**Lab 105 – Publish Subscribe using ActiveMQ** (rev 1.2)

In this type of messaging, the publisher of the message does not know the specifics of those who wish to receive the message. Subscribers explicitly opt in to start receiving events. The subscribers need to know which endpoint is responsible for publishing a message. Messages of significant importance to business are published as events. Since these messages convey a certain something happened, they are named in the passive past tense; e.g., OrderAccepted, OrderShipped, OrderCancelled. Since these have a significant importance, there are often multiple parties interested in when they happen, who subscribe to get that information.

For durability, the publisher stores its list of subscribers in a database. By default this is RavenDB. A different lab exercise teaches how to switch from using RavenDB to a different kind of storage such as SQL Server for the publisher.

**About ActiveMQ as a transport:**

ActiveMQ supports distributed transactions.

Lab Objectives

**In this lab you will learn**

• How to implement the Publish/Subscribe messaging pattern using NServiceBus

• How to set up the transport of your choice for message delivery using ActiveMQ

• How to define events

• How to publish events on the server

• How to add subscribers for the events that are published

• How to use POCOs for messages and how to load these messages in the NserviceBus endpoints using Unobtrusive conventions.

Lab Prerequisites

This lab already has these components pre-installed:

* Visual Studio 2012
* JDK 1.7.0\_21
* ActiveMQ 5.8.0

<http://activemq.apache.org/activemq-580-release.html>

See the prerequisites for installing on Windows here:

<http://activemq.apache.org/getting-started.html> and here:

<http://activemq.apache.org/how-can-i-monitor-activemq.html>

* NServiceBus Infrastructure – RavenDB version 2.0.2261.0
* NServiceBus Infrastructure – Performance Counters

**NOTE**: To install NServiceBus infrastructure on your machines, use Powershell commandlets.

Problem Definition

FastCars would like to offer its frequent clients with a reward program. When a client becomes preferred, FastCars offers them a free weekend compact car rental, which expires in 30 days.

In this lab, you will define the event schema for the ClientBecamePreferred event. Next you will create a publisher endpoint capable of publishing this event. And finally, you will create a subscriber endpoint which will receive this event, and print a message for the client for the free rental, when the customer becomes preferred. You will implement the solution using ActiveMQ as transport for the message exchange.

**Estimated time to complete:**

60 mins

Completed Lab Solution

For your convenience, the complete solution for this exercise can be found under C:\Hands on Labs\Completed Solutions\Lab 105 – Publish Subscribe using ActiveMQ

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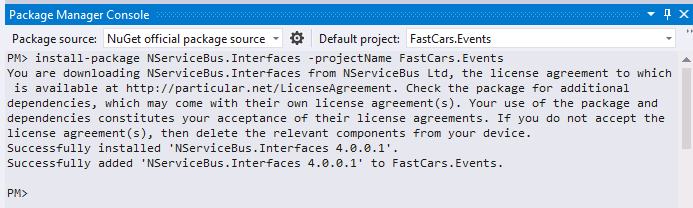
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# Exercise 1: Publish Subscribe using ActiveMQ as transport

## Task 1: Create the message schema (FastCars.Events)

1. Open a new instance of Visual Studio 2012 and make sure to run it as an administrator.
2. Open the solution FastCars.CustomerRelations in C:\Hands on Labs\Exercises\Lab 105 – Publish Subscribe using ActiveMQ
3. **Install NServiceBus.Interfaces nuget package:** In the Package Manager Console (Tools -> Library Package Manager -> Package Manager Console), install package NServiceBus.Interfaces, by typing the following at the prompt:

**Install-package NServiceBus.Interfaces –projectName FastCars.Events**



1. Define your event schema for ClientBecamePreferred in ClientBecamePreferred.cs and resolve using statement for the interface IEvent:

namespace FastCars.Events

{

using System;

using NServiceBus;

public class ClientBecamePreferred : IEvent

{

public Guid ClientId { get; set; }

public DateTime PreferredUntil { get; set; }

}

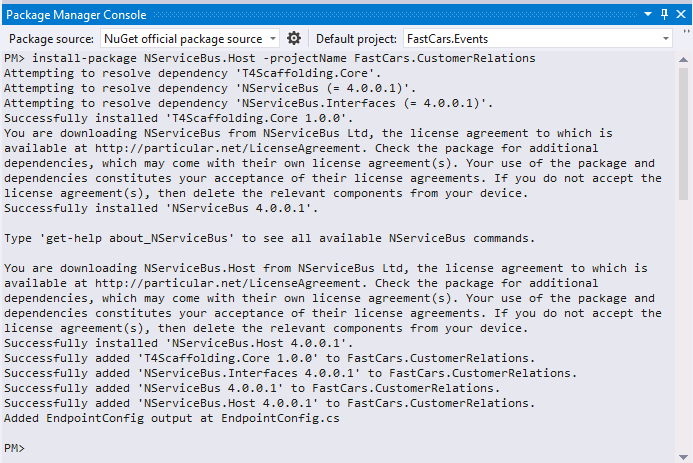
}

1. Make sure the project compiles without any errors.

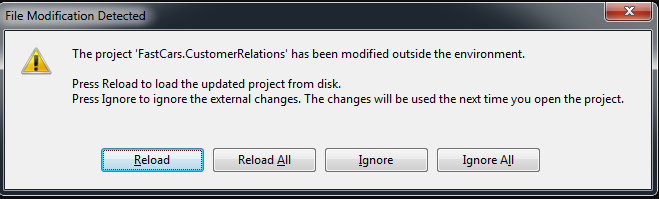
## Task 2: Create a publisher endpoint (FastCars.CustomerRelations) and configure ActiveMQ as the message transport

1. In the class library project FastCars.CustomerRelations, add a project reference to the FastCars.Events project.
2. **Install NServiceBus.Host nuget package:** Go to the Package Manager Console and type

**Install-package NServiceBus.Host –ProjectName FastCars.CustomerRelations**



1. NServiceBus automatically adds the proper configuration necessary for the endpoint. When prompted to reload the project, choose Reload All.



1. To set up ActiveMQ as the transport and add the needed dependencies, in the package manager console, type

**Install-Package NServiceBus.ActiveMQ –ProjectName FastCars.CustomerRelations**

1. In your solution explorer is a new file called EndpointConfig.cs, which looks like that below. NServiceBus configures the transport to MSMQ by default and configures it as a Server endpoint. Keep the AsA\_Server and add UsingTransport<ActiveMQ>

**NOTE:** AsA\_Publisher role is \***not\*** required for transports that support Pub/Sub natively like ActiveMQ and RabbitMQ and is only needed for transports like Msmq and SqlServer which do not support Pub/Sub natively.

namespace FastCars.CustomerRelations

{

using NServiceBus;

public class EndpointConfig : IConfigureThisEndpoint, AsA\_Server, UsingTransport<ActiveMQ>

{

}

}

1. Add the following connection string in the app.config for ActiveMQ after the configSections node:

<connectionStrings>

<!-- ActiveMQ-->

<add name="NServiceBus/Transport"

connectionString="ServerUrl=activemq:tcp://localhost:61616"/>

</connectionStrings>

1. In the Bootstrapper.cs class modify the code such that every time the ‘Enter’ key is pressed, the ClientBecamePreferred event is published.
   1. To publish events, you need the IBus interface. Add a public get setter for the IBus in your class. NServiceBus automatically injects the IBus into this class:

public IBus Bus { get; set; }

* 1. To publish an event every time we press Enter, implement the IWantToRunWhenBusStartsAndStops interface. When you are done, your bootstrapper class might look like this:

namespace FastCars.CustomerRelations

{

using System;

using NServiceBus;

using FastCars.Events;

public class Bootstrapper : IWantToRunWhenBusStartsAndStops

{

public IBus Bus { get; set; }

public void Start()

{

Console.WriteLine("Press Enter to publish an event");

while (Console.ReadLine() != null)

{

Bus.Publish<ClientBecamePreferred>(m =>

{

m.ClientId = Guid.NewGuid();

m.PreferredUntil = DateTime.Today.AddDays(30);

});

Console.WriteLine("Published ClientBecamePreferred event");

}

}

public void Stop()

{

}

}

}

1. Compile your solution and make sure it builds as expected.

## Task 4: Create a subscriber endpoint (FastCars.Promotions)

1. In the project FastCars.Promotions add a project reference to the FastCars.Events project.
2. **Install NServiceBus.Host nuget package:** Go to the Package Manager Console and type

**Install-package NServiceBus.Host –ProjectName FastCars.Promotions**

NServiceBus automatically adds the proper configuration necessary for the endpoint. When prompted to reload the project, choose Reload All.

