



.NET 2.1

Getting started with .NET on RHEL 7

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Abstract

Installing and running .NET Core 2.1 for developing .NET applications on Red Hat Enterprise Linux 7

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PROVIDING FEEDBACK ON RED HAT DOCUMENTATION

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CHAPTER 1. INTRODUCING .NET CORE

.NET Core is a general-purpose development platform featuring automatic memory management and modern programming languages. Using .NET, you can build high-quality applications efficiently. .NET Core is available on Red Hat Enterprise Linux (RHEL) and OpenShift Container Platform through certified containers.

.NET Core offers the following features:

- The ability to follow a microservices-based approach, where some components are built with .NET and others with Java, but all can run on a common, supported platform on RHEL and OpenShift Container Platform.
- The capacity to more easily develop new .NET Core workloads on Microsoft Windows. You can deploy and run your applications on either RHEL or Windows Server.
- A heterogeneous data center, where the underlying infrastructure is capable of running .NET applications without having to rely solely on Windows Server.

.NET Core 2.1 is supported on RHEL 7, RHEL 8, and OpenShift Container Platform versions 3.3 and later.

CHAPTER 2. USING .NET CORE 2.1 ON RED HAT ENTERPRISE LINUX 7

Learn how to install .NET Core 2.1 as well as create and publish .NET Core applications.

2.1. INSTALLING .NET CORE 2.1

To install .NET Core on RHEL 7 you need to first enable the .NET Core software repositories and install the **scl** tool.

Prerequisites

- Installed and registered RHEL 7 with attached subscriptions.
For more information, see [Registering the System and Attaching Subscriptions](#).

Procedure

1. Enable the .NET Core software repositories:

```
$ sudo subscription-manager repos --enable=rhel-7-variant-dotnet-rpms
```

Replace *variant* with **server**, **workstation** or **hpc-node** depending on what RHEL system you are running (RHEL 7 Server, RHEL 7 Workstation, or HPC Compute Node, respectively).

2. Verify the list of subscriptions attached to your system:

```
$ sudo subscription-manager list --consumed
```

3. Install the **scl** tool:

```
$ sudo yum install scl-utils -y
```

4. Install .NET Core 2.1 and all of its dependencies:

```
$ sudo yum install rh-dotnet21 -y
```

5. Enable the **rh-dotnet21** Software Collection environment:

```
$ scl enable rh-dotnet21 bash
```

You can now run **dotnet** commands in this **bash** shell session.

If you log out, use another shell, or open up a new terminal, the **dotnet** command is no longer enabled.



WARNING

Red Hat does not recommend permanently enabling **rh-dotnet21** because it may affect other programs. For example, **rh-dotnet21** includes a version of **libcurl** that differs from the base RHEL version. This may lead to issues in programs that do not expect a different version of **libcurl**. If you want to enable **rh-dotnet** permanently, add **source scl_source enable rh-dotnet21** to your **~/.bashrc** file.

Verification steps

- Verify the installation:

```
$ dotnet --info
```

The output returns the relevant information about the .NET Core installation and the environment.

2.2. CREATING AN APPLICATION USING .NET CORE 2.1

Learn how to create a C# **hello-world** application.

Procedure

1. Create a new Console application in a directory called **my-app**:

```
$ dotnet new console --output my-app
```

The output returns:

```
The template "Console Application" was created successfully.
```

```
Processing post-creation actions...
```

```
Running 'dotnet restore' on my-app/my-app.csproj...
```

```
Restoring packages for /home/username/my-app/my-app.csproj...
```

```
Generating MSBuild file /home/username/my-app/obj/my-app.csproj.nuget.g.props.
```

```
Generating MSBuild file /home/username/my-app/obj/my-app.csproj.nuget.g.targets.
```

```
Restore completed in 224.85 ms for /home/username/my-app/my-app.csproj.
```

```
Restore succeeded.
```

A simple **Hello World** console application is created from a template. The application is stored in the specified **my-app** directory.

The directory includes the following files:

```
$ tree my-app
my-app
|__ my-app.csproj
|__ obj
```



Verification steps

- Run the project:

```
$ dotnet run --project my-app
```

The output returns:

```
Hello World!
```

2.3. PUBLISHING APPLICATIONS USING .NET CORE 2.1

.NET Core 2.1 applications can be published to use a shared system-wide version of .NET Core or to include .NET Core.

