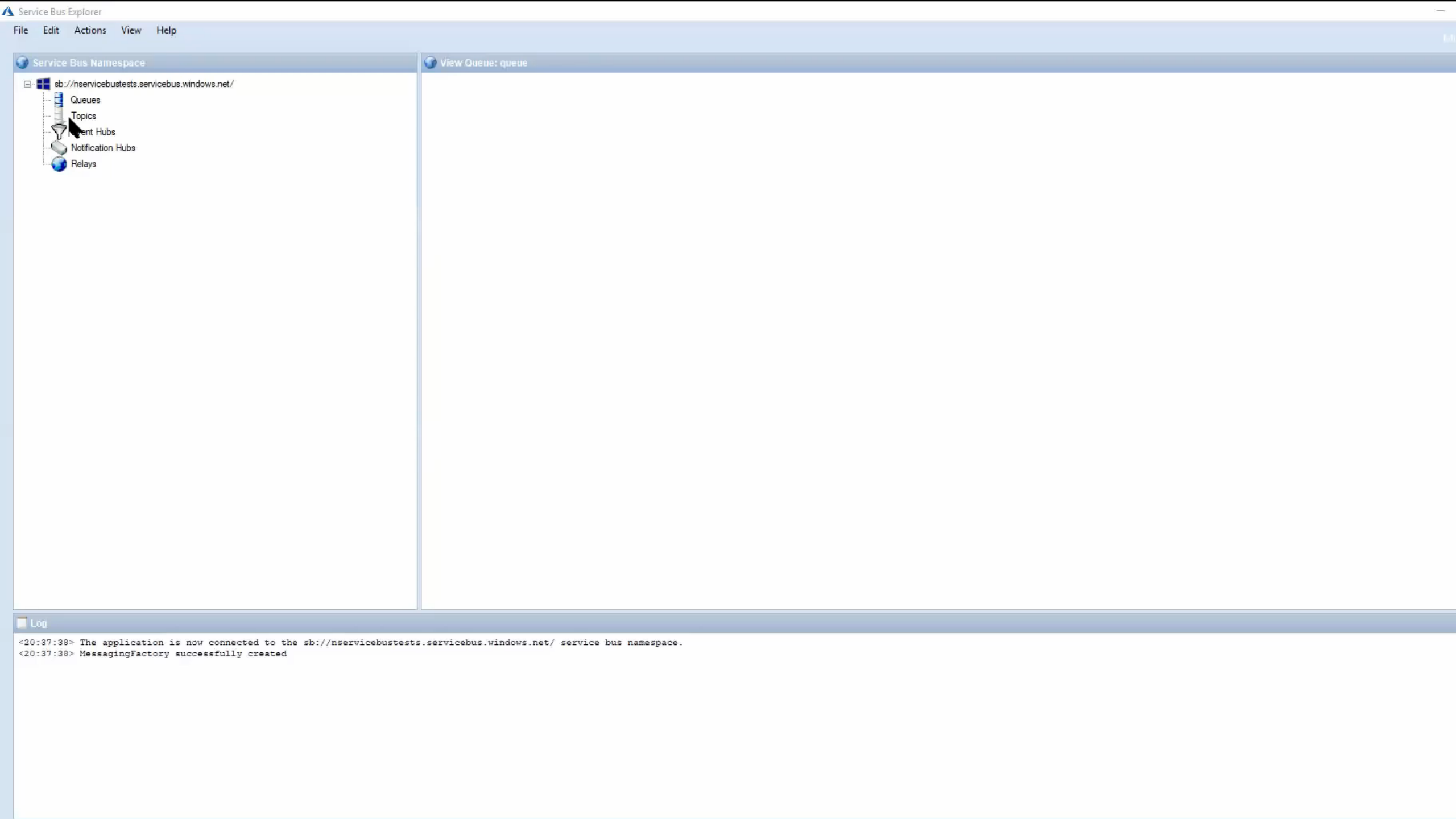
218,969 total downloads

Send

```
await using var serviceBusClient = new ServiceBusClient(connectionString);
await using var client = serviceBusClient.CreateSender(destination);

var message = new ServiceBusMessage("Deep Dive");
<PackageReference Include="Azure.Messaging.ServiceBus" />
message.ApplicationProperties.Add("TenantId", "MyTenantId");

await client.SendMessageAsync(message);
```


message.
await cl
Console.
GetType
MessageId
PartitionKey
ReplyTo
ReplyToSessionId
ScheduledEnqueueTime
SessionId
Subject
TimeToLive
To
ToString
TransactionPartitionKey

```
c:\p\AzureServiceBus.DeepDive\Send
> dotnet run
```


Service Bus Explorer
File
Edit
Actions
View
Help
Service Bus Namespace
sb://nservicebustests.servicebus.windows.net/
Queues
Topics
Event Hubs
Notification Hubs
Relays
View Queue: queue
Log
<20:37:38> The application is now connected to the sb://nservicebustests.servicebus.windows.net/ service bus namespace.
<20:37:38> MessagingFactory successfully created

```
c:\p\AzureServiceBus.DeepDive\Send
> dotnet run
```

Service Bus Explorer

File Edit Actions View Help

Service Bus Namespace

- sb://nservicebustests.servicebus.windows.net/
  - Queues
    - queue (1, 0, 0)
  - Topics
  - Event Hubs
  - Notification Hubs
  - Relays

View Queue: queue

Description | Authorization Rules

Path

Relative URI: queue

Duplicate Detection History Time Window

Days:	Hours:	Minutes:	Seconds:	Millisecs:
0	0	10	0	0

Queue Properties

Max Queue Size In GB: 1 GB

Max Delivery Count: 10

User Description:

Forward To:

Forward Dead Lettered Messages To:

Auto Delete On Idle

Days:	Hours:	Minutes:	Seconds:	Millisecs:
106751	2	48	5	477

Default Message Time To Live

Days:	Hours:	Minutes:	Seconds:	Millisecs:
106751	2	48	5	477

Lock Duration

Days:	Hours:	Minutes:	Seconds:	Millisecs:
0	0	1	0	0

Queue Settings

- [ ] Enable Batched Operations
- [ ] Enable Dead Lettering On Message Expiration
- [ ] Enable Partitioning
- [ ] Enable Express
- [ ] Requires Duplicate Detection
- [ ] Requires Session
- [ ] Enforce Message Ordering

Queue Information

Name	Value
Status	Active
Is ReadOnly	False
Size In Bytes	201
Created At	14.06.2019 18:38:48
Accessed At	14.06.2019 18:40:10
Updated At	14.06.2019 18:38:48
Active Message Count	1
DeadLetter Message Count	0
Scheduled Message Count	0
Transfer Message Count	0
Transfer DL Message Count	0
Message Count	1

Purge | Purge DLQ | Messages | Deadletter | Transf DLQ | Refresh | Status | Delete | Upda

Log

```
<20:37:38> The application is now connected to the sb://nservicebustests.servicebus.windows.net/ service bus namespace.
<20:37:38> MessagingFactory successfully created
<20:38:51> The queue queue has been successfully created.
<20:39:51> The queue queue has been successfully retrieved.
<20:40:03> The queue queue has been successfully retrieved.
<20:40:03> [2] messages have been purged from the [queue] queue in [1602] milliseconds.
<20:40:20> The queue queue has been successfully retrieved.
```

Management

```
var client = new ServiceBusAdministrationClient(connectionString);
await client.CreateQueueAsync(destination);
```

Receive

```
await using var sender = serviceBusClient.CreateSender(destination);
await sender.SendMessageAsync(new ServiceBusMessage("Deep Dive"));
```

```
var receiverOptions = new ServiceBusReceiverOptions
{
    ReceiveMode = ServiceBusReceiveMode.PeekLock,
    PrefetchCount = 10,
    SubQueue = SubQueue.None
};

await using var receiver = serviceBusClient
      .CreateReceiver(destination, receiverOptions);

await foreach (var message in receiver.ReceiveMessagesAsync())
{
    // consume message
}
```

```
var processorOptions = new ServiceBusProcessorOptions
{
    AutoCompleteMessages = false,
    MaxConcurrentCalls = 1,
    MaxAutoLockRenewalDuration = TimeSpan.FromMinutes(10),
    ReceiveMode = ServiceBusReceiveMode.PeekLock,
    PrefetchCount = 10
};

await using var receiver = serviceBusClient.
     CreateProcessor(destination, processorOptions);
```

```
receiver.ProcessMessageAsync += async messageEventArgs =>
{
    var message = messageEventArgs.Message;

    await Out.WriteLineAsync(
        $"Received message with '{message.MessageId}’
           and content '{UTF8.GetString(message.Body)}'");

    // throw new InvalidOperationException();

    await messageEventArgs.CompleteMessageAsync(message);

};
```

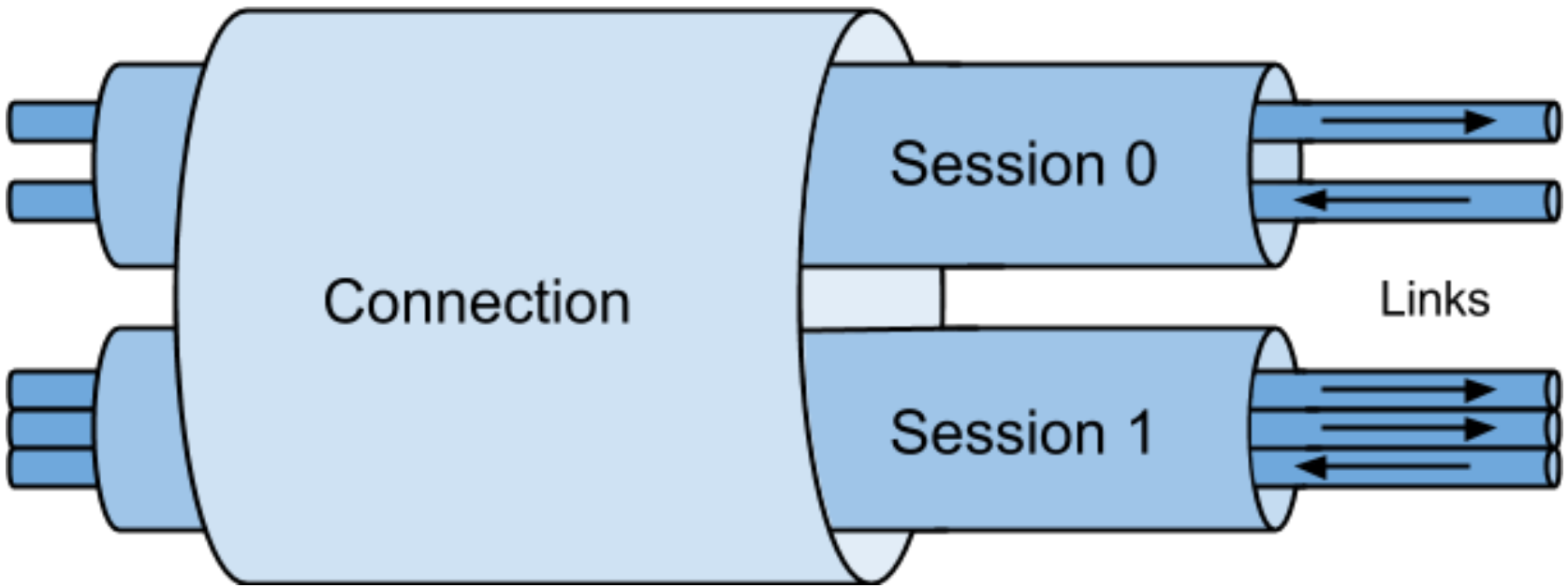
```
receiver.ProcessErrorAsync += async errorEventArgs =>
{
    await Out.WriteLineAsync($"Exception:
        {errorEventArgs.Exception}");
    await Out.WriteLineAsync($"FullyQualifiedNamespace:
        {errorEventArgs.FullyQualifiedNamespace}");
    await Out.WriteLineAsync($"ErrorSource:
        {errorEventArgs.ErrorSource}");
    await Out.WriteLineAsync($"EntityPath:
        {errorEventArgs.EntityPath}");
};
```

```
await receiver.StartProcessingAsync();

await untilStopRequired;

await receiver.StopProcessingAsync();
```

```
c:\p\AzureServiceBus.DeepDive\Receive
> dotnet run
```

```
c:\p\AzureServiceBus.DeepDive\Receive
$ dotnet run
```

Connections


Connection
Session 0
Session 1
Links

```
await using var serviceBusClient =
      new ServiceBusClient(connectionString);

await using var connectionSharingSender = serviceBusClient
      .CreateSender(destination);
await connectionSharingSender
      .SendMessageAsync(new ServiceBusMessage("Deep Dive"));

await using var connectionSharingReceiver = serviceBusClient
      .CreateReceiver(destination);
await connectionSharingReceiver.ReceiveMessageAsync();
```

```
C:\p\AzureServiceBus.DeepDive\Connections
$ dotnet run
```

```
C:\Users\daniel.marbach
$ netstat -an | find "5671 "
```

```
await using var senderServiceBusClient =
      new ServiceBusClient(connectionString);
await using var receiverServiceBusClient =
      new ServiceBusClient(connectionString);

await using var senderWithDedicatedConnection =
      senderServiceBusClient.CreateSender(destination);
await using var receiverWithDedicatedConnection =
      receiverServiceBusClient.CreateReceiver(destination);

await senderWithDedicatedConnection
      .SendMessageAsync(new ServiceBusMessage("Deep Dive"));
await receiverWithDedicatedConnection.ReceiveMessageAsync();
```

```
C:\p\AzureServiceBus.DeepDive\Connections
$ dotnet run
netstat -na | find "5671 "
Continue with a dedicated connection

Enter to stop
```

```
C:\Users\daniel.marbach
$ netstat -an | find "5671 "
  TCP    192.168.0.14:58459     52.166.127.37:5671     ESTABLISHED
  TCP    192.168.0.14:58460     52.166.127.37:5671     ESTABLISHED

C:\Users\daniel.marbach
$
```

Scheduling

```
await using var sender = serviceBusClient.CreateSender(destination);

var due = DateTimeOffset.UtcNow.AddSeconds(10);
await sender.ScheduleMessageAsync(
   new ServiceBusMessage($"Deep Dive + {due}"), due);
```

```
var sequenceId = await sender.ScheduleMessageAsync(
      new ServiceBusMessage($"Deep Dive + {due}"), due);

await sender.CancelScheduledMessageAsync(sequenceId);
```

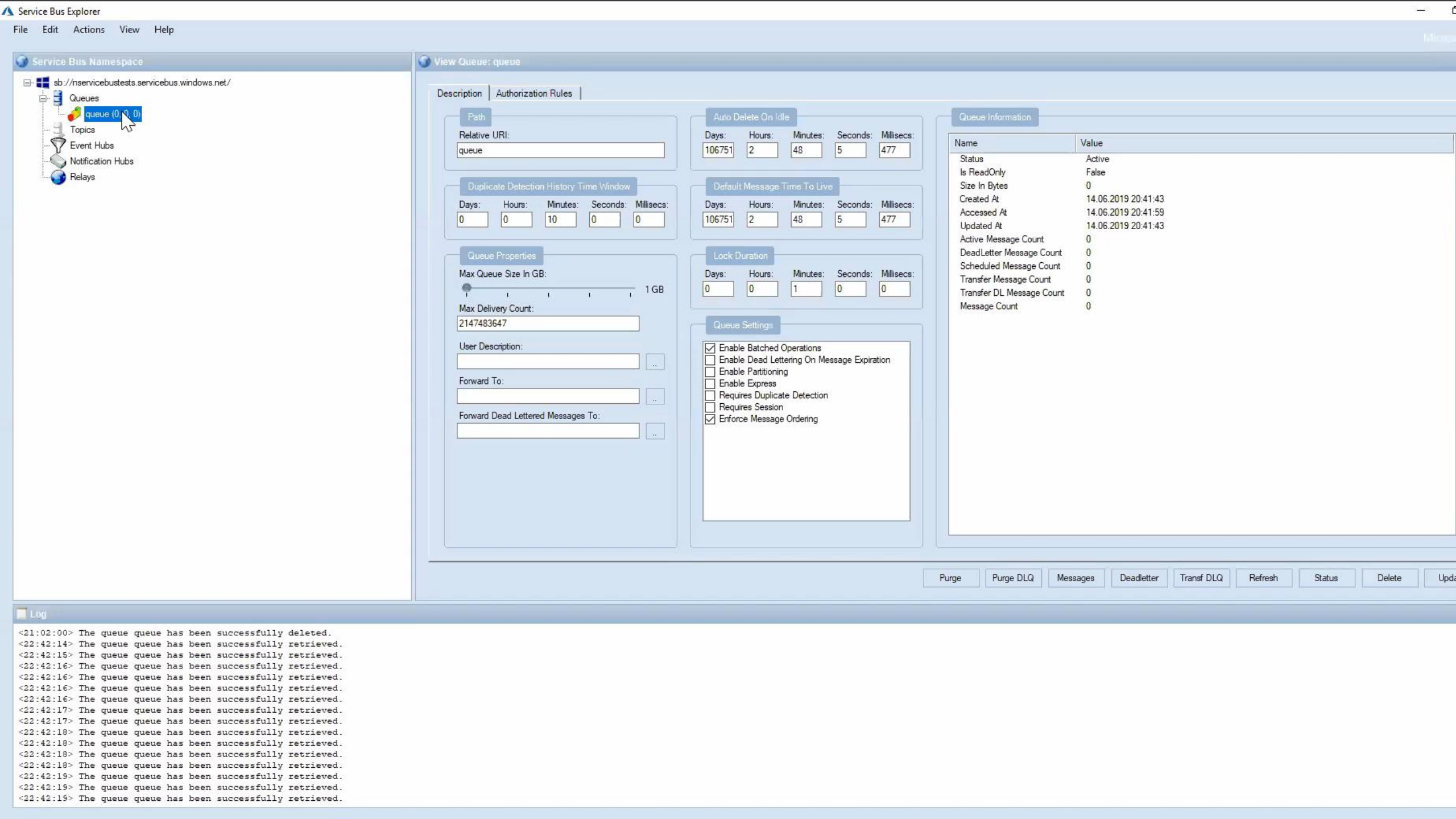
```
c:\p\AzureServiceBus.DeepDive\Scheduling
> dotnet run
```

Expiry

```
await using var sender = serviceBusClient.CreateSender(destination);

var message = new ServiceBusMessage("Half life")
{
    TimeToLive = TimeSpan.FromSeconds(10)
};

await sender.SendMessageAsync(message);

await Prepare.SimulateActiveReceiver(serviceBusClient, destination);
```

```
c:\p\AzureServiceBus.DeepDive\Expiry
> dotnet run
```

Where does the message go?


Service Bus Explorer
File
Edit
Actions
View
Help
Service Bus Namespace
sb://nservicebustests.servicebus.windows.net/
Queues
queue (0, 0, 0)
Topics
Event Hubs
Notification Hubs
Relays
View Queue: queue
Description
Authorization Rules
Path
Relative URI:
queue
Auto Delete On Idle
Days: 106751
Hours: 2
Minutes: 48
Seconds: 5
Millisecs: 477
Duplicate Detection History Time Window
Days: 0
Hours: 0
Minutes: 10
Seconds: 0
Millisecs: 0
Default Message Time To Live
Days: 106751
Hours: 2
Minutes: 48
Seconds: 5
Millisecs: 477
Queue Properties
Max Queue Size In GB:
1 GB
Max Delivery Count:
2147483647
User Description:
Forward To:
Forward Dead Lettered Messages To:
Lock Duration
Days: 0
Hours: 0
Minutes: 1
Seconds: 0
Millisecs: 0
Queue Settings
Enable Batched Operations
Enable Dead Lettering On Message Expiration
Enable Partitioning
Enable Express
Requires Duplicate Detection
Requires Session
Enforce Message Ordering
Queue Information
Name
Value
Status
Active
Is ReadOnly
False
Size In Bytes
0
Created At
14.06.2019 20:41:43
Accessed At
14.06.2019 20:41:59
Updated At
14.06.2019 20:41:43
Active Message Count
0
DeadLetter Message Count
0
Scheduled Message Count
0
Transfer Message Count
0
Transfer DL Message Count
0
Message Count
0
Purge
Purge DLQ
Messages
Deadletter
Transf DLQ
Refresh
Status
Delete
Log
<21:02:00> The queue queue has been successfully deleted.
<22:42:14> The queue queue has been successfully retrieved.
<22:42:15> The queue queue has been successfully retrieved.
<22:42:16> The queue queue has been successfully retrieved.
<22:42:16> The queue queue has been successfully retrieved.
<22:42:16> The queue queue has been successfully retrieved.
<22:42:16> The queue queue has been successfully retrieved.
<22:42:17> The queue queue has been successfully retrieved.
<22:42:17> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.

Deadlettering

```
var description = new CreateQueueOptions(destination)
{
    DeadLetteringOnMessageExpiration = true,
    MaxDeliveryCount = 1
};
await client.CreateQueueAsync(description);
```

```
var message = new ServiceBusMessage("Half life")
{
    TimeToLive = TimeSpan.FromSeconds(1)
};
await sender.SendMessageAsync(message);
```

```
var message = new ServiceBusMessage("Delivery Count");
await sender.SendMessageAsync(message);
```

```
var message = new ServiceBusMessage("Poor Soul");
message.ApplicationProperties.Add("Yehaa", "Why so happy?");
await sender.SendMessageAsync(message);
```

```
receiver.ProcessMessageAsync += async processMessageEventArgs =>
{
    var message = processMessageEventArgs.Message;
    switch (UTF8.GetString(message.Body)) {
        case "Half life":
            await processMessageEventArgs.AbandonMessageAsync(message);
            await Error.WriteLineAsync("Abandon half life message");
            break;

        case "Delivery Count":
            await Error.WriteLineAsync("Throwing delivery count message");
            throw new InvalidOperationException();

        case "Poor Soul":
            await Error.WriteLineAsync("Dead letter poor soul message");
            await processMessageEventArgs.DeadLetterMessageAsync(message,
                new Dictionary<string, object>
                {
                    {"Reason", "Because we can!"},
                    {"When", DateTimeOffset.UtcNow}
                });
            break;
    }
};
```

```
c:\p\AzureServiceBus.DeepDive\Deadlettering
> dotnet run
```

Service Bus Explorer

File Edit Actions View Help

Service Bus Namespace

- sb://nservicebustests.servicebus.windows.net/
  - Queues
    - queue (0, 3, 0)
  - Topics
  - Event Hubs
  - Notification Hubs
  - Relays

View Queue: queue

Description | Authorization Rules | Messages

Message List

MessageId	Seq	Size	Label	EnqueuedTimeUtc	ExpiresAtUtc

Message System Properties

Message Text

1

Message Custom Properties

Name	Value

Purge | Purge DLQ | Messages | Deadletter | Transf DLQ | Refresh | Status | Delete | Upd

Log

```
<22:42:16> The queue queue has been successfully retrieved.
<22:42:16> The queue queue has been successfully retrieved.
<22:42:16> The queue queue has been successfully retrieved.
<22:42:17> The queue queue has been successfully retrieved.
<22:42:17> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:44:42> The queue queue has been successfully retrieved.
<22:44:50> [0] messages peeked from the queue [queue].
<23:11:32> The queue queue has been successfully retrieved.
<23:12:18> The queue queue has been successfully retrieved.
```

Service Bus Explorer

File Edit Actions View Help

Service Bus Namespace

- sb://nservicebustests.servicebus.windows.net/
  - Queues
    - queue (0, 3, 0)
  - Topics
  - Event Hubs
  - Notification Hubs
  - Relays

View Queue: queue

Description | Authorization Rules | Messages | Deadletter

Message List

MessageId	Seq	Size	Label	EnqueuedTimeUtc	ExpiresAtUtc
e11399faea7445249e520e...	1	227		14.06.2019 21:12	14.06.2019 21:12
dfc3c370cba04145b4d89e...	2	270		14.06.2019 21:12	31.12.9999 23:59
cc10d022cceb4944b359e1...	3	207		14.06.2019 21:12	31.12.9999 23:59

Message System Properties

Message Text

```
1 Half life
```

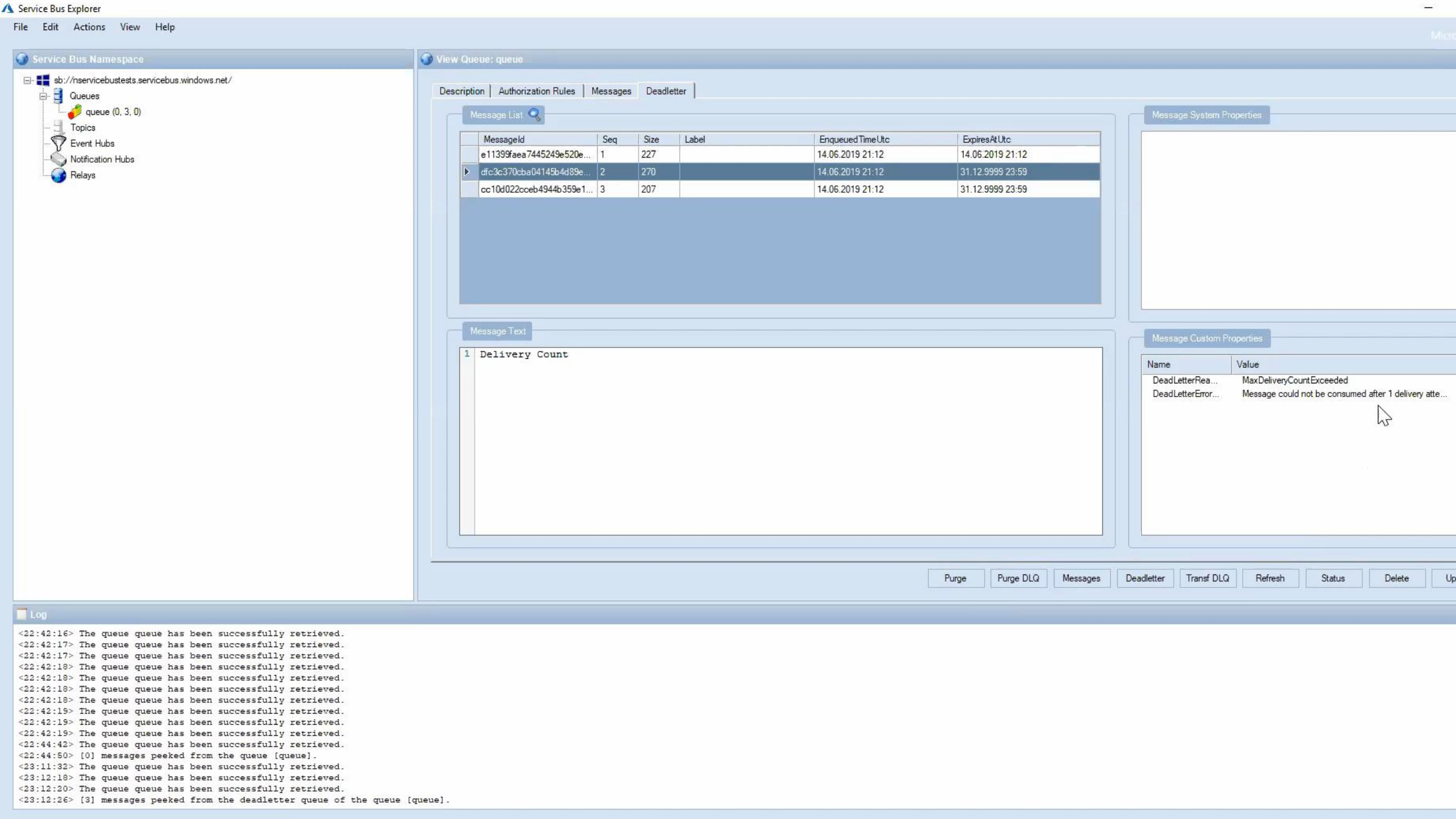
Message Custom Properties

Name	Value
DeadLetterRea...	TTLExpiredException
DeadLetterError...	The message expired and was dead lettered.

Purge | Purge DLQ | Messages | Deadletter | Transf DLQ | Refresh | Status | Delete | Up

Log

```
<22:42:16> The queue queue has been successfully retrieved.
<22:42:17> The queue queue has been successfully retrieved.
<22:42:17> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:44:42> The queue queue has been successfully retrieved.
<22:44:50> [0] messages peeked from the queue [queue].
<23:11:32> The queue queue has been successfully retrieved.
<23:12:18> The queue queue has been successfully retrieved.
<23:12:20> The queue queue has been successfully retrieved.
<23:12:26> [3] messages peeked from the deadletter queue of the queue [queue].
```


Service Bus Explorer
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Queues
queue (0, 3, 0)
Topics
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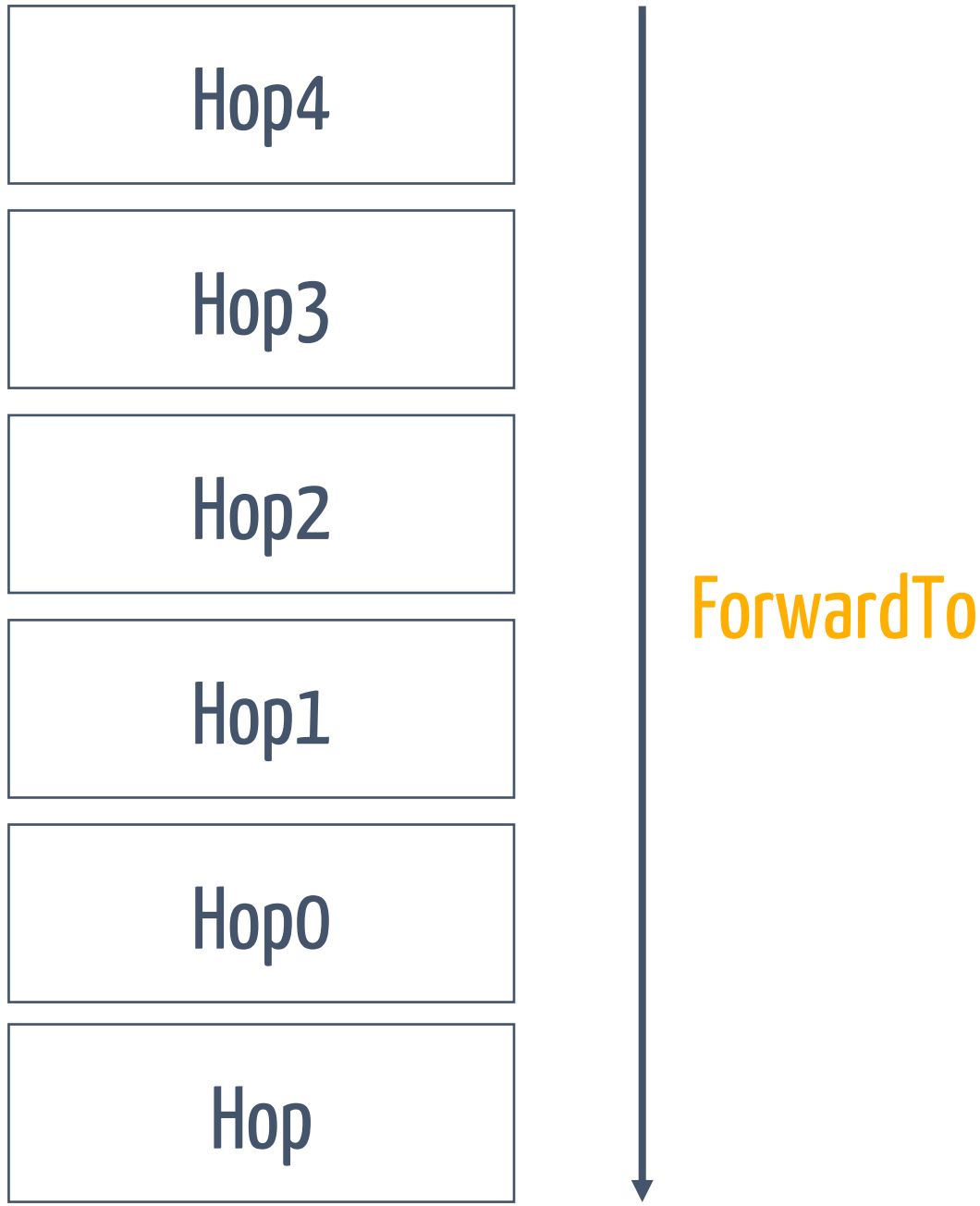
Notification Hubs
Relays
View Queue: queue
Description
Authorization Rules
Messages
Deadletter
Message List
MessageId
Seq
Size
Label
EnqueuedTimeUtc
ExpiresAtUtc
e11399faea7445249e520e...
1
227
14.06.2019 21:12
14.06.2019 21:12
dfc3c370cba04145b4d89e...
2
270
14.06.2019 21:12
31.12.9999 23:59
cc10d022cceb4944b359e1...
3
207
14.06.2019 21:12
31.12.9999 23:59
Message System Properties
Message Text
1
Delivery Count
Message Custom Properties
Name
Value
DeadLetterRea...
MaxDeliveryCountExceeded
DeadLetterError...
Message could not be consumed after 1 delivery atte...
Purge
Purge DLQ
Messages
Deadletter
Transf DLQ
Refresh
Status
Delete
Log
<22:42:16> The queue queue has been successfully retrieved.
<22:42:17> The queue queue has been successfully retrieved.
<22:42:17> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:18> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:42:19> The queue queue has been successfully retrieved.
<22:44:42> The queue queue has been successfully retrieved.
<22:44:50> [0] messages peeked from the queue [queue].
<23:11:32> The queue queue has been successfully retrieved.
<23:12:18> The queue queue has been successfully retrieved.
<23:12:20> The queue queue has been successfully retrieved.
<23:12:26> [3] messages peeked from the deadletter queue of the queue [queue].

Forwarding


Hop4
Hop3
Hop2
Hop1
Hop0
Hop
ForwardTo

```
var description = new CreateQueueOptions("Hop");
await client.CreateQueueAsync(description);

description = new  CreateQueueOptions("Hop0");
await client.CreateQueueAsync(description);

description = new  CreateQueueOptions("Hop1")
{
    ForwardTo = "Hop0"
};
await client.CreateQueueAsync(description);

description = new  CreateQueueOptions("Hop2")
{
    ForwardTo = "Hop1"
};
await client.CreateQueueAsync(description);

description = new  CreateQueueOptions("Hop3")
{
    ForwardTo = "Hop2"
};
await client.CreateQueueAsync(description);

description = new  CreateQueueOptions("Hop4")
{
    ForwardTo = "Hop3"
};
await client.CreateQueueAsync(description);
```

```
await using var serviceBusClient =
    new ServiceBusClient(connectionString);
var sender = serviceBusClient.CreateSender("Hop4");

var message = new ServiceBusMessage("Weeeeeeehhh!");
await sender.SendMessageAsync(message);
```

```
c:\p\AzureServiceBus.DeepDive\Forwarding
> dotnet run
```

File Edit Actions View Help

Service Bus Namespace

- sb://nservicebustests.servicebus.windows.net/
  - Queues
  - Topics
  - Event Hubs
  - Notification Hubs
  - Relays

Entity

Log

File Edit Actions View Help

Service Bus Namespace

- sb://nservicebustests.servicebus.windows.net/
  - Queues
    - hop (0, 0, 0)
    - hop0 (0, 0, 0)
    - hop1 (0, 0, 0)
    - hop2 (0, 0, 0)
    - hop3 (0, 0, 0)
    - hop4 (0, 0, 0)
  - Topics
  - Event Hubs
  - Notification Hubs
  - Relays

View Queue: hop0

Description | Authorization Rules

Path

Relative URI: hop0

Duplicate Detection History Time Window

Days:	Hours:	Minutes:	Seconds:	Millisecs:
0	0	10	0	0

Queue Properties

Max Queue Size In GB: 1 GB

Max Delivery Count: 10

User Description:

Forward To:

Forward Dead Lettered Messages To:

Auto Delete On Idle

Days:	Hours:	Minutes:	Seconds:	Millisecs:
106751	2	48	5	477

Default Message Time To Live

Days:	Hours:	Minutes:	Seconds:	Millisecs:
106751	2	48	5	477

Lock Duration

Days:	Hours:	Minutes:	Seconds:	Millisecs:
0	0	1	0	0

Queue Settings

- [x] Enable Batched Operations
- [ ] Enable Dead Lettering On Message Expiration
- [ ] Enable Partitioning
- [ ] Enable Express
- [ ] Requires Duplicate Detection
- [ ] Requires Session
- [x] Enforce Message Ordering

Queue Information

Name	Value
Status	Active
Is ReadOnly	False
Size In Bytes	0
Created At	14.06.2019 21:33:14
Accessed At	14.06.2019 21:33:20
Updated At	14.06.2019 21:33:14
Active Message Count	0
DeadLetter Message Count	0
Scheduled Message Count	0
Transfer Message Count	0
Transfer DL Message Count	0
Message Count	0

Purge | Purge DLQ | Messages | Deadletter | Transf DLQ | Refresh | Status | Del

Log

```
<23:33:35> The queue hop has been successfully retrieved.
<23:33:35> The queue hop0 has been successfully retrieved.
<23:33:35> The queue hop1 has been successfully retrieved.
<23:33:35> The queue hop2 has been successfully retrieved.
<23:33:35> The queue hop3 has been successfully retrieved.
<23:33:35> The queue hop4 has been successfully retrieved.
```

```
c:\p\AzureServiceBus.DeepDive\Forwarding
> dotnet run
Sent message
Got 'Weeeeeeehhh!' on hop 'Hop0'
Setup forwarding from Hop0 to Hop
```

File Edit Actions View Help

Service Bus Namespace

- sb://nservicebustests.servicebus.windows.net/
  - Queues
    - hop (0, 0, 0)
    - hop0 (0, 0, 0)
    - hop1 (0, 0, 0)
    - hop2 (0, 0, 0)
    - hop3 (0, 0, 0)
    - hop4 (0, 0, 0)
  - Topics
  - Event Hubs
  - Notification Hubs
  - Relays

View Queue: hop0

Description | Authorization Rules

Path

Relative URI: hop0

Auto Delete On Idle

Days:	Hours:	Minutes:	Seconds:	Millisecs:
106751	2	48	5	477

Duplicate Detection History Time Window

Days:	Hours:	Minutes:	Seconds:	Millisecs:
0	0	10	0	0

Default Message Time To Live

Days:	Hours:	Minutes:	Seconds:	Millisecs:
106751	2	48	5	477

Queue Properties

Max Queue Size In GB: 1 GB

Max Delivery Count: 10

User Description:

Forward To: hop

Forward Dead Lettered Messages To:

Lock Duration

Days:	Hours:	Minutes:	Seconds:	Millisecs:
0	0	1	0	0

Queue Settings

- [x] Enable Batched Operations
- [ ] Enable Dead Lettering On Message Expiration
- [ ] Enable Partitioning
- [ ] Enable Express
- [ ] Requires Duplicate Detection
- [ ] Requires Session
- [x] Enforce Message Ordering

Queue Information

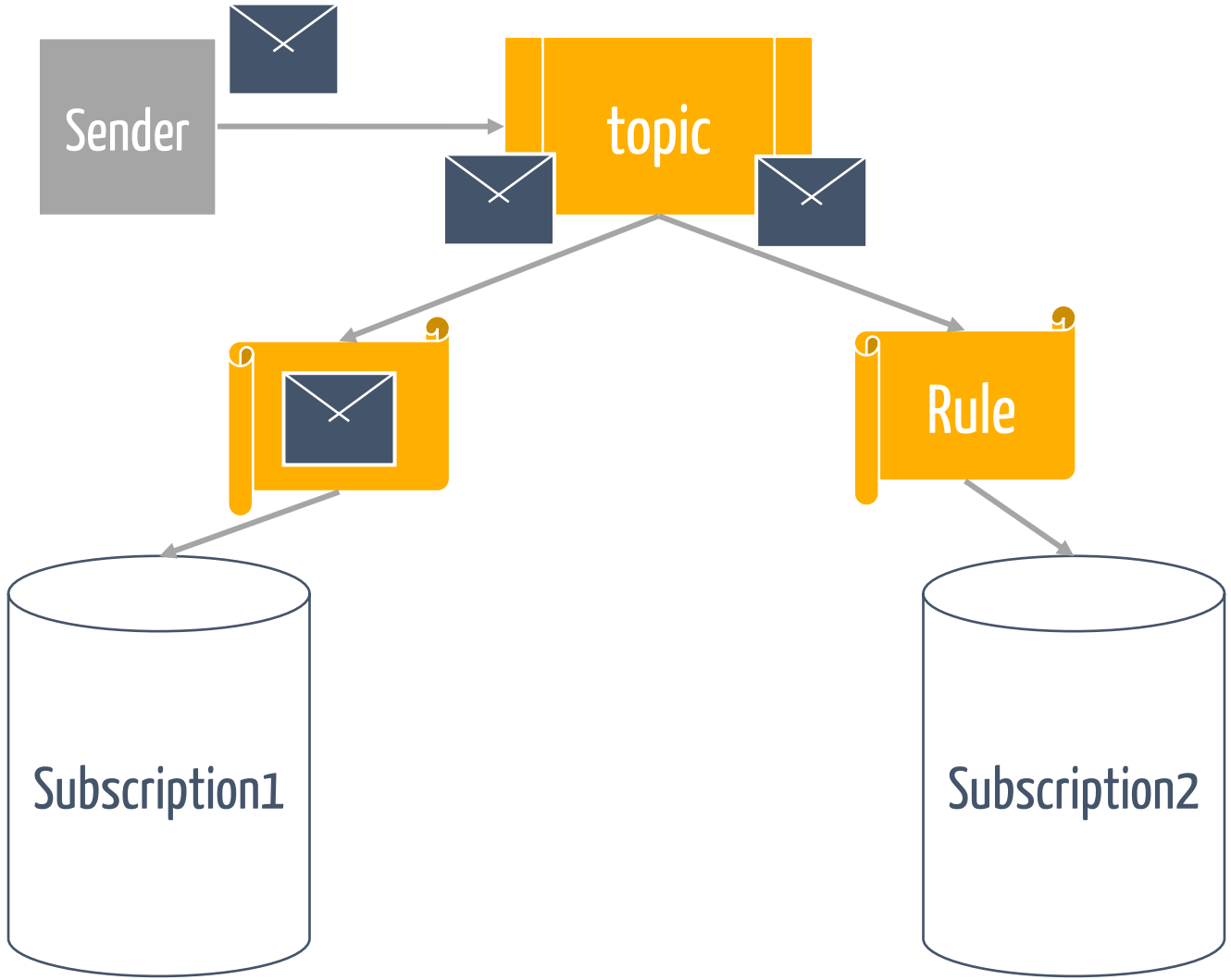
Name	Value
Status	Active
Is ReadOnly	False
Size In Bytes	0
Created At	14.06.2019 21:33:14
Accessed At	14.06.2019 21:33:20
Updated At	14.06.2019 21:33:14
Active Message Count	0
DeadLetter Message Count	0
Scheduled Message Count	0
Transfer Message Count	0
Transfer DL Message Count	0
Message Count	0

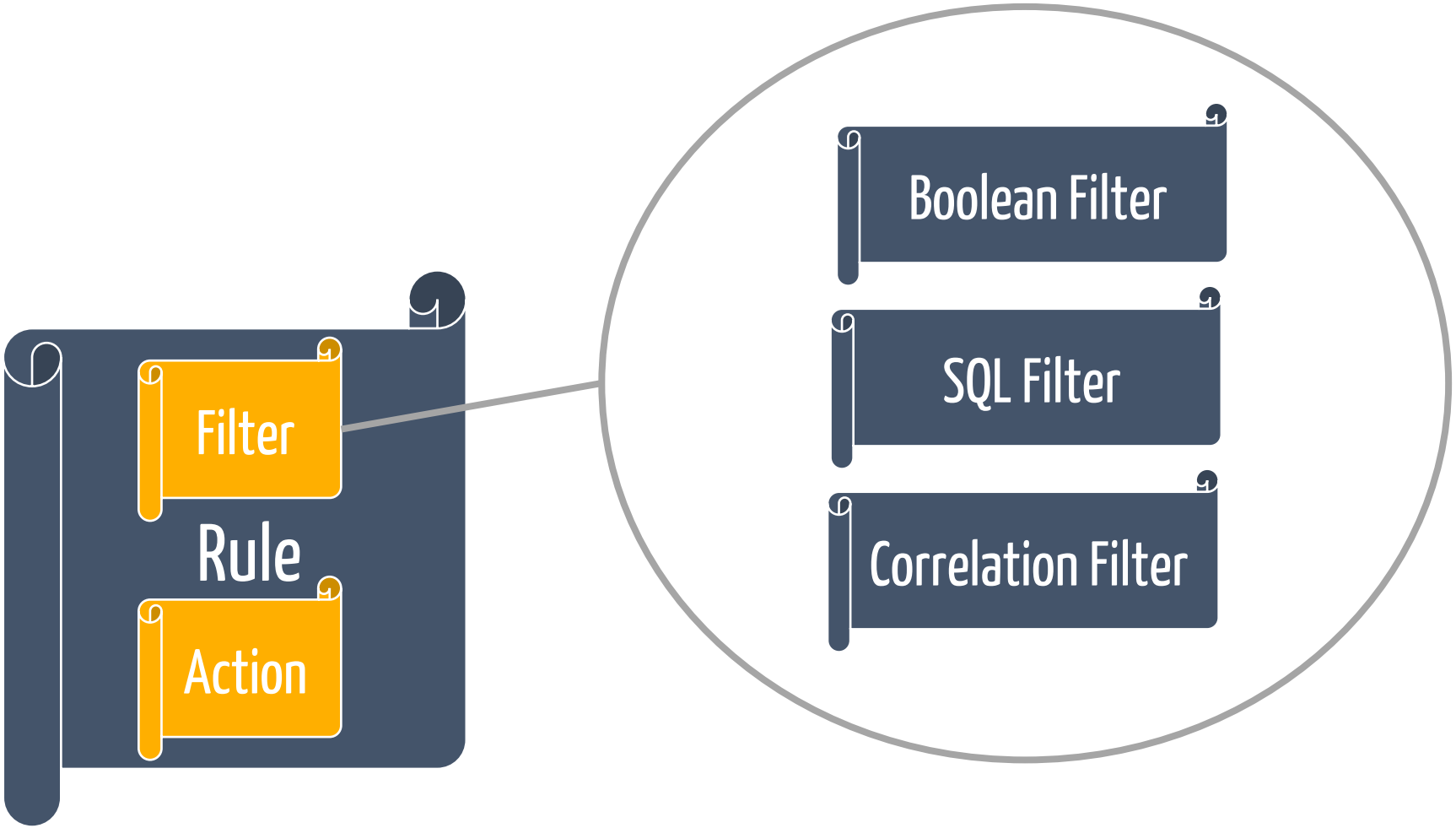
Purge | Purge DLQ | Messages | Deadletter | Transf DLQ | Refresh | Status | Delete

Log

```
<23:33:35> The queue hop has been successfully retrieved.
<23:33:35> The queue hop0 has been successfully retrieved.
<23:33:35> The queue hop1 has been successfully retrieved.
<23:33:35> The queue hop2 has been successfully retrieved.
<23:33:35> The queue hop3 has been successfully retrieved.
<23:33:35> The queue hop4 has been successfully retrieved.
<23:33:45> The queue hop0 has been successfully updated.
```

Pub/Sub


Sender
topic
Rule
Subscription1
Subscription2


Filter
Rule
Action
Boolean Filter
SQL Filter
Correlation Filter

```
   var topicDescription = new CreateTopicOptions (topicName);
   await client.CreateTopicAsync(topicDescription);
```

```
var subscriptionDescription =
      new CreateSubscriptionOptions(topicName, rushSubscription);
await client.CreateSubscriptionAsync(subscriptionDescription);

subscriptionDescription =
   new CreateSubscriptionOptions(topicName, currencySubscription);
await client.CreateSubscriptionAsync(subscriptionDescription);
```

```
var ruleDescription = new CreateRuleOptions
{
    Name = "MessagesWithRushlabel",
    Filter = new CorrelationRuleFilter
    {
        Subject = "rush"
    },
    Action = null
};
await client.
      CreateRuleAsync(topicName, rushSubscription, ruleDescription);
```

```
ruleDescription = new CreateRuleOptions
{
    Name = "MessagesWithCurrencyCHF",
    Filter = new SqlRuleFilter("currency = 'CHF'"),
    Action = new SqlRuleAction("SET currency = 'Złoty'")
};
await client.CreateRuleAsync(topicName,
   currencySubscription, ruleDescription);
```

```
var message = new ServiceBusMessage("Damn I have no time!")
{
    Subject = "rush"
};
await sender.SendMessageAsync(message);

message = new ServiceBusMessage("I'm rich! I have 1000");
message.ApplicationProperties.Add("currency", "CHF");
await sender.SendMessageAsync(message);
```

Service Bus Explorer

File Edit Actions View Help

Service Bus Namespace

- sb://nservicebustests.servicebus.windows.net/
  - Queues
  - Topics
    - topic
      - Subscriptions
        - alwaysInRush (1, 0, 0)
        - maybeRich (1, 0, 0)
  - Event Hubs
  - Notification Hubs
  - Relays

View Topic: topic

Description | Authorization Rules

Path

Relative URI: topic

Auto Delete On Idle

Days:	Hours:	Minutes:	Seconds:	Millisecs:
106751	2	48	5	477

Default Message Time To Live

Days:	Hours:	Minutes:	Seconds:	Millisecs:
106751	2	48	5	477

Topic Properties

Max Queue Size In GB: 1 GB

User Description:

Duplicate Detection History Time Window

Days:	Hours:	Minutes:	Seconds:	Millisecs:
0	0	10	0	0

Topic Settings

- [x] Enable Batched Operations
- [ ] Enable Filtering Messages Before Publishing
- [ ] Enable Partitioning
- [ ] Enable Express
- [ ] Requires Duplicate Detection
- [ ] Enforce Message Ordering

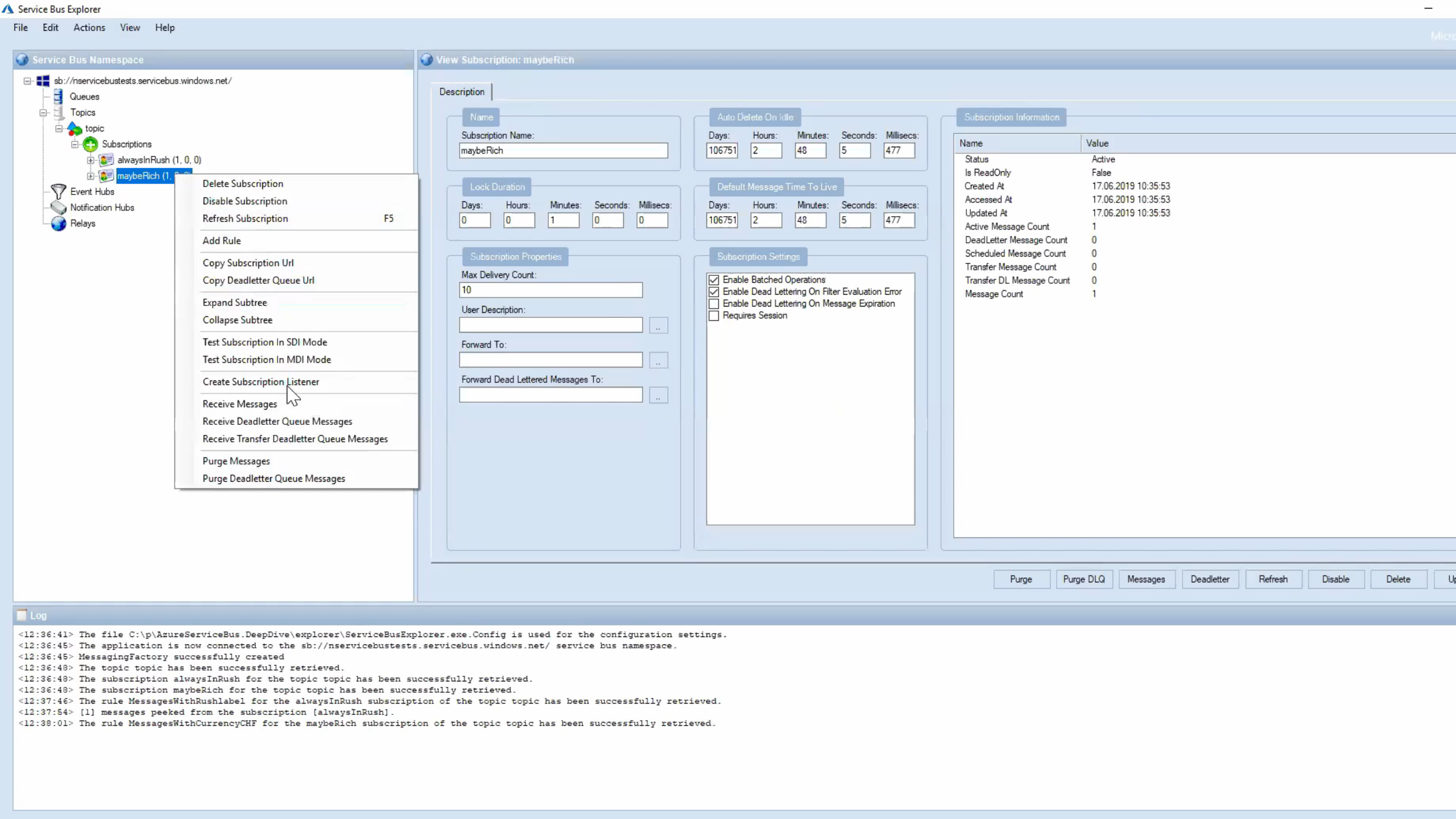
Topic Information

Name	Value
Status	Active
Is ReadOnly	False
Size In Bytes	504
Created At	17.06.2019 10:35:53
Accessed At	17.06.2019 10:35:55
Updated At	17.06.2019 10:35:53
Active Message Count	0
DeadLetter Message Count	0
Scheduled Message Count	0
Transfer Message Count	0
Transfer DL Message Count	0

Refresh Disable Delete

Log

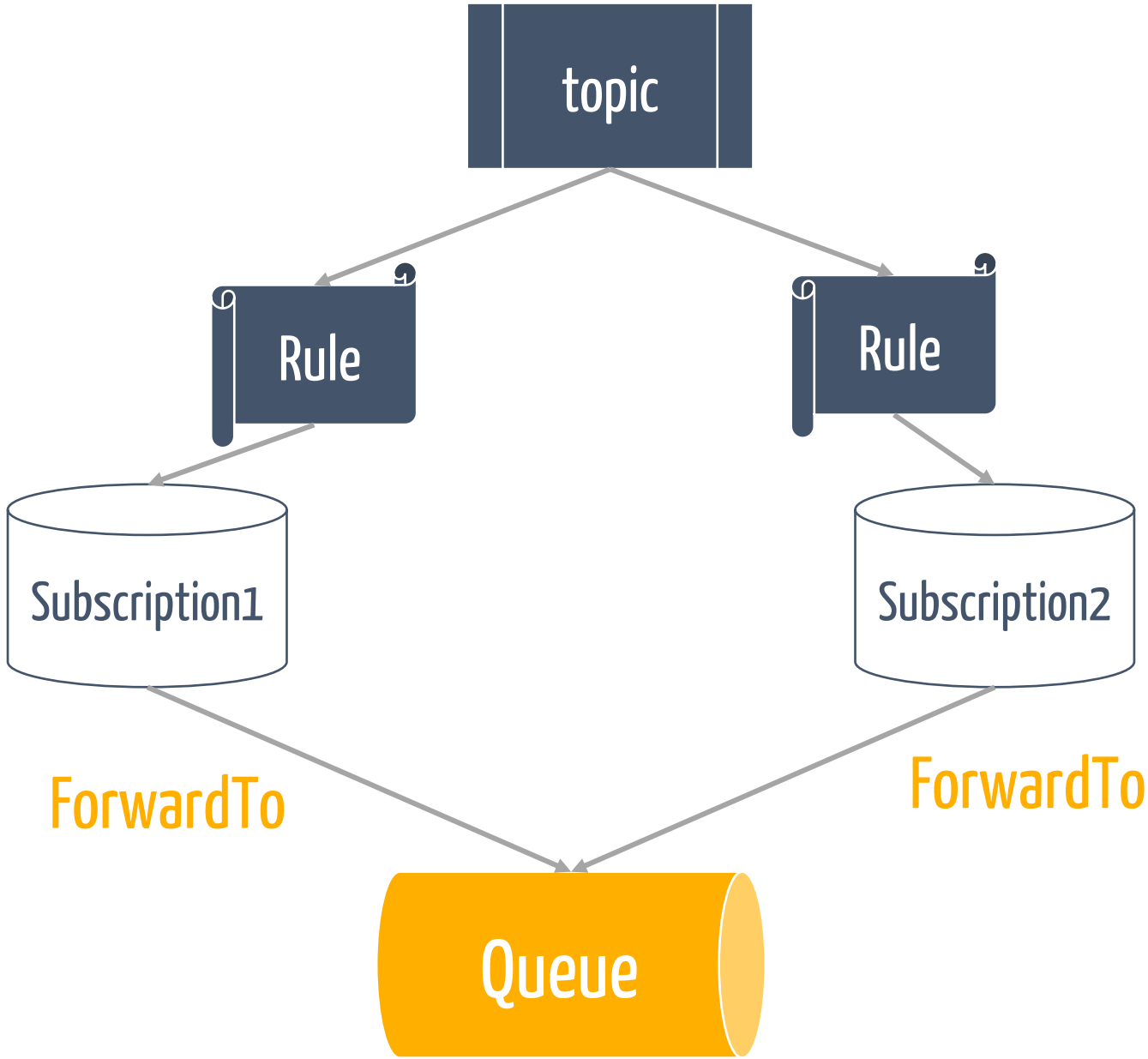
```
<12:36:41> The file C:\p\AzureServiceBus.DeepDive\explorer\ServiceBusExplorer.exe.Config is used for the configuration settings.
<12:36:45> The application is now connected to the sb://nservicebustests.servicebus.windows.net/ service bus namespace.
<12:36:45> MessagingFactory successfully created
<12:36:48> The topic topic has been successfully retrieved.
<12:36:48> The subscription alwaysInRush for the topic topic has been successfully retrieved.
<12:36:48> The subscription maybeRich for the topic topic has been successfully retrieved.
```


Service Bus Explorer
File
Edit
Actions
View
Help
Service Bus Namespace
sb://nservicebustests.servicebus.windows.net/
Queues
Topics
topic
Subscriptions
alwaysInRush (1, 0, 0)
maybeRich (1, 0, 0)
Event Hubs
Notification Hubs
Relays
Delete Subscription
Disable Subscription
Refresh Subscription F5
Add Rule
Copy Subscription Url
Copy Deadletter Queue Url
Expand Subtree
Collapse Subtree
Test Subscription In SDI Mode
Test Subscription In MDI Mode
Create Subscription Listener
Receive Messages
Receive Deadletter Queue Messages
Receive Transfer Deadletter Queue Messages
Purge Messages
Purge Deadletter Queue Messages
View Subscription: maybeRich
Description
Name
Subscription Name:
maybeRich
Auto Delete On Idle
Days: Hours: Minutes: Seconds: Millisecs:
106751 2 48 5 477
Subscription Information
Name Value
Status Active
Is ReadOnly False
Created At 17.06.2019 10:35:53
Accessed At 17.06.2019 10:35:53
Updated At 17.06.2019 10:35:53
Active Message Count 1
DeadLetter Message Count 0
Scheduled Message Count 0
Transfer Message Count 0
Transfer DL Message Count 0
Message Count 1
Lock Duration
Days: Hours: Minutes: Seconds: Millisecs:
0 0 1 0 0
Default Message Time To Live
Days: Hours: Minutes: Seconds: Millisecs:
106751 2 48 5 477
Subscription Properties
Max Delivery Count:
10
User Description:
Forward To:
Forward Dead Lettered Messages To:
Subscription Settings
Enable Batched Operations
Enable Dead Lettering On Filter Evaluation Error
Enable Dead Lettering On Message Expiration
Requires Session
Purge
Purge DLQ
Messages
Deadletter
Refresh
Disable
Delete
Log
<12:36:41> The file C:\p\AzureServiceBus.DeepDive\explorer\ServiceBusExplorer.exe.Config is used for the configuration settings.
<12:36:45> The application is now connected to the sb://nservicebustests.servicebus.windows.net/ service bus namespace.
<12:36:45> MessagingFactory successfully created
<12:36:48> The topic topic has been successfully retrieved.
<12:36:48> The subscription alwaysInRush for the topic topic has been successfully retrieved.
<12:36:48> The subscription maybeRich for the topic topic has been successfully retrieved.
<12:37:46> The rule MessagesWithRushlabel for the alwaysInRush subscription of the topic topic has been successfully retrieved.
<12:37:54> [1] messages peeked from the subscription [alwaysInRush].
<12:38:01> The rule MessagesWithCurrencyCHF for the maybeRich subscription of the topic topic has been successfully retrieved.

Favor Correlation filter over SQL filter

Subscriptions are virtual queues and subscribers need to receive from them

Topologies


topic
Rule
Rule
Subscription1
Subscription2
ForwardTo
ForwardTo
Queue

```
var subscriptionDescription =
      new CreateSubscriptionOptions(topicName, rushSubscription)
      {
          ForwardTo = inputQueue
      };
await client.CreateSubscriptionAsync(subscriptionDescription);

subscriptionDescription =
      new CreateSubscriptionOptions(topicName, currencySubscription)
      {
          ForwardTo = inputQueue
      };
await client.CreateSubscriptionAsync(subscriptionDescription);
```

```
c:\p\AzureServiceBus.DeepDive\Topologies
> dotnet run
```

Service Bus Explorer

File Edit Actions View Help

Service Bus Namespace

- sb://nservicebustests.servicebus.windows.net/
  - Queues
    - queue (2, 0, 0)
  - Topics
    - topic
  - Event Hubs
  - Notification Hubs
  - Relays

View Subscription: maybeRich

Description | Messages

Message List

MessageId	Seq	Size	Label	EnqueuedTimeUtc	ExpiresAtUtc
e0d9141d27684e3aac0eb6...	1	163		17.06.2019 10:35	31.12.9999 23:59

Message System Properties

Misc	
ContentType	
CorrelationId	
DeadLetterSource	
DeliveryCount	1
EnqueuedSequenceNumber	2
EnqueuedTimeUtc	17.06.2019 10:35
ExpiresAtUtc	31.12.9999 23:59
ForcePersistence	**False**
IsBodyConsumed	False
Label	
LockedUntilUtc	Operation is not valid due to the current s
LockToken	Operation is not valid due to the current s
MessageId	**e0d9141d27684e3aac0eb66ea0a**

Message Text

```
1 I'm rich! I have 1000
```

Message Custom Properties

Name	Value
currency	Zloty
RuleName	MessagesWithCurrencyCHF

Purge | Purge DLQ | Messages | Deadletter | Refresh | Disable | Delete

Log

```
<12:36:41> The file C:\p\AzureServiceBus.DeepDive\explorer\ServiceBusExplorer.exe.Config is used for the configuration settings.
<12:36:45> The application is now connected to the sb://nservicebustests.servicebus.windows.net/ service bus namespace.
<12:36:45> MessagingFactory successfully created
<12:36:48> The topic topic has been successfully retrieved.
<12:36:48> The subscription alwaysInRush for the topic topic has been successfully retrieved.
<12:36:48> The subscription maybeRich for the topic topic has been successfully retrieved.
<12:37:46> The rule MessagesWithRushlabel for the alwaysInRush subscription of the topic topic has been successfully retrieved.
<12:37:54> [1] messages peeked from the subscription [alwaysInRush].
<12:38:01> The rule MessagesWithCurrencyCHF for the maybeRich subscription of the topic topic has been successfully retrieved.
<12:38:04> [1] messages peeked from the subscription [maybeRich].
<12:53:06> The queue queue has been successfully retrieved.
<12:53:06> The topic topic has been successfully retrieved.
<12:53:07> The subscription alwaysInRush for the topic topic has been successfully retrieved.
<12:53:07> The subscription maybeRich for the topic topic has been successfully retrieved.
```

Service Bus Explorer

File Edit Actions View Help

Service Bus Namespace

- sb://nservicebustests.servicebus.windows.net/
  - Queues
    - queue (2, 0, 0)
  - Topics
    - topic
      - Subscriptions
        - alwaysInRush (0, 0, 0)
        - maybeRich (0, 0, 0)
  - Event Hubs
  - Notification Hubs
  - Relays

View Queue: queue

Description | Authorization Rules | Messages

Message List

MessageId	Seq	Size	Label	EnqueuedTimeUtc	ExpiresAtUtc
6b1fe11b26be418ab3b349f...	1	228	rush	17.06.2019 10:52	31.12.9999 23:59
ccbbea7401af434890a2f38...	2	273		17.06.2019 10:52	31.12.9999 23:59

Message System Properties

Misc	
ContentType	
CorrelationId	
DeadLetterSource	
DeliveryCount	1
EnqueuedSequenceNumber	1
EnqueuedTimeUtc	17.06.2019 10:52
ExpiresAtUtc	31.12.9999 23:59
ForcePersistence	**False**
IsBodyConsumed	False
Label	**rush**
LockedUntilUtc	Operation is not valid due to the current s
LockToken	Operation is not valid due to the current s
MessageId	6b1fe11b26be418ab3b349f43c3f...

Message Text

```
1 Damn I have not time!
```

Message Custom Properties

Name	Value

Purge | Purge DLQ | Messages | Deadletter | Transf DLQ | Refresh | Status | Delete | Up

Log

```
<12:36:45> The application is now connected to the sb://nservicebustests.servicebus.windows.net/ service bus namespace.
<12:36:45> MessagingFactory successfully created
<12:36:48> The topic topic has been successfully retrieved.
<12:36:48> The subscription alwaysInRush for the topic topic has been successfully retrieved.
<12:36:48> The subscription maybeRich for the topic topic has been successfully retrieved.
<12:37:46> The rule MessagesWithRushlabel for the alwaysInRush subscription of the topic topic has been successfully retrieved.
<12:37:54> [1] messages peeked from the subscription [alwaysInRush].
<12:38:01> The rule MessagesWithCurrencyCHF for the maybeRich subscription of the topic topic has been successfully retrieved.
<12:38:04> [1] messages peeked from the subscription [maybeRich].
<12:53:06> The queue queue has been successfully retrieved.
<12:53:06> The topic topic has been successfully retrieved.
<12:53:07> The subscription alwaysInRush for the topic topic has been successfully retrieved.
<12:53:07> The subscription maybeRich for the topic topic has been successfully retrieved.
<12:53:13> The rule MessagesWithRushlabel for the alwaysInRush subscription of the topic topic has been successfully retrieved.
<12:53:15> The rule MessagesWithCurrencyCHF for the maybeRich subscription of the topic topic has been successfully retrieved.
<12:53:24> [2] messages peeked from the queue [queue].
```

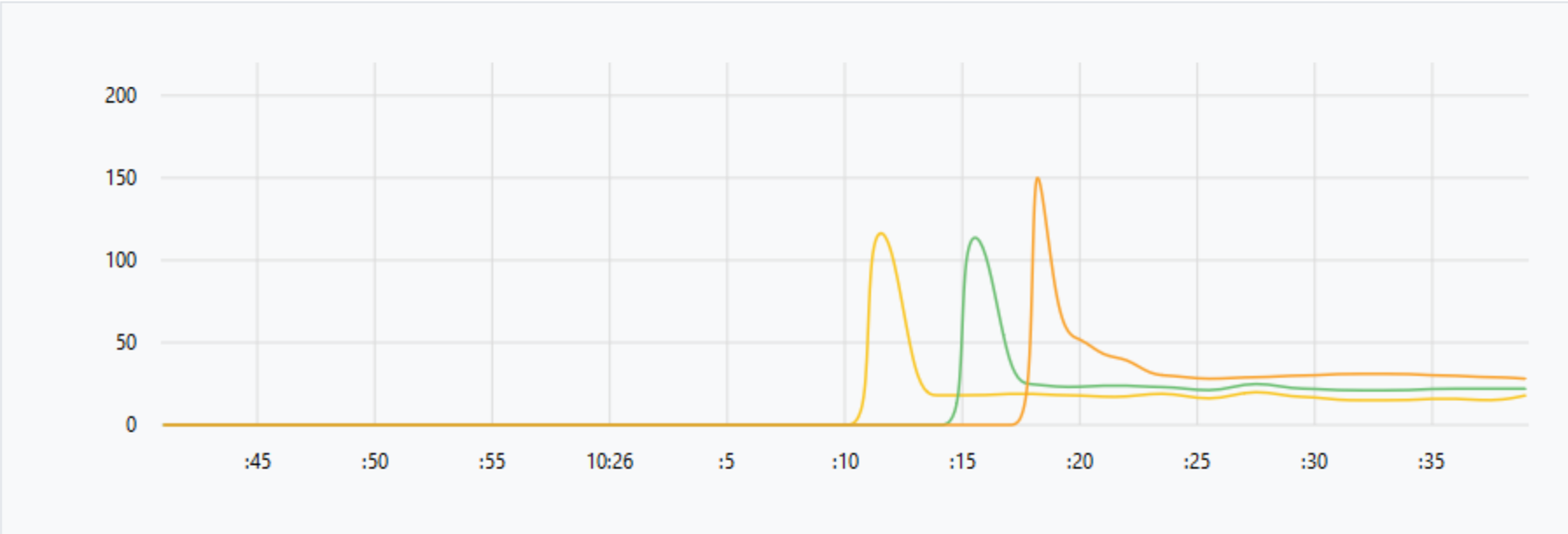
Atomic Sends

```
using (var scope =
      new TransactionScope(TransactionScopeAsyncFlowOption.Enabled))
{
    var message = new ServiceBusMessage("Deep Dive 1");
    await sender.SendMessageAsync(message);

    message = new ServiceBusMessage("Deep Dive 2");
    await sender.SendMessageAsync(message);

    scope.Complete();
}
```

```
c:\p\AzureServiceBus.DeepDive\AtomicSend
> dotnet run
```

Batching

Region	Average Latency (ms)
Switzerland North (Zurich)	18 ms
Germany West Central (Frankfurt)	22 ms
France Central (Paris)	28 ms



Latency Test

Geography	Region	Physical Location	Average Latency (ms)
Europe	France Central	Paris	28 ms
Europe	Germany West Central	Frankfurt	22 ms
Europe	Switzerland North	Zurich	18 ms

```
var messages = new List<ServiceBusMessage>();
for (var i = 0; i < 10; i++)
{
    var message = new ServiceBusMessage("Deep Dive{i}");
    messages.Add(message);
}

await sender.SendMessagesAsync(messages);
```

```
c:\p\AzureServiceBus.DeepDive\Batching
> dotnet run
```

```
var messagesToSend = new Queue<ServiceBusMessage>();
for (var i = 0; i < 4500; i++)
{
    var message = new ServiceBusMessage($"Deep Dive{i}. Deep Dive{i}. Deep Dive
{i}.");
    messagesToSend.Enqueue(message);
}
```

```
var messageCount = messagesToSend.Count;
int batchCount = 1;
while (messagesToSend.Count > 0)
{
    using ServiceBusMessageBatch messageBatch = await sender.CreateMessageBatchAsync();

    if (messageBatch.TryAddMessage(messagesToSend.Peek()))
    {
        messagesToSend.Dequeue();
    }
    else
    {
        throw new Exception($"Message {messageCount -
 messagesToSend.Count} is too large and cannot be sent.");
    }

    while (messagesToSend.Count > 0 && messageBatch.TryAddMessage(messagesToSend.Peek()))
    {
        messagesToSend.Dequeue();
    }


    await sender.SendMessagesAsync(messageBatch);
}
```

Upgrade to premium tier

Use ServiceBus.AttachmentPlugin

Send Via


Incoming
Transfer
Outgoing1
Outgoing2

```
await using var transactionalClient =
      new ServiceBusClient(connectionString,
      new ServiceBusClientOptions
      {
          EnableCrossEntityTransactions = true,
      });

receiver = transactionalClient.CreateProcessor(inputQueue);
sender = transactionalClient.CreateSender(destinationQueue);
```

```
receiver.ProcessMessageAsync += async processMessageEventArgs =>
{
    var message = processMessageEventArgs.Message;
    using (var scope = new TransactionScope(TransactionScopeAsyncFlowOption.Enabled))
    {
        await sender.SendMessageAsync(new ServiceBusMessage("Will not leak"));

        if (!message.ApplicationProperties.ContainsKey("Win"))
           throw new InvalidOperationException();

        await sender.SendMessageAsync(new ServiceBusMessage("Will not leak"));

        scope.Complete();
    }

};
```

```
c:\p\AzureServiceBus.DeepDive\SendVia
> dotnet run
```

```
c:\p\AzureServiceBus.DeepDive\SendVia
> dotnet run
#'0' messages in 'destination'
Received message with 'bdc126e8424549acb9d1c23a5af31799' and content 'Kick off'
#'1' messages in 'destination'
Received message with 'bdc126e8424549acb9d1c23a5af31799' and content 'Kick off'
#'2' messages in 'destination'
```

TransferDLQ

```
receiver.ProcessMessageAsync += async processMessageEventArgs =>
{
    var message = processMessageEventArgs.Message;
    using (var scope = new TransactionScope(TransactionScopeAsyncFlowOption.Enabled))
    {
        await sender.SendMessageAsync(new ServiceBusMessage("Will not leak"));

        var client = new ServiceBusAdministrationClient(connectionString);

        QueueProperties queueProperties = await client.GetQueueAsync(destinationQueue);
        queueProperties.Status = EntityStatus.SendDisabled;

        await client.UpdateQueueAsync(queueProperties);

        scope.Complete();
    }

};
```

```
var client = new  ServiceBusAdministrationClient(connectionString);

QueueRuntimeProperties info = await client
    .GetQueueRuntimeInfoAsync(destination);


long activeMessageCount =  info.ActiveMessageCount;
long deadLetterMessageCount = info.DeadLetterMessageCount;
long transferDeadLetterMessageCount = info.TransferDeadLetterMessageC
ount;

string destinationDeadLetterPath = EntityNameHelper
       .FormatDeadLetterPath(destination);
string destinationTransferDeadLetterPath = EntityNameHelper
       .FormatTransferDeadLetterPath(destination);
```

```
c:\p\AzureServiceBus.DeepDive\TransferDLQ
> dotnet run
```

Dedup

```
var queueDescription = new CreateQueueOptions(destination)
{
    RequiresDuplicateDetection = true,
    DuplicateDetectionHistoryTimeWindow = TimeSpan.FromSeconds(20)
};
await client.CreateQueueAsync(queueDescription);
```

```
var content = Encoding.UTF8.GetBytes("Message1Message1");
var messageId = new Guid(content).ToString();

var messages = new List<ServiceBusMessage>
{
    new ServiceBusMessage(content) { MessageId = messageId },
    new ServiceBusMessage(content) { MessageId = messageId },
    new ServiceBusMessage(content) { MessageId = messageId }
};

await sender.SendMessagesAsync(messages);
```

```
c:\p\AzureServiceBus.DeepDive\Dedup
> dotnet run
```

SUMMARY

ENTERPRISE MESSAGING FEATURES

MESSAGE TRANSACTIONAL PROCESSING

RELIABILITY

GUARANTEED THROUGHPUT AND LATENCY

TOTAL: PRICELESS

Azure Service Bus Transport

Tags

Source | NServiceBus.Transport.AzureServiceBus (1.x)
Target NServiceBus Version: 7.x

The Azure Serv ice Bus transport leverages the .NET Standard Microsoft.Azure.ServiceBus client SDK.

Azure Service B us is a messaging service hosted on the Azure platform that allows for exchanging messages between various applica tions in a loosely coupled fashion. The service offers guaranteed message delivery and supports a range of standard protoc ols (e.g. REST, AMQP, WS*) and APIs such as relative pub/sub, delayed deliver

Configuri n endpoint

To use Azure S Bus as the underlying transport:

```
var transport = endpointConfiguration.UseTransport<AzureServiceBusTransport>();
transport.ConnectionString("Endpoint=sb://[NAMESPACE].servicebus.windows.net/;SharedAccessKeyName=[KEYNAME];SharedAccessKey=[KEY]");
```

Copy/Edit

The Azure Service Bus transport requires a connection string to connect to a namespace.

Samples

- Azure Service Bus Native Integration
  Consuming messages published by non-NServiceBus endpoints.
- Azure Service Bus Send/Reply Sample
  Demonstrates the send/reply pattern with Azure Service Bus.

Particular
Software

Thanks

Slides, Links...

github.com/danielmarbach/AzureServiceBus.DeepDive

Particular
Software

Q&A

Particular Software

Software Engineer
Microsoft MVP

@danielmarbach
particular.net/blog
planetgeek.ch