1. In the Package Manager Console, type

**Install-Package NServiceBus.ActiveMQ –ProjectName FastCars.Promotions**

1. In your solution explorer is a new file called EndpointConfig.cs, which looks like that below. NServiceBus configures the transport to MSMQ by default and configures it for a Server endpoint. Leave the default as AsA\_Server and add UsingTransport<ActiveMQ>:

namespace FastCars.Promotions

{

using NServiceBus;

public class EndpointConfig : IConfigureThisEndpoint, AsA\_Server, UsingTransport<ActiveMQ>

{

}

}

1. To tell NServiceBus to use the right host, add the connection string in App.Config after the configSections node:

<connectionStrings>

<!-- ActiveMQ-->

<add name="NServiceBus/Transport"

connectionString="ServerUrl=activemq:tcp://localhost:61616"/>

</connectionStrings>

NOTE: ActiveMQ supports configuration-less pub/sub, therefore there is no need to add the message endpoint mappings in the UnicastBusConfig section.

1. The subscriber must implement a message handler that will be invoked when the event is raised. To do this, implement the interface IHandleMessages<ClientBecamePreferred> in ClientBecamePreferredHandler.cs and resolve the using statements.

namespace FastCars.Promotions

{

using System;

using NServiceBus;

using FastCars.Events;

public class ClientBecamePreferredHandler : IHandleMessages<ClientBecamePreferred>

{

public void Handle(ClientBecamePreferred message)

{

Console.WriteLine("Client became preferred, send them a new free rental offer");

}

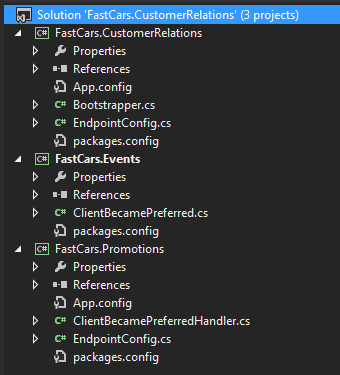
}

}

1. Compile your solution and make sure it builds as expected.

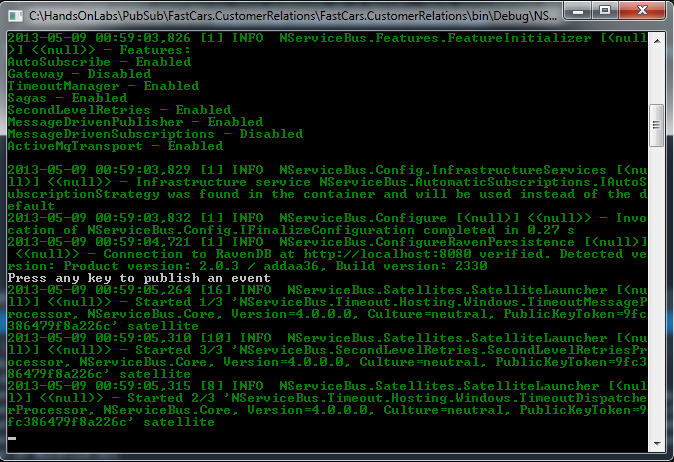
## Task 5: Run the solution.

1. Your project solution should look as follows:

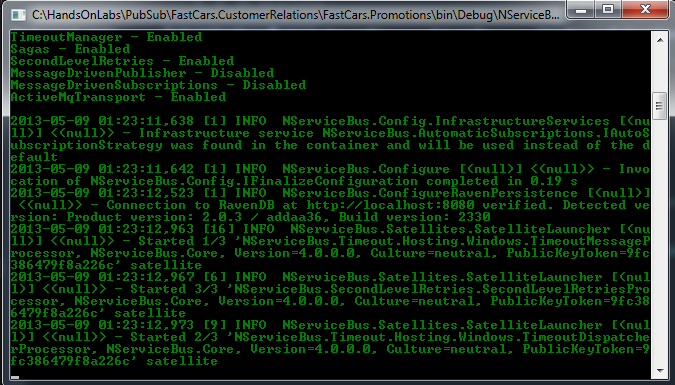


1. Make sure ActiveMQ service is running. Go to the install location of ActiveMQ and start it. Open a command prompt as an administrator. Change the directory to C:\Program Files (x86)\ActiveMQ\apache-activemq-5.8.0\bin and type activemq to start it.