The following methods exist for publishing .NET Core 2.1 applications:

- Framework-dependent deployment (FDD) – The application uses a shared system-wide version of .NET. When publishing an application for RHEL, Red Hat recommends using FDD, because it ensures that the application is using an up-to-date version of .NET Core, built by Red Hat, that includes a specific set of native dependencies. These native libraries are part of the **rh-dotnet21** Software Collection.
- Self-contained deployment (SCD) – The application includes .NET. This method uses a runtime built by Microsoft. Running applications outside the **rh-dotnet21** Software Collection may cause issues due to the unavailability of native libraries.

Prerequisites

- Existing .NET Core application.
For more information on how to create a .NET Core application, see [Section 2.2, “Creating an application using .NET Core 2.1”](#).

2.3.1. Publishing .NET Core applications

Procedure

1. Publish the framework-dependent application:

```
$ dotnet publish my-app -f netcoreapp2.1 -c Release
```

Replace *my-app* with the name of the application you want to publish.

2. **Optional:** If the application is for RHEL only, trim out the dependencies needed for other platforms:

```
$ dotnet restore my-app -r rhel.7-x64
$ dotnet publish my-app -f netcoreapp2.1 -c Release -r rhel.7-x64 --self-contained false
```

3. Enable the Software Collection and pass the application assembly name to the dotnet to run the application on a RHEL system:

```
$ scl enable rh-dotnet21 -- dotnet <app>.dll
```

4. You can add the **scl enable rh-dotnet21 — dotnet <app>.dll** command to a script that is published with the application.

Add the following script to your project and update the **ASSEMBLY** variable:

```
#!/bin/bash

APP=<app>
SCL=rh-dotnet21
DIR="$(dirname "$(readlink -f "$0")")"

scl enable $SCL -- "$DIR/$APP" "$@"
```

5. To include the script when publishing, add this **ItemGroup** to the **csproj** file:

```
<ItemGroup>
  <None Update="<scriptname>" Condition="'$(RuntimeIdentifier)' == 'rhel.7-x64' and
  '$(SelfContained)' == 'false'" CopyToPublishDirectory="PreserveNewest" />
</ItemGroup>
```

2.3.2. Publishing ASP.NET applications

When using the Microsoft SDK, ASP.NET Core 2.1 web applications are published with a dependency on the ASP.NET Core shared framework. This is a set of packages that are expected to be available on the runtime system.

When publishing on RHEL, these packages are included with the application. To include the packages using the Microsoft SDK, the **MicrosoftNETPlatformLibrary** property must be set to **Microsoft.NETCore.App** in the project file as shown below.

```
<Project Sdk="Microsoft.NET.Sdk.Web">
  <PropertyGroup>
    <TargetFramework>netcoreapp2.1</TargetFramework>
    <MicrosoftNETPlatformLibrary>Microsoft.NETCore.App</MicrosoftNETPlatformLibrary>
  </PropertyGroup>
  <ItemGroup>
    <PackageReference Include="Microsoft.AspNetCore.App" Version="2.1" />
  </ItemGroup>
</Project>
```

This property can be set when publishing the application.

```
$ dotnet publish -f netcoreapp2.1 -c Release -r rhel.7-x64 --self-contained false
/p:Microsoft.NETPlatformLibrary=Microsoft.NETCore.App
```

2.4. RUNNING .NET CORE 2.1 APPLICATIONS IN CONTAINERS

Use the **dotnet/dotnet-21-runtime-rhel7** image to run a precompiled application inside a Linux container.

Prerequisites

- Preconfigured containers.
The following example uses podman.

Procedure

1. Create a new MVC project in a directory called **mvc_runtime_example**:

```
$ dotnet new mvc --output mvc_runtime_example --no-restore
```

2. Restore and publish the project:

```
$ dotnet restore mvc_runtime_example -r rhel.7-x64
$ dotnet publish mvc_runtime_example -f netcoreapp2.1 -c Release -r rhel.7-x64 --self-
contained false /p:Microsoft.NETPlatformLibrary=Microsoft.NETCore.App
```

3. Create the **Dockerfile**:

```
$ cat > Dockerfile <<EOF
FROM registry.redhat.io/dotnet/dotnet-21-runtime-rhel7

ADD bin/Release/netcoreapp2.1/publish/ .

CMD ["dotnet", "mvc_runtime_example.dll"]
EOF
```

4. Build your image:

```
$ podman build -t dotnet-21-runtime-example .
```



NOTE

If you get an error containing the message **unable to retrieve auth token: invalid username/password**, you need to provide credentials for the **registry.redhat.io** server. Use the command **podman login registry.redhat.io** to log in. Your credentials are typically the same as those used for the Red Hat Customer Portal.

