RabbitMQ™

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Routing

(using the .NET client)

In the previous tutorial we built a simple logging system. We were able to broadcast log messages to many receivers.

In this tutorial we're going to add a feature to it - we're going to make it possible to subscribe only to a subset of the messages. For example, we will be able to direct only critical error messages to the log file (to save disk space), while still being able to print all of the log messages on the console.

Prerequisites

This tutorial assumes RabbitMQ is installed and running on `localhost` on the standard port (`5672`). In case you use a different host, port or credentials, connections settings would require adjusting.

Where to get help

If you're having trouble going through this tutorial you can contact us through the mailing list or RabbitMQ community Slack.

Bindings

In previous examples we were already creating bindings. You may recall code like:

```
channel.QueueBind(queue: queueName,
                  exchange: "logs",
                  routingKey: "");
```

A binding is a relationship between an exchange and a queue. This can be simply read as: the queue is interested in messages from this exchange.

Bindings can take an extra `routingKey` parameter. To avoid the confusion with a `BasicPublish` parameter we're going to call it a `binding key` . This is how we could create a binding with a key:

```
channel.QueueBind(queue: queueName,
                  exchange: "direct_logs",
                  routingKey: "black");
```

The meaning of a binding key depends on the exchange type. The `fanout` exchanges, which we used previously, simply ignored its value.

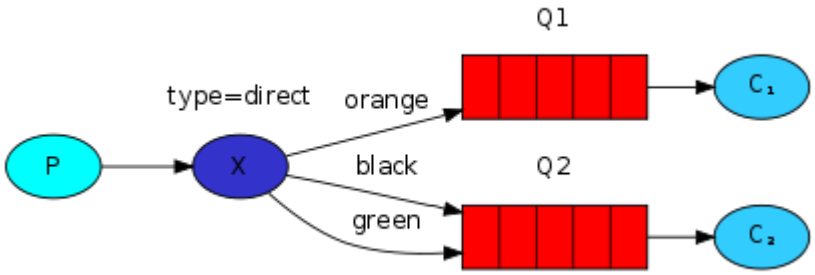
Direct exchange

Our logging system from the previous tutorial broadcasts all messages to all consumers. We want to extend that to allow filtering messages based on their severity. For example we may want the script which is writing log messages to the disk to only receive critical errors, and not waste disk space on warning or info log messages.

We were using a `fanout` exchange, which doesn't give us much flexibility - it's only capable of mindless broadcasting.

We will use a `direct` exchange instead. The routing algorithm behind a `direct` exchange is simple - a message goes to the queues whose `binding key` exactly matches the `routing key` of the message.

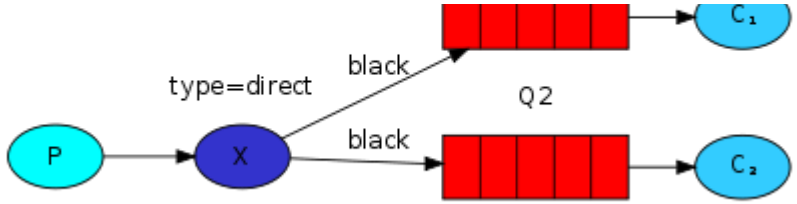
To illustrate that, consider the following setup:



In this setup, we can see the `direct` exchange `X` with two queues bound to it. The first queue is bound with binding key `orange`, and the second has two bindings, one with binding key `black` and the other one with `green`.

In such a setup a message published to the exchange with a routing key `orange` will be routed to queue `Q1`. Messages with a routing key of `black` or `green` will go to `Q2`. All other messages will be discarded.

Multiple bindings



It is perfectly legal to bind multiple queues with the same binding key. In our example we could add a binding between `X` and `Q1` with binding key `black`. In that case, the `direct` exchange will behave like `fanout` and will broadcast the message to all the matching queues. A message with routing key `black` will be delivered to both `Q1` and `Q2`.

Emitting logs

We'll use this model for our logging system. Instead of `fanout` we'll send messages to a `direct` exchange. We will supply the log severity as a `routing key`. That way the receiving script will be able to select the severity it wants to receive. Let's focus on emitting logs first.

As always, we need to create an exchange first:

```
channel.ExchangeDeclare(exchange: "direct_logs", type: "direct");
```

And we're ready to send a message:

```
var body = Encoding.UTF8.GetBytes(message);
channel.BasicPublish(exchange: "direct_logs",
                     routingKey: severity,
                     basicProperties: null,
                     body: body);
```

To simplify things we will assume that 'severity' can be one of 'info', 'warning', 'error'.