Run the FastCars.CustomerRelations endpoint first (Right click on the project, Debug and select Start new instance). This will automatically create the needed queues, since this is being run within the Visual Studio Debugger.



1. Next, run the FastCars.Promotions.



1. Press the enter key in FastCars.CustomerRelations and watch the handler on FastCars.Promotions get invoked.

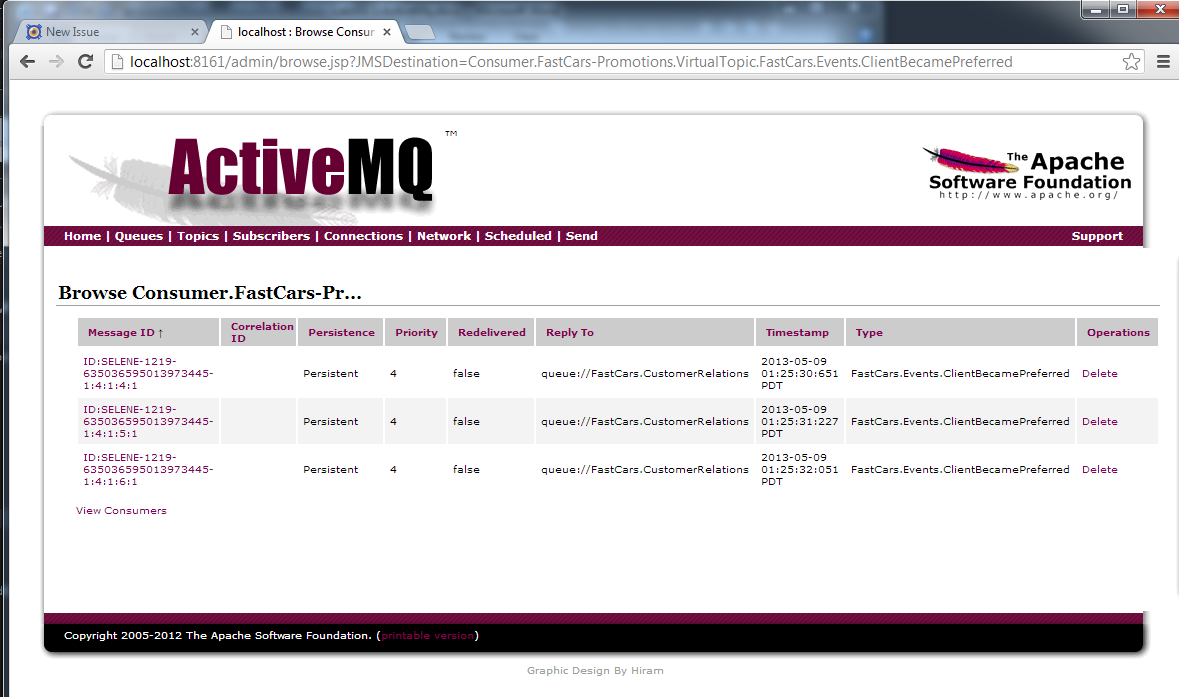
# Exercise 2: Durability

## Task1: Bring the subscriber down

Close the FastCars.Promotions endpoint.

## Task2: Publish a few events

1. Press Enter a few times in the FastCars.CustomerRelations endpoint to publish a few events.
2. View the queues in the management console for ActiveMQ using <http://localhost:8161>/admin. When prompted for a password, use admin/admin as the credentials. Click Manage ActiveMQ broker and click Queues. Sort by the “Number of Messages Pending” column and find the queue:



## Task3: Bring back the subscriber

Restart the FastCars.Promotions endpoint and verify that the subscriber now receives all the events that occurred when the subscriber was down.

# Exercise 3: Unobtrusive Conventions

In the first exercise, we built the publisher and subscriber endpoints that shared the message schema, but the message schema had a dependency on NServiceBus. In order to use message schema as POCO and remove this dependency on NServiceBus interfaces assembly, NServiceBus offers the unobtrusive conventions. For more details, please see:

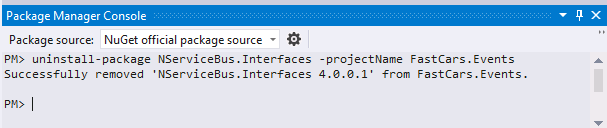
<http://particular.net/articles/unobtrusive-mode-messages>

In this exercise, we will convert the Exercise 1 to use unobtrusive conventions instead.

## Task1 – Remove NServiceBus dependency in the FastCars.Events project

1. **Uninstall NServiceBus.Interfaces nuget package:** In the Package Manager Console (Tools -> Library Package Manager -> Package Manager Console), uninstall the package NServiceBus.Interfaces, by typing the following at the prompt:

**uninstall-package NServiceBus.Interfaces –projectName FastCars.Events**



1. Remove the IEvent marker interface and the using NServiceBus reference in class ClientBecamePreferred.cs

namespace FastCars.Events

{

using System;

public class ClientBecamePreferred

{

public Guid ClientId { get; set; }

public DateTime PreferredUntil { get; set; }

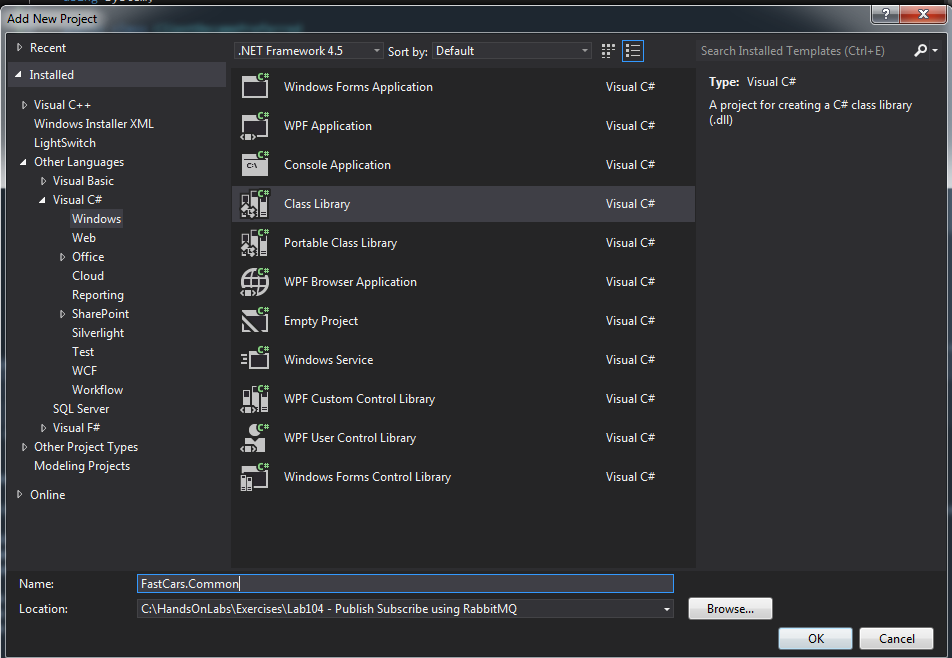
}

}

1. Make sure that the project builds successfully.

## Task2 – Define a common unobtrusive convention to be used for all endpoints

1. Add a new class library project called FastCars.Common to the solution.



1. **Install NServiceBus nuget package:** Go to the Package Manager Console and type

**Install-package NServiceBus –ProjectName FastCars.Common**

1. Rename class1.cs to UnobtrusiveConventions.cs and implement IWantToRunBeforeConfiguration as follows:

namespace FastCars.Common

{

using NServiceBus;

public class UnobtrusiveConventions : IWantToRunBeforeConfiguration

{

public void Init()

{

Configure.Instance.DefiningEventsAs(t => t.Namespace != null

&& t.Namespace.StartsWith("FastCars")

&& t.Namespace.EndsWith("Events"));

}

}

}

1. Ensure that the project builds successfully without any errors.

## Task 3 – Change the endpoints to use the new convention

1. In project FastCars.CustomerRelations, add a project reference to FastCars.Common
2. In project FastCars.Promotions, add a project reference to FastCars.Common

## Task 4 – Run the solution

1. Clean the solution and Rebuild all the projects in the solution.
2. Start both FastCars.CustomerRelations endpoint and FastCars.Promotions endpoint
3. Publish a few events on the FastCars.CustomerRelations endpoint by pressing Enter.
4. Make sure that the FastCars.Promotions endpoint receives the events.

Congratulations on building a reliable publish/subscribe system using ActiveMQ as your message transport.