5. Run your image:

```
$ podman run -d -p8080:8080 dotnet-21-runtime-example
```

Verification steps

- View the application running in the container:

```
$ xdg-open http://127.0.0.1:8080
```

CHAPTER 3. USING .NET CORE 2.1 ON OPENSIFT CONTAINER PLATFORM

You can install .NET Core image streams on Linux, Mac, or Windows operating system.

3.1. INSTALLING .NET CORE 2.1 IMAGE STREAMS

.NET Core image streams definition can be defined globally in the **openshift** namespace or locally in your specific project.

Procedure

1. If you are a system administrator or otherwise have sufficient permissions, change to the **openshift** project. Using the **openshift** project allows you to globally update the image stream definitions.

```
$ oc project openshift
```

If you do not have permissions to use the **openshift** project, you can still update your project definitions starting with Step 2.

2. List all available .NET Core image versions:

```
$ oc describe is dotnet -n openshift
$ oc describe is dotnet
```

The output shows installed images or the message **Error from server (NotFound)** if no images are installed.

3. To pull the images, OpenShift needs credentials for authenticating with the **registry.redhat.io server**. These credentials are stored in a secret.



NOTE

For OpenShift 3.11 and later, a secret is preconfigured for the **openshift** namespace.

Enter the following command to list secrets. The first column shows the secret name.

```
$ oc get secret | grep kubernetes.io/dockerc
```

To check the contents of a secret, you can decode the **.dockercfg** or **.dockerconfigjson** data from Base64 format. This allows you to see if you already have credentials for the **registry.redhat.io server**. Enter the following command to show the **.dockercfg** section in a secret.

```
$ oc get secret <secret-name> -o yaml | grep .dockercfg
.dockercfg:
eyJyZWdpc3RyeS5yZWRoYXQuaW8iOnsidXNlcm5hbWUiOiIqKioqKioqKilslbBhc3N3b3JkljoiKi
oqKioqKioiLCJlbWFpbGl6InVudXNlZCIsImF1dGgiOiJLaW9xS2lvcUtpbzZLaW9xS2lvcUtpbz0ifX
0=
```

Copy and paste the output in the following command to convert it from Base64 format. The example below shows the credentials for the **registry.redhat.io** server.

```
$ echo
eyJyZWdpd3RyeS5yZWRoYXQuaW8iOmsidXNlcm5hbWUiOiIqKioqKioqKilsInBhc3N3b3JkIjoiKi
oqKioqKioiLCJlbWFpbGl6LnVudXNlZCIsImF1dGgiOiJLaW9xS2lvcUtpbzZLaW9xS2lvcUtpbz0ifX
0= | base64 -d
{"registry.redhat.io":
{"username":"","password":"","email":"unused","auth":"KioqKioqKio6KioqKioqKio="}}
```

If there is no secret listed with credentials for the **registry.redhat.io** server you need to add it.

4. **Red Hat account credentials are used for registry.redhat.io access.** If you are a customer with entitlements to Red Hat products, you already have account credentials to use. These are typically the same credentials used to log in to the Red Hat Customer Portal. To verify your Red Hat credentials, enter the following command and attempt to log in.

```
$ podman login registry.redhat.io
```

If you cannot log in, you first need to get an account with Red Hat. See [Red Hat Container Registry Authentication](#) for additional information. If you can log in, enter the following commands to create the secret.

```
$ oc create secret docker-registry redhat-registry \
--docker-server=registry.redhat.io \
--docker-username=<user-name> \
--docker-password=<password> \
--docker-email=unused
$ oc secrets link default redhat-registry --for=pull
$ oc secrets link builder redhat-registry
```

5. **Import new image streams:**

```
$ oc create -f https://raw.githubusercontent.com/redhat-developer/s2i-dotnetcore/master/dotnet_imagestreams.json
```

If image streams were already installed, use the **replace** command to update the image stream definitions.

```
$ oc replace -f https://raw.githubusercontent.com/redhat-developer/s2i-dotnetcore/master/dotnet_imagestreams.json
```

3.2. DEPLOYING APPLICATIONS FROM SOURCE USING oc

You can use OpenShift Client (**oc**) for application deployment.

The following example demonstrates how to deploy the *example-app* application using **oc**, which is in the **app** folder on the **dotnetcore-2.1** branch of the **redhat-developer/s2i-dotnetcore-ex** GitHub repository:

Procedure

1. Create a new OpenShift project:

```
$ oc new-project sample-project
```

2. Add the ASP.NET Core application:

```
$ oc new-app --name=example-app 'dotnet:2.1~https://github.com/redhat-developer/s2i-dotnetcore-ex#dotnetcore-2.1' --build-env DOTNET_STARTUP_PROJECT=app
```

3. Track the progress of the build:

```
$ oc logs -f bc/example-app
```

4. View the deployed application once the build is finished:

```
$ oc logs -f dc/example-app
```

The application is now accessible within the project.

5. Optional: Make the project accessible externally:

```
$ oc expose svc/example-app
```

6. Obtain the shareable URL:

```
$ oc get routes
```

3.3. DEPLOYING APPLICATIONS FROM BINARY ARTIFACTS USING `oc`

You can use .NET Core Source-to-Image (S2I) builder image to build applications using binary artifacts that you provide.

Prerequisites

1. Published application.
For more information, see [Section 2.3, “Publishing applications using .NET Core 2.1”](#)

Procedure

1. Create a new binary build:

```
$ oc new-build --name=my-web-app dotnet:2.1 --binary=true
```

2. Start the build and specify the path to the binary artifacts on your local machine:

```
$ oc start-build my-web-app --from-dir=bin/Release/netcoreapp2.1/publish
```

3. Create a new application:

```
$ oc new-app my-web-app
```

3.4. USING JENKINS SLAVE

The OpenShift Container Platform Jenkins image provides auto-discovery of the .NET Core 2.1 slave image (**dotnet-21**).

For auto-discovery to work, you need to add a Jenkins slave **ConfigMap** yaml file to the project.

Procedure

1. Change to the project where Jenkins is (or will be) deployed:

```
$ oc project _project-name_
```

2. Create a **dotnet-jenkins-slave.yaml** file:



NOTE

The value used for the `<serviceAccount>` element is the account used by the Jenkins slave. If no value is specified, the **default** service account is used.

```
kind: ConfigMap
apiVersion: v1
metadata:
  name: dotnet-jenkins-slave-21
  labels:
    role: jenkins-slave
data:
  dotnet21: |-
    <org.csanchez.jenkins.plugins.kubernetes.PodTemplate>
    <inheritFrom></inheritFrom>
    <name>dotnet-21</name>
    <instanceCap>2147483647</instanceCap>
    <idleMinutes>0</idleMinutes>
    <label>dotnet-21</label>
    <serviceAccount>jenkins</serviceAccount>
    <nodeSelector></nodeSelector>
    <volumes>
    <containers>
      <org.csanchez.jenkins.plugins.kubernetes.ContainerTemplate>
        <name>jnlp</name>
        <image>registry.access.redhat.com/dotnet/dotnet-21-jenkins-slave-
rhel7:latest</image>
        <privileged>>false</privileged>
        <alwaysPullImage>true</alwaysPullImage>
        <workingDir>/tmp</workingDir>
        <command></command>
        <args>${computer.jnlpmac} ${computer.name}</args>
        <ttyEnabled>>false</ttyEnabled>
        <resourceRequestCpu></resourceRequestCpu>
        <resourceRequestMemory></resourceRequestMemory>
        <resourceLimitCpu></resourceLimitCpu>
        <resourceLimitMemory></resourceLimitMemory>
        <envVars>
      </org.csanchez.jenkins.plugins.kubernetes.ContainerTemplate>
```

```

    </containers>
    <envVars/>
    <annotations/>
    <imagePullSecrets/>
    <nodeProperties/>
  </org.csanchez.jenkins.plