PROTOTYPE DEVELOPMENT

Task 1: Chat Application

MARCH 25, 2024

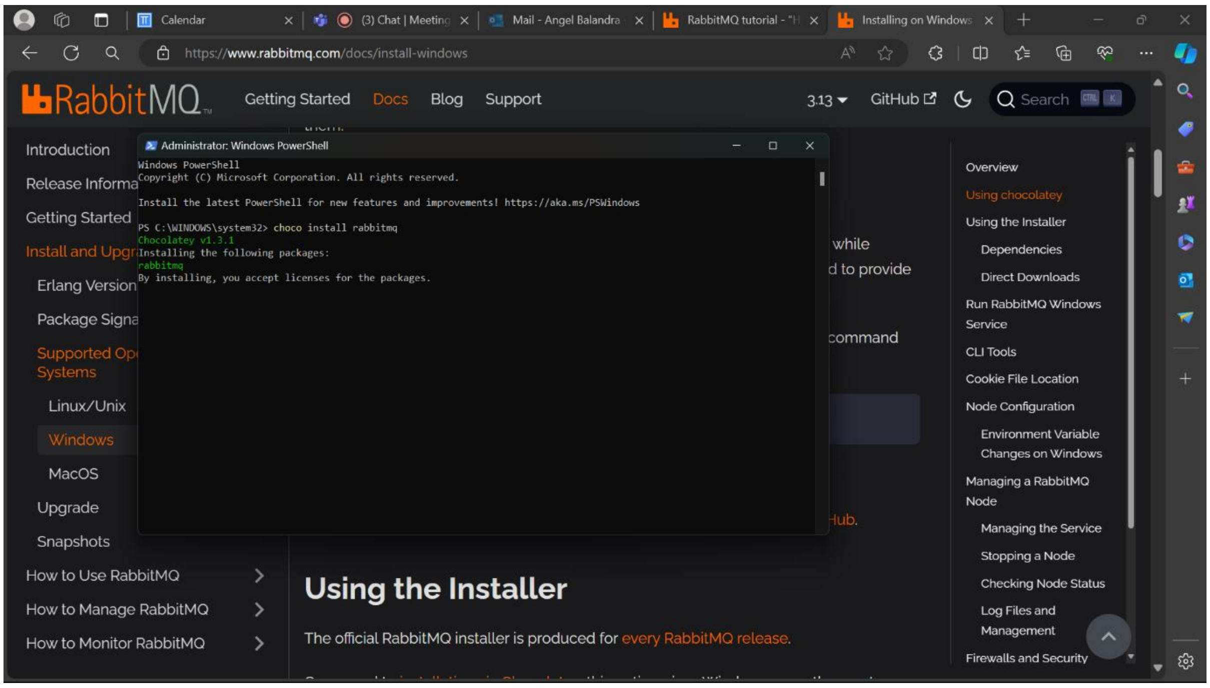
LECTURER: RUBINA SARKI
Angel C Balandra
Group 4

This report will contain a detailed information of the task one of assessment one, which is creating a basic command line chat application. The original draft of the code was originally created on 15th March, the chosen middleware is RabbitMQ.Net, the chosen code editor is Visual Studio, and the chosen programming language is C#. Following the brief instructions is a must when creating the chat application.

Below are the steps I have took to create the chat application.

1. Setting up the middleware

Since I am using Windows and have already installed chocolatey in my operating system before, I had to double check that I have the updated version of the chocolatey and used the command "choco install RabbitMQ".



```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> choco install rabbitmq
Chocolatey v1.3.1
Installing the following packages:
rabbitmq
By installing, you accept licenses for the packages.
```
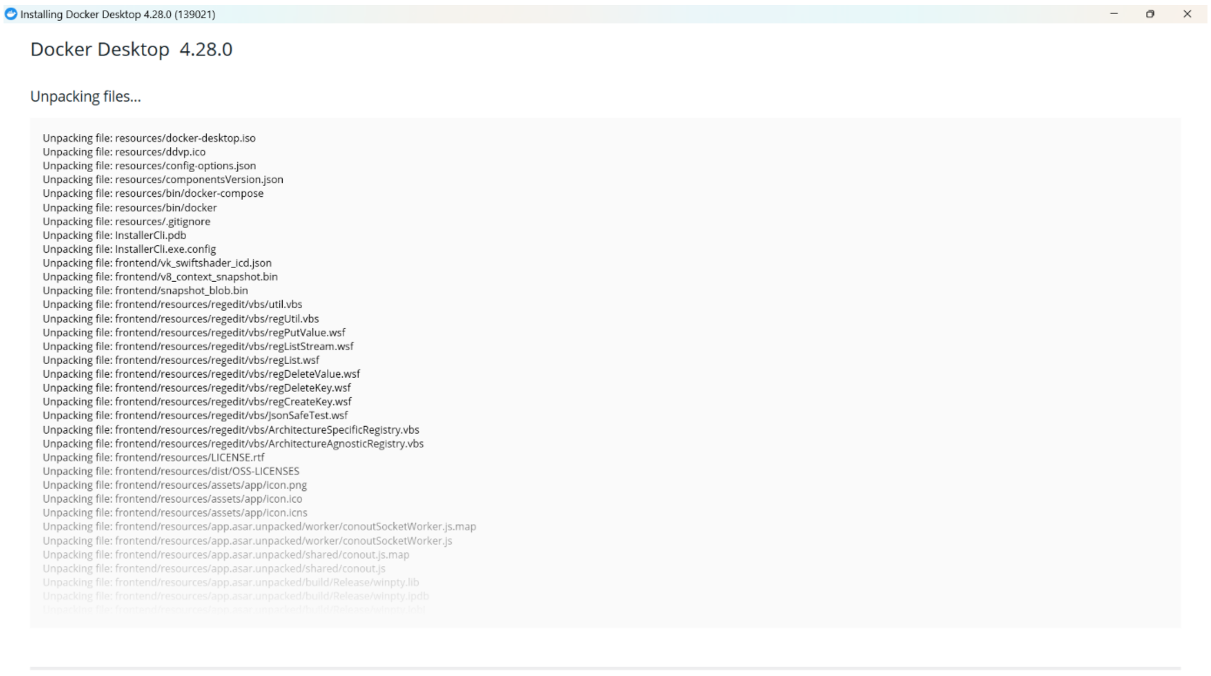
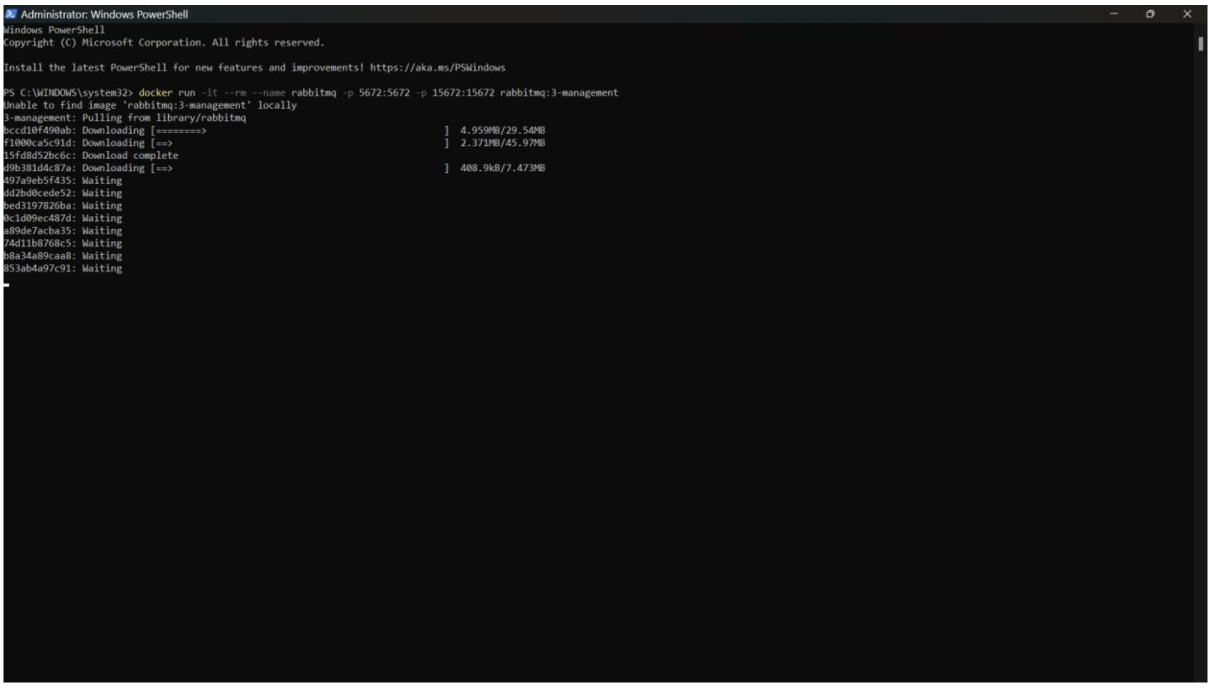

Now that the RabbitMQ has been installed, I also must install Docker to completely set up the middleware for me to achieve the utilization of the message broker.



```
Installing Docker Desktop 4.28.0 (139021)

Docker Desktop  4.28.0

Unpacking files...

Unpacking file: resources/docker-desktop.iso
Unpacking file: resources/ddvp.ico
Unpacking file: resources/config-options.json
Unpacking file: resources/componentsVersion.json
Unpacking file: resources/bin/docker-compose
Unpacking file: resources/bin/docker
Unpacking file: resources/.gitignore
Unpacking file: InstallerCli.pdb
Unpacking file: InstallerCli.exe.config
Unpacking file: frontend/vk_swiftshader_icd.json
Unpacking file: frontend/v8_context_snapshot.bin
Unpacking file: frontend/snapshot_blob.bin
Unpacking file: frontend/resources/regedit/vbs/util.vbs
Unpacking file: frontend/resources/regedit/vbs/regUtil.vbs
Unpacking file: frontend/resources/regedit/vbs/regPutValue.wsf
Unpacking file: frontend/resources/regedit/vbs/regListStream.wsf
Unpacking file: frontend/resources/regedit/vbs/regList.wsf
Unpacking file: frontend/resources/regedit/vbs/regDeleteValue.wsf
Unpacking file: frontend/resources/regedit/vbs/regDeleteKey.wsf
Unpacking file: frontend/resources/regedit/vbs/regCreateKey.wsf
Unpacking file: frontend/resources/regedit/vbs/JsonSafeTest.wsf
Unpacking file: frontend/resources/regedit/vbs/ArchitectureSpecificRegistry.vbs
Unpacking file: frontend/resources/regedit/vbs/ArchitectureAgnosticRegistry.vbs
Unpacking file: frontend/resources/LICENSE.rtf
Unpacking file: frontend/resources/dist/OSS-LICENSES
Unpacking file: frontend/resources/assets/app/icon.png
Unpacking file: frontend/resources/assets/app/icon.ico
Unpacking file: frontend/resources/assets/app/icon.icns
Unpacking file: frontend/resources/app.asar.unpacked/worker/conoutSocketWorker.js.map
Unpacking file: frontend/resources/app.asar.unpacked/worker/conoutSocketWorker.js
Unpacking file: frontend/resources/app.asar.unpacked/shared/conout.js.map
Unpacking file: frontend/resources/app.asar.unpacked/shared/conout.js
Unpacking file: frontend/resources/app.asar.unpacked/build/Release/winpty.lib
Unpacking file: frontend/resources/app.asar.unpacked/build/Release/winpty.ipdb
Unpacking file: frontend/resources/app.asar.unpacked/build/Release/winpty.iobj
```

2. Getting the middleware up and running

For me to achieve this, I have followed the original documentation from the RabbitMQ and along with following additional resources that may help me. After a thorough read through the resources, I came into a realisation that I must use this command to run the middleware so it can be use as a message broker "docker run -it --rm --name rabbitmq -p 5672:5672 -p 15672:15672 rabbitmq:3-management".



```
Administrator: Windows PowerShell
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> docker run -it --rm --name rabbitmq -p 5672:5672 -p 15672:15672 rabbitmq:3-management
Unable to find image 'rabbitmq:3-management' locally
3-management: Pulling from library/rabbitmq
bccd10f490ab: Downloading [========>                                          ]  4.959MB/29.54MB
f1000ca5c91d: Downloading [==>                                                ]  2.371MB/45.97MB
15fd8d52bc6c: Download complete
d9b381d4c87a: Downloading [==>                                                ]  408.9kB/7.473MB
497a9eb5f435: Waiting
dd2bd0cede52: Waiting
bed3197826ba: Waiting
0c1d09ec487d: Waiting
a89de7acba35: Waiting
74d11b8768c5: Waiting
b8a34a89caa8: Waiting
853ab4a97c91: Waiting
```
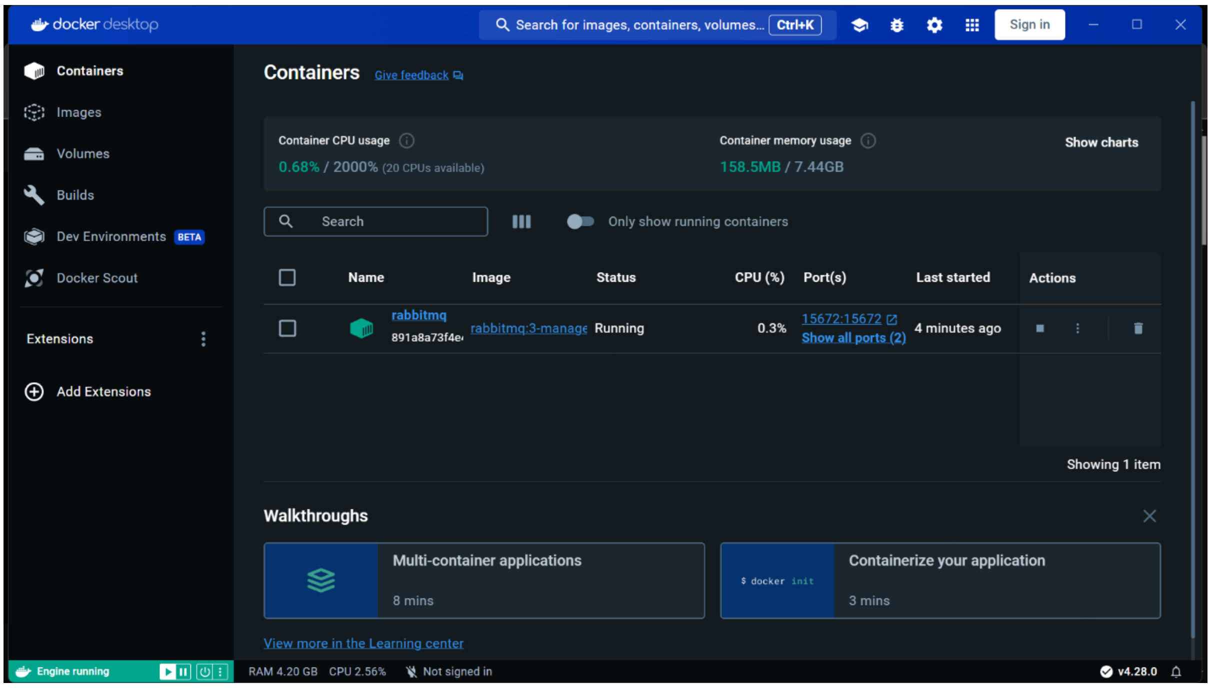

3. Aftermath of running the command

After I have ran the command in my Power Shell, I then opened my docker and clicked on the local host ports. Both local host ports will directly lead me to the same webpage.



Containers

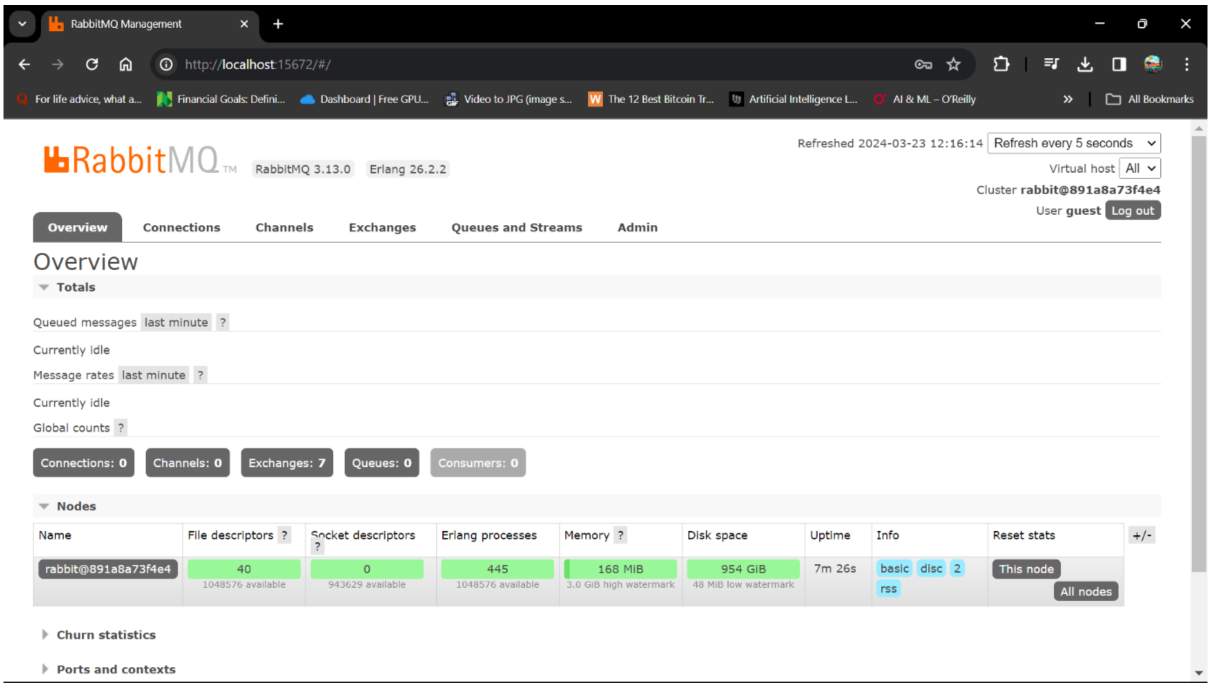
Container CPU usage 0.68% / 2000% (20 CPUs available)

Container memory usage 158.5MB / 7.44GB

Name	Image	Status	CPU (%)	Port(s)	Last started
rabbitmq 891a8a73f4e	rabbitmq:3-manage	Running	0.3%	15672:15672 Show all ports (2)	4 minutes ago

Showing 1 item

RAM 4.20 GB CPU 2.56% Not signed in v4.28.0



RabbitMQ 3.13.0 Erlang 26.2.2

Refreshed 2024-03-23 12:16:14 Refresh every 5 seconds

Virtual host All

Cluster rabbit@891a8a73f4e4

User guest

Overview

Totals

Queued messages last minute ?

Currently idle

Message rates last minute ?

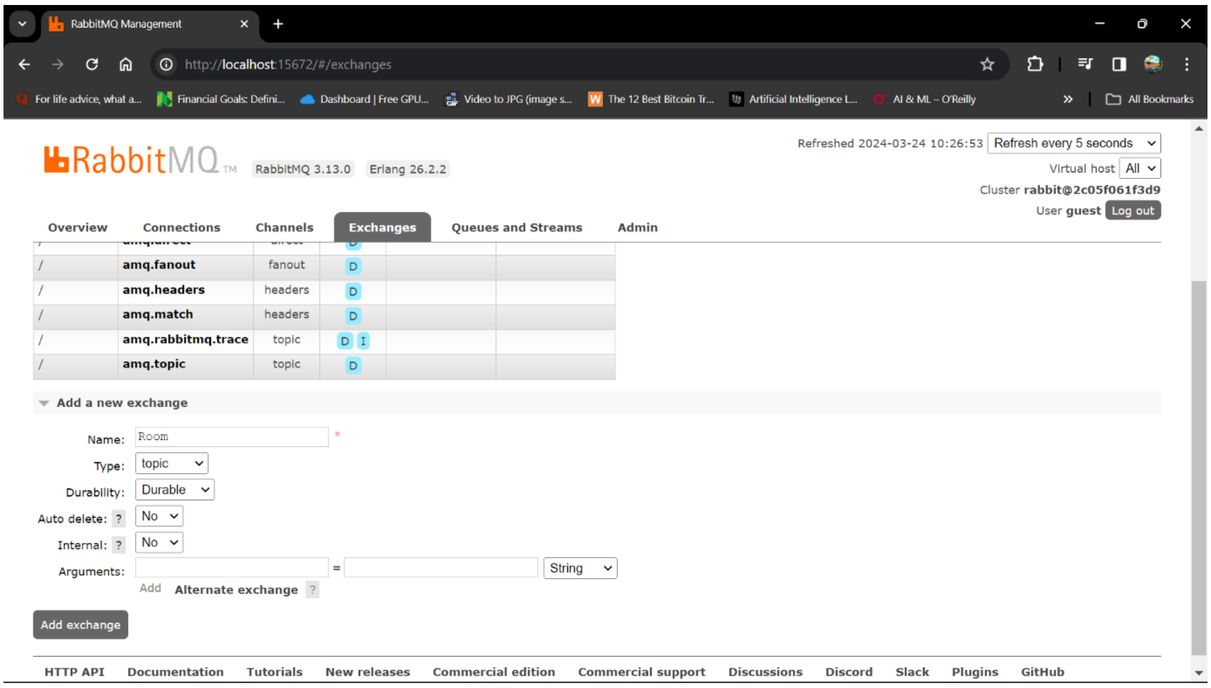
Currently idle

Global counts ?

Connections: 0 Channels: 0 Exchanges: 7 Queues: 0 Consumers: 0

Nodes

Name	File descriptors ?	Socket descriptors ?	Erlang processes	Memory ?	Disk space	Uptime	Info	Reset stats
rabbit@891a8a73f4e4	40 1048576 available	0 943629 available	445 1048576 available	168 MiB 3.0 GiB high watermark	954 GiB 48 MiB low watermark	7m 26s	basic disc 2 rss	This node All nodes


RabbitMQ Management

http://localhost:15672/#/exchanges

RabbitMQ 3.13.0 Erlang 26.2.2

Refreshed 2024-03-24 10:26:53 Refresh every 5 seconds

Virtual host All

Cluster rabbit@2c05f061f3d9

User guest Log out

Overview Connections Channels Exchanges Queues and Streams Admin

/	amq.fanout	fanout	D
/	amq.headers	headers	D
/	amq.match	headers	D
/	amq.rabbitmq.trace	topic	D I
/	amq.topic	topic	D

Add a new exchange

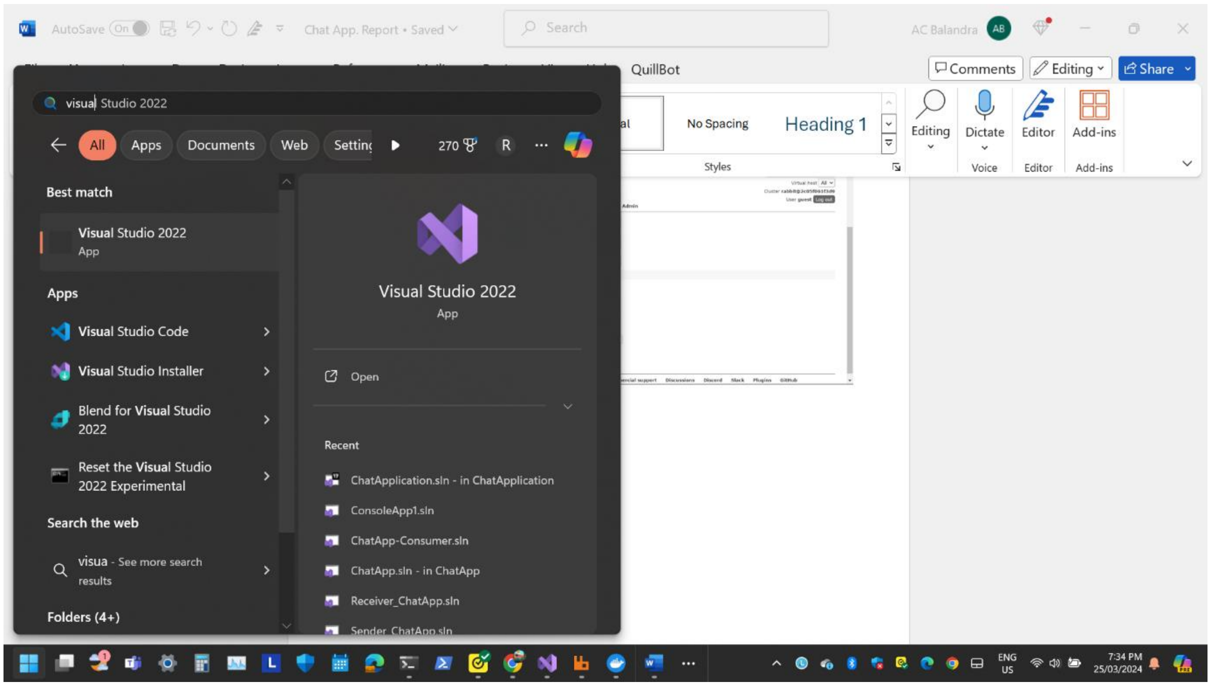
Name:	Room
Type:	topic
Durability:	Durable
Auto delete:	No
Internal:	No
Arguments:	= String

Add Alternate exchange

Add exchange

HTTP API Documentation Tutorials New releases Commercial edition Commercial support Discussions Discord Slack Plugins GitHub

4. Creating the chat application


Chat App. Report • Saved

visual Studio 2022

All Apps Documents Web Settings

Best match

Visual Studio 2022
App

Apps

Visual Studio Code

Visual Studio Installer

Blend for Visual Studio 2022

Reset the Visual Studio 2022 Experimental

Search the web

visua - See more search results

Folders (4+)

Visual Studio 2022
App

Open

Recent

ChatApplication.sln - in ChatApplication

ConsoleApp1.sln

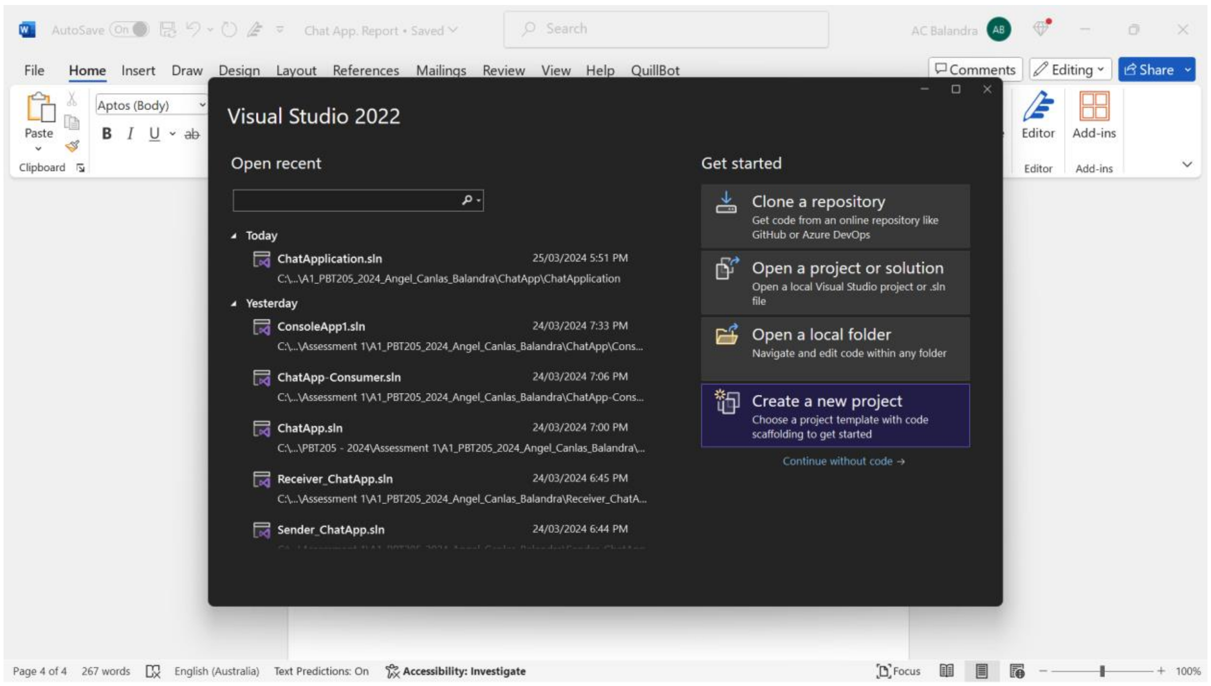
ChatApp-Consumer.sln

ChatApp.sln - in ChatApp

Receiver_ChatApp.sln

Sender_ChatApp.sln

7:34 PM 25/03/2024



Visual Studio 2022

Open recent

Today

ChatApplication.sln 25/03/2024 5:51 PM
C:\...\A1_PBT205_2024_Angel_Canlas_Balandra\ChatApp\ChatApplication

Yesterday

ConsoleApp1.sln 24/03/2024 7:33 PM
C:\...\Assessment 1\A1_PBT205_2024_Angel_Canlas_Balandra\ChatApp\Cons...

ChatApp-Consumer.sln 24/03/2024 7:06 PM
C:\...\Assessment 1\A1_PBT205_2024_Angel_Canlas_Balandra\ChatApp-Cons...

ChatApp.sln 24/03/2024 7:00 PM
C:\...\PBT205 - 2024\Assessment 1\A1_PBT205_2024_Angel_Canlas_Balandra\...

Receiver_ChatApp.sln 24/03/2024 6:45 PM
C:\...\Assessment 1\A1_PBT205_2024_Angel_Canlas_Balandra\Receiver_ChatA...

Sender_ChatApp.sln 24/03/2024 6:44 PM

Get started

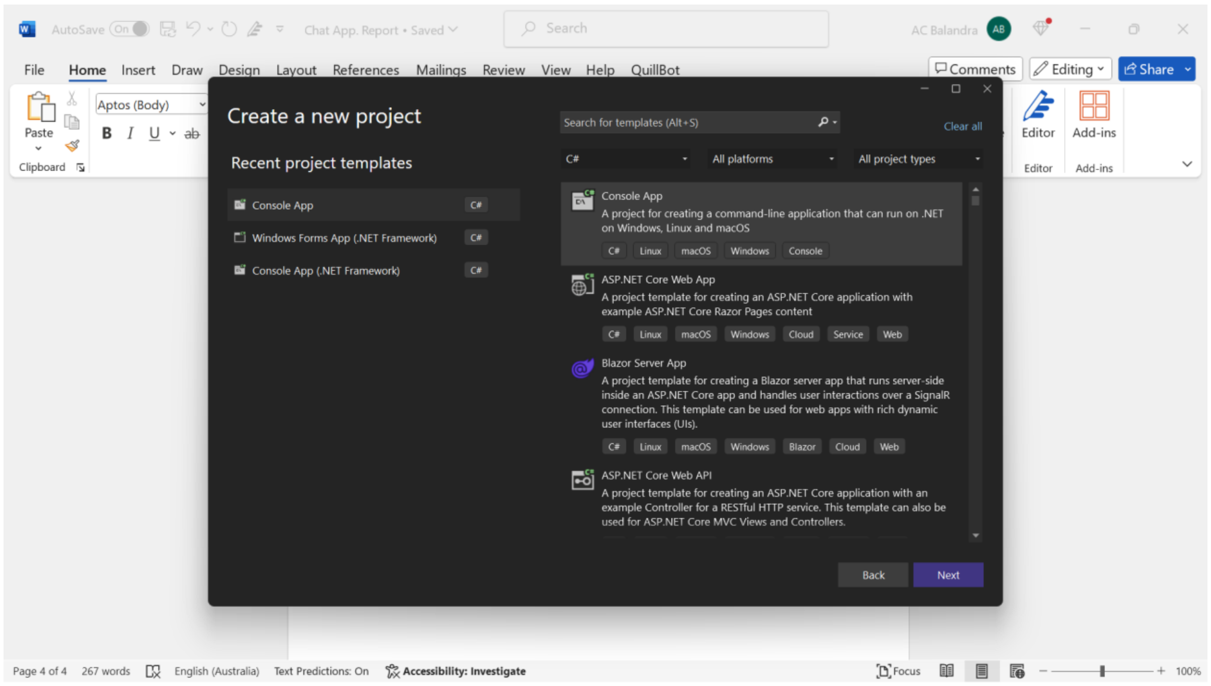
Clone a repository
Get code from an online repository like GitHub or Azure DevOps

Open a project or solution
Open a local Visual Studio project or .sln file

Open a local folder
Navigate and edit code within any folder

Create a new project
Choose a project template with code scaffolding to get started

Continue without code →



Create a new project

Recent project templates

Console App C#
Windows Forms App (.NET Framework) C#
Console App (.NET Framework) C#

Search for templates (Alt+S)
Clear all
C#
All platforms
All project types

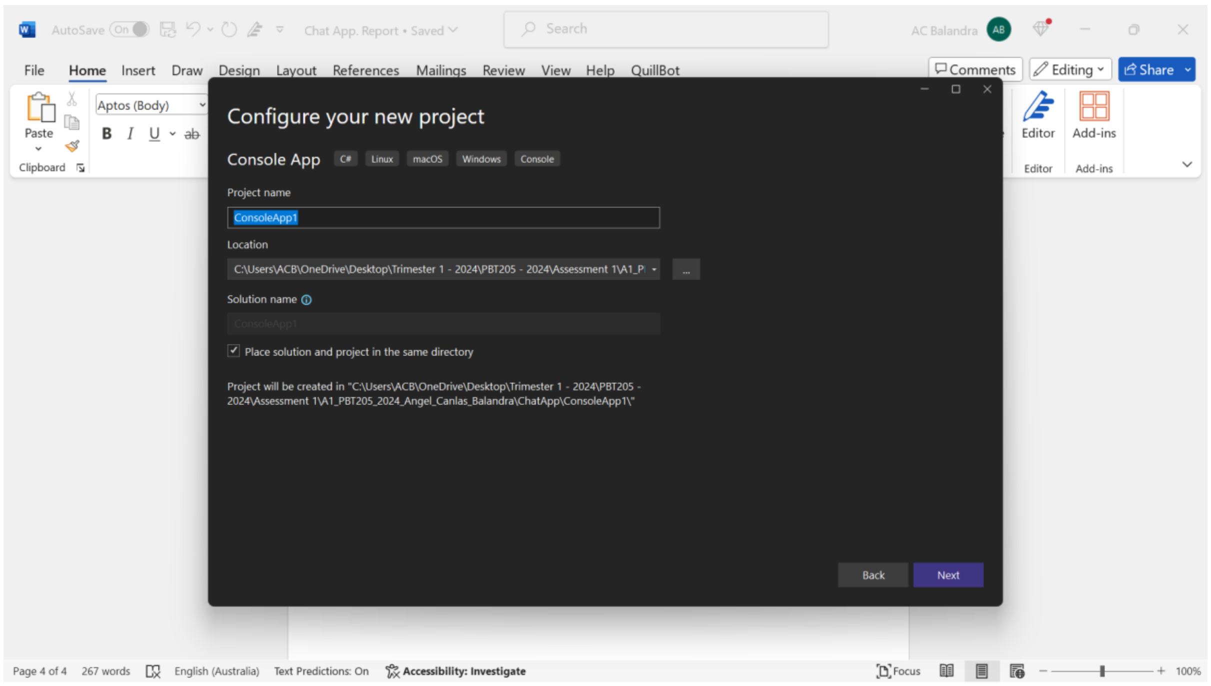
Console App
A project for creating a command-line application that can run on .NET on Windows, Linux and macOS
C# Linux macOS Windows Console

ASP.NET Core Web App
A project template for creating an ASP.NET Core application with example ASP.NET Core Razor Pages content
C# Linux macOS Windows Cloud Service Web

Blazor Server App
A project template for creating a Blazor server app that runs server-side inside an ASP.NET Core app and handles user interactions over a SignalR connection. This template can be used for web apps with rich dynamic user interfaces (UIs).
C# Linux macOS Windows Blazor Cloud Web

ASP.NET Core Web API
A project template for creating an ASP.NET Core application with an example Controller for a RESTful HTTP service. This template can also be used for ASP.NET Core MVC Views and Controllers.

Back
Next


Configure your new project

Console App

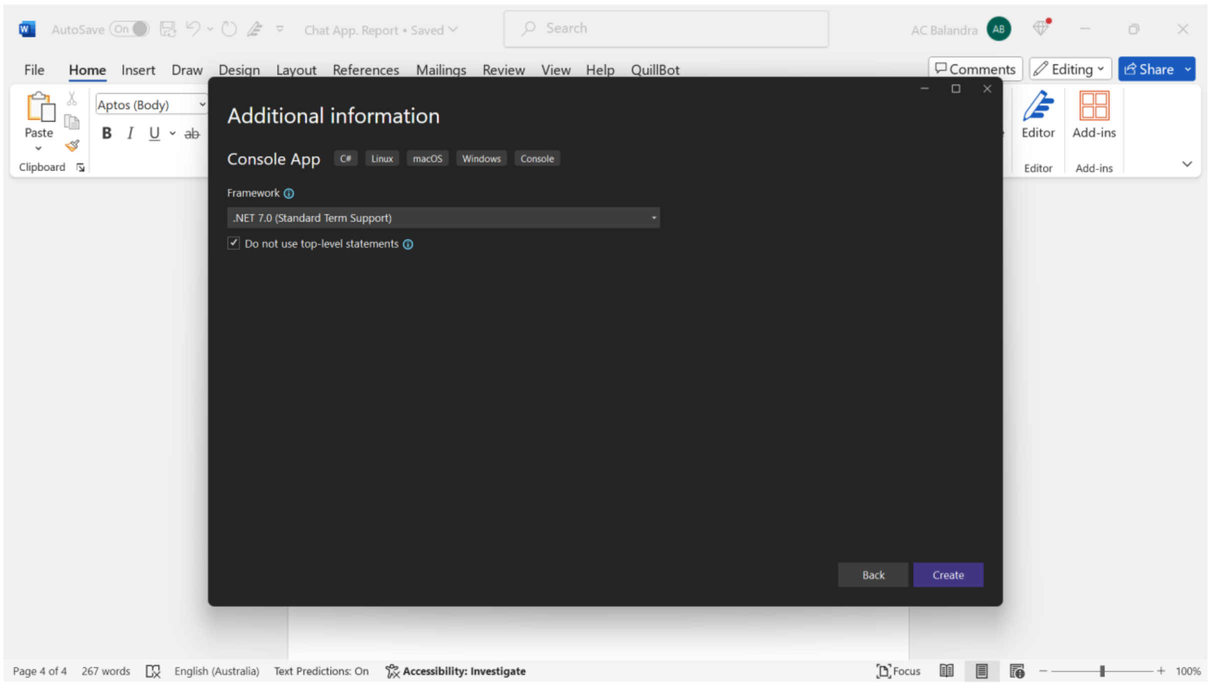
Project name: ConsoleApp1

Location: C:\Users\ACB\OneDrive\Desktop\Trimester 1 - 2024\PBT205 - 2024\Assessment 1\A1_P

Solution name: ConsoleApp1

[✓] Place solution and project in the same directory

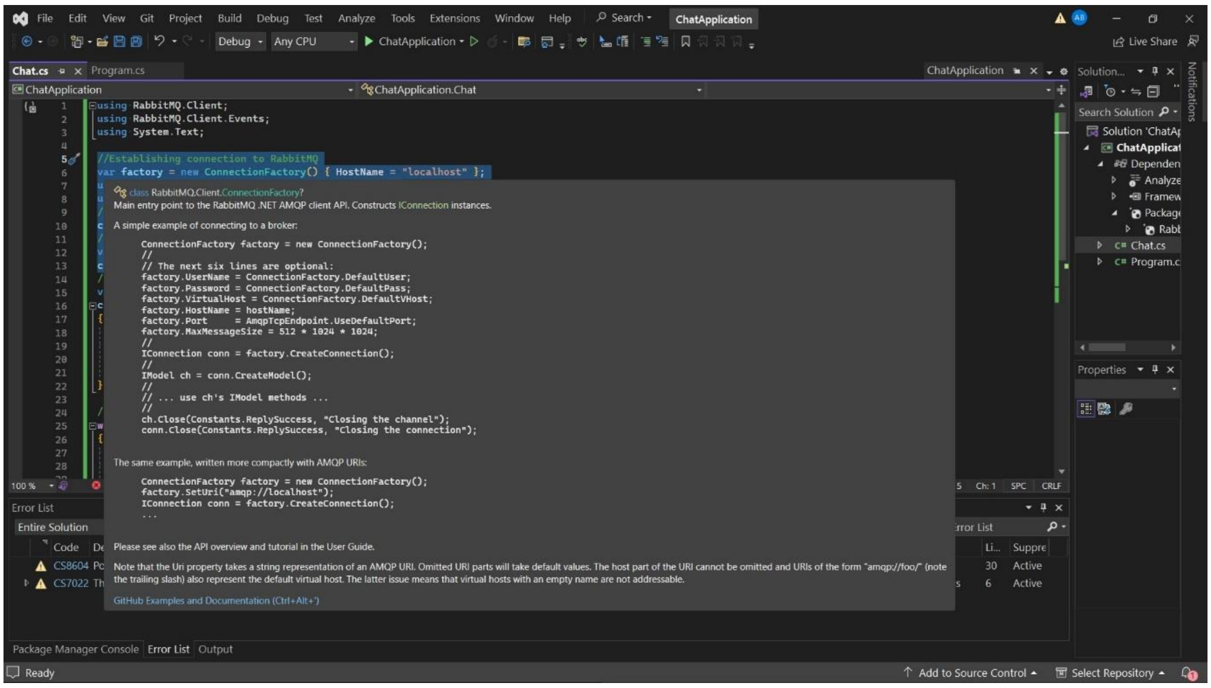
Project will be created in "C:\Users\ACB\OneDrive\Desktop\Trimester 1 - 2024\PBT205 - 2024\Assessment 1\A1_PBT205_2024_Angel_Canlas_Balandra\ChatApp\ConsoleApp1\"


Additional information

Console App

Framework: .NET 7.0 (Standard Term Support)

[✓] Do not use top-level statements


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

//Establishing connection to RabbitMQ
var factory = new ConnectionFactory() { HostName = "localhost" };
```

class RabbitMQ.Client.ConnectionFactory?
Main entry point to the RabbitMQ .NET AMQP client API. Constructs IConnection instances.

A simple example of connecting to a broker:

```csharp
ConnectionFactory factory = new ConnectionFactory();
//
// The next six lines are optional:
factory.UserName = ConnectionFactory.DefaultUser;
factory.Password = ConnectionFactory.DefaultPass;
factory.VirtualHost = ConnectionFactory.DefaultVHost;
factory.HostName = hostName;
factory.Port     = AmqpTcpEndpoint.UseDefaultPort;
factory.MaxMessageSize = 512 * 1024 * 1024;
//
IConnection conn = factory.CreateConnection();
//
IModel ch = conn.CreateModel();
//
// ... use ch's IModel methods ...
//
ch.Close(Constants.ReplySuccess, "Closing the channel");
conn.Close(Constants.ReplySuccess, "Closing the connection");
```

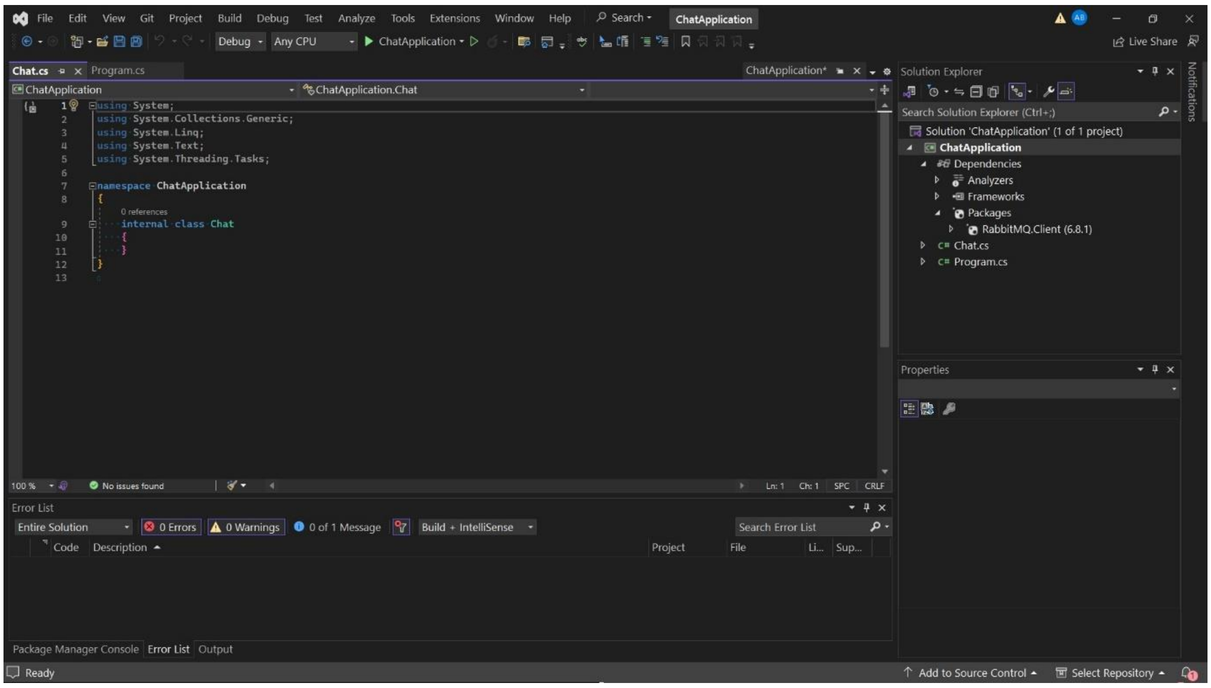
The same example, written more compactly with AMQP URIs:

```csharp
ConnectionFactory factory = new ConnectionFactory();
factory.SetUri("amqp://localhost");
IConnection conn = factory.CreateConnection();
...
```

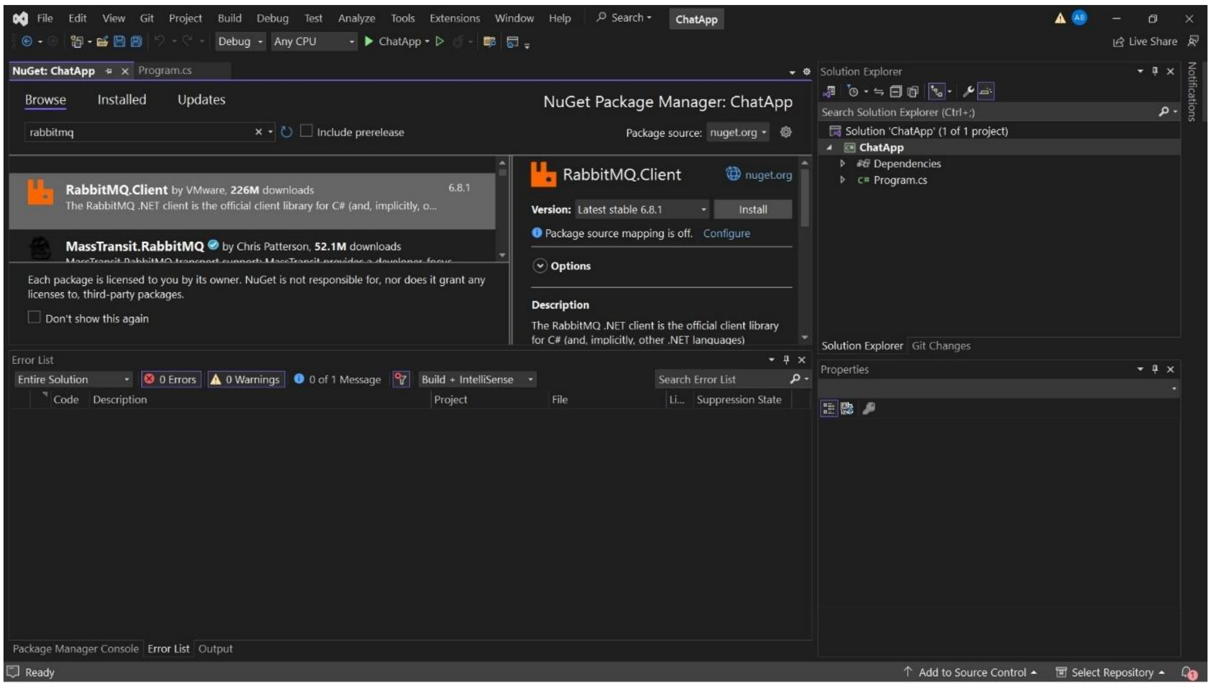
Please see also the API overview and tutorial in the User Guide.

Note that the Uri property takes a string representation of an AMQP URI. Omitted URI parts will take default values. The host part of the URI cannot be omitted and URIs of the form "amqp://foo/" (note the trailing slash) also represent the default virtual host. The latter issue means that virtual hosts with an empty name are not addressable.

GitHub Examples and Documentation (Ctrl+Alt+')


```csharp
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace ChatApplication
{
    internal class Chat
    {
    }
}
```

5. Installing RabbitMQ. Client package library


NuGet Package Manager: ChatApp

Browse · Installed · Updates

rabbitmq — Include prerelease — Package source: nuget.org

RabbitMQ.Client by VMware, **226M** downloads 6.8.1
The RabbitMQ .NET client is the official client library for C# (and, implicitly, o...

MassTransit.RabbitMQ by Chris Patterson, **52.1M** downloads

Each package is licensed to you by its owner. NuGet is not responsible for, nor does it grant any licenses to, third-party packages.

Don't show this again

RabbitMQ.Client — nuget.org

Version: Latest stable 6.8.1 — Install

Package source mapping is off. Configure

Options

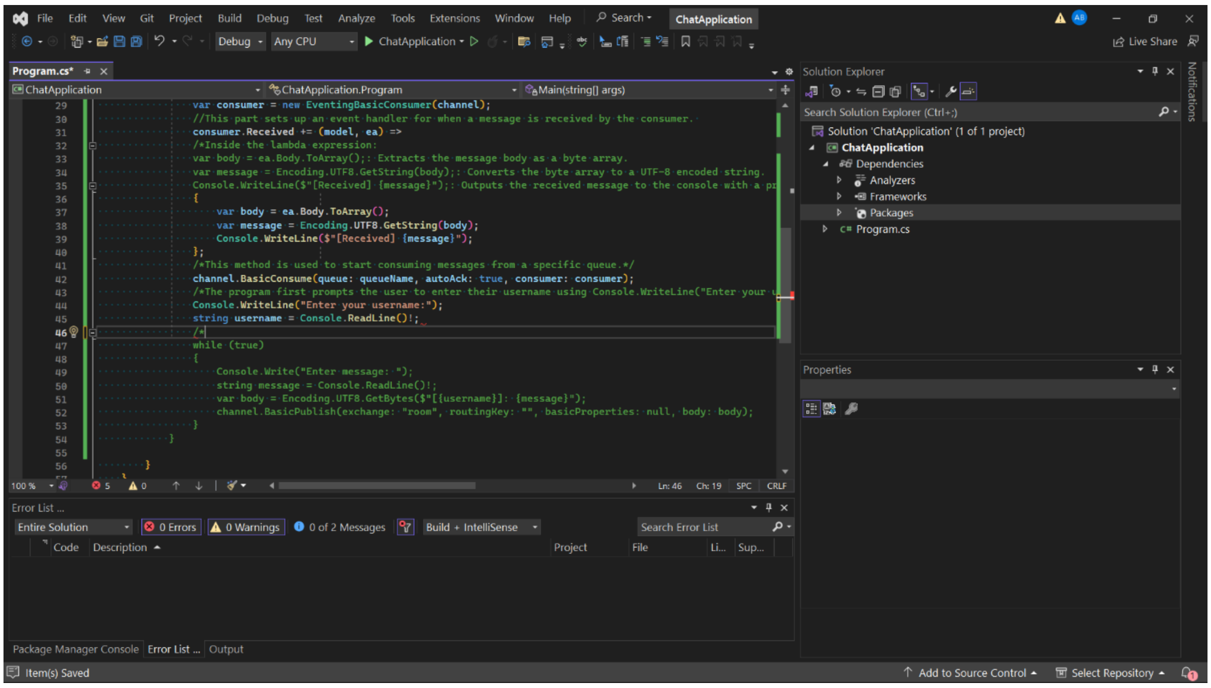
Description
The RabbitMQ .NET client is the official client library for C# (and, implicitly, other .NET languages)

Error List: Entire Solution — 0 Errors — 0 Warnings — 0 of 1 Message — Build + IntelliSense

Solution Explorer: Solution 'ChatApp' (1 of 1 project) — ChatApp — Dependencies — Program.cs

Ready

6. Touching up the chat application code

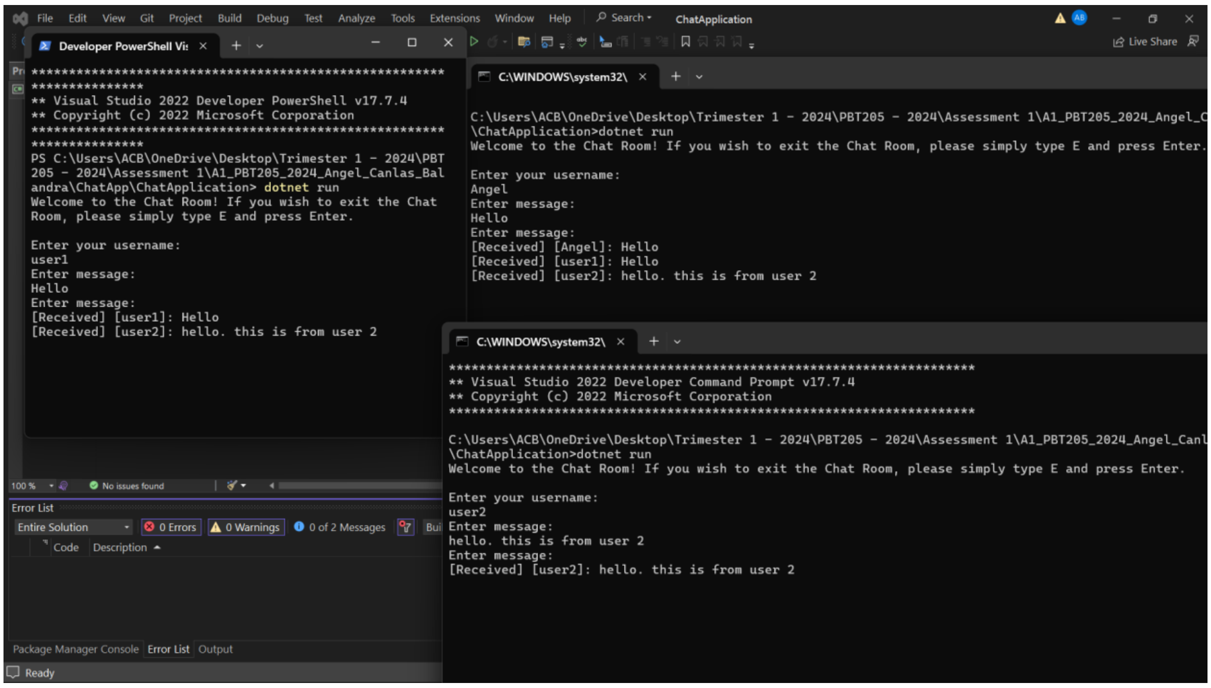

```
var consumer = new EventingBasicConsumer(channel);
//This part sets up an event handler for when a message is received by the consumer.
consumer.Received += (model, ea) =>
/*Inside the lambda expression:
var body = ea.Body.ToArray();: Extracts the message body as a byte array.
var message = Encoding.UTF8.GetString(body);: Converts the byte array to a UTF-8 encoded string.
Console.WriteLine($"[Received] {message}");: Outputs the received message to the console with a pr
{
    var body = ea.Body.ToArray();
    var message = Encoding.UTF8.GetString(body);
    Console.WriteLine($"[Received] {message}");
};
/*This method is used to start consuming messages from a specific queue.*/
channel.BasicConsume(queue: queueName, autoAck: true, consumer: consumer);
/*The program first prompts the user to enter their username using Console.WriteLine("Enter your u
Console.WriteLine("Enter your username:");
string username = Console.ReadLine()!;
/*
while (true)
{
    Console.Write("Enter message: ");
    string message = Console.ReadLine()!;
    var body = Encoding.UTF8.GetBytes($"[{username}]: {message}");
    channel.BasicPublish(exchange: "room", routingKey: "", basicProperties: null, body: body);
}
        }

    }
```

Error List: Entire Solution — 0 Errors — 0 Warnings — 0 of 2 Messages — Build + IntelliSense

Solution Explorer: Solution 'ChatApplication' (1 of 1 project) — ChatApplication — Dependencies — Analyzers — Frameworks — Packages — Program.cs

Item(s) Saved

7. Testing the build and the chat application code



```
****************************************************************
***************
** Visual Studio 2022 Developer PowerShell v17.7.4
** Copyright (c) 2022 Microsoft Corporation
****************************************************************
***************
PS C:\Users\ACB\OneDrive\Desktop\Trimester 1 - 2024\PBT
205 - 2024\Assessment 1\A1_PBT205_2024_Angel_Canlas_Bal
andra\ChatApp\ChatApplication> dotnet run
Welcome to the Chat Room! If you wish to exit the Chat
Room, please simply type E and press Enter.

Enter your username:
user1
Enter message:
Hello
Enter message:
[Received] [user1]: Hello
[Received] [user2]: hello. this is from user 2
```

```
C:\Users\ACB\OneDrive\Desktop\Trimester 1 - 2024\PBT205 - 2024\Assessment 1\A1_PBT205_2024_Angel_C
\ChatApplication>dotnet run
Welcome to the Chat Room! If you wish to exit the Chat Room, please simply type E and press Enter.

Enter your username:
Angel
Enter message:
Hello
Enter message:
[Received] [Angel]: Hello
[Received] [user1]: Hello
[Received] [user2]: hello. this is from user 2
```

```
**********************************************************************
** Visual Studio 2022 Developer Command Prompt v17.7.4
** Copyright (c) 2022 Microsoft Corporation
**********************************************************************

C:\Users\ACB\OneDrive\Desktop\Trimester 1 - 2024\PBT205 - 2024\Assessment 1\A1_PBT205_2024_Angel_Canl
\ChatApplication>dotnet run
Welcome to the Chat Room! If you wish to exit the Chat Room, please simply type E and press Enter.

Enter your username:
user2
Enter message:
hello. this is from user 2
Enter message:
[Received] [user2]: hello. this is from user 2
```

Conclusion

RabbitMQ is one of the most important aspects of creating a versatile communication application that allows developers to create instances that will suit their application needs. In this report, I have included how I have created a simple command line based chat application with the use of RabbitMQ and Docker.

References

C# Read (Consume) Messages from RabbitMQ Queue - Tutlane. (n.d.). Www.tutlane.com. Retrieved March 26, 2024, from https://www.tutlane.com/tutorial/rabbitmq/csharp-read-messages-from-rabbitmq-queue

Dyrrachitis, G. (2020, September 2). *.NET Core and RabbitMQ*. Medium. https://medium.com/@giorgos.dyrrahitis/net-core-and-rabbitmq-5f3c76f39de6

RabbitMQ tutorial - Topics | RabbitMQ. (n.d.). Www.rabbitmq.com. Retrieved March 26, 2024, from https://www.rabbitmq.com/tutorials/tutorial-five-dotnet