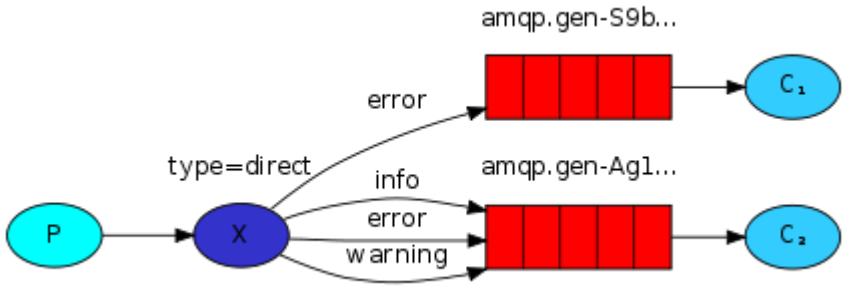
Subscribing

Receiving messages will work just like in the previous tutorial, with one exception - we're going to create a new binding for each severity we're interested in.

```
var queueName = channel.QueueDeclare().QueueName;

foreach(var severity in args)
{
    channel.QueueBind(queue: queueName,
                      exchange: "direct_logs",
                      routingKey: severity);
}
```

Putting it all together



The code for `EmitLogDirect.cs` class:

```
using System;
using System.Linq;
using RabbitMQ.Client;
using System.Text;
```

```
class EmitLogDirect
{
    public static void Main(string[] args)
    {
        var factory = new ConnectionFactory() { HostName = "localhost" };
        using(var connection = factory.CreateConnection())
        using(var channel = connection.CreateModel())
        {
            channel.ExchangeDeclare(exchange: "direct_logs",
                                    type: "direct");

            var severity = (args.Length > 0) ? args[0] : "info";
            var message = (args.Length > 1)
                          ? string.Join(" ", args.Skip( 1 ).ToArray())
                          : "Hello World!";
            var body = Encoding.UTF8.GetBytes(message);
            channel.BasicPublish(exchange: "direct_logs",
                                 routingKey: severity,
                                 basicProperties: null,
                                 body: body);
            Console.WriteLine(" [x] Sent '{0}':'{1}'", severity, message);
        }


        Console.WriteLine(" Press [enter] to exit.");
        Console.ReadLine();
    }
}
```

The code for `ReceiveLogsDirect.cs` :

```
using System;
using RabbitMQ.Client;
using RabbitMQ.Client.Events;
using System.Text;

class ReceiveLogsDirect
{
    public static void Main(string[] args)
    {
        var factory = new ConnectionFactory() { HostName = "localhost" };
        using(var connection = factory.CreateConnection())
        using(var channel = connection.CreateModel())
        {
            channel.ExchangeDeclare(exchange: "direct_logs",
                                    type: "direct");
            var queueName = channel.QueueDeclare().QueueName;

            if(args.Length < 1)
            {
                Console.Error.WriteLine("Usage: {0} [info] [warning] [error]",
                                        Environment.GetCommandLineArgs()[0]);

                Console.WriteLine(" Press [enter] to exit.");
                Console.ReadLine();
                Environment.ExitCode = 1;
                return;
            }

            foreach(var severity in args)
```

```
            {
                channel.QueueBind(queue: queueName,
                                  exchange: "direct_logs",
                                  routingKey: severity);
            }

            Console.WriteLine(" [*] Waiting for messages.");

            var consumer = new EventingBasicConsumer(channel);
            consumer.Received += (model, ea) =>
            {
                var body = ea.Body.ToArray();
                var message = Encoding.UTF8.GetString(body);
                var routingKey = ea.RoutingKey;
                Console.WriteLine(" [x] Received '{0}':'{1}'",
                                  routingKey, message);
            };
            channel.BasicConsume(queue: queueName,
                                 autoAck: true,
                                 consumer: consumer);

            Console.WriteLine(" Press [enter] to exit.");

            Console.ReadLine();
        }
    }
}
```

Create projects as usual (see tutorial one for advice).

If you want to save only 'warning' and 'error' (and not 'info') log messages to a file, just open a console and type:

```
cd ReceiveLogsDirect
dotnet run warning error > logs_from_rabbit.log
```

If you'd like to see all the log messages on your screen, open a new terminal and do:

```
cd ReceiveLogsDirect
dotnet run info warning error
# => [*] Waiting for logs. To exit press CTRL+C
```

And, for example, to emit an `error` log message just type:

```
cd EmitLogDirect
dotnet run error "Run. Run. Or it will explode."
# => [x] Sent 'error':'Run. Run. Or it will explode.'
```

(Full source code for (EmitLogDirect.cs source) and (ReceiveLogsDirect.cs source))

Move on to tutorial 5 to find out how to listen for messages based on a pattern.

Production [Non-]Suitability Disclaimer

Please keep in mind that this and other tutorials are, well, tutorials. They demonstrate one new concept at a time and may intentionally oversimplify some things and leave out others. For example topics such as connection management, error handling, connection recovery, concurrency and metric collection are largely omitted for the sake of brevity. Such simplified code should not be considered production ready.

Please take a look at the rest of the documentation before going live with your app. We particularly recommend the following guides: Publisher Confirms and Consumer Acknowledgements, Production Checklist and Monitoring.

Getting Help and Providing Feedback

If you have questions about the contents of this tutorial or any other topic related to RabbitMQ, don't hesitate to ask them on the RabbitMQ mailing list.

Help Us Improve the Docs <3

If you'd like to contribute an improvement to the site, its source is available on GitHub. Simply fork the repository and submit a pull request. Thank you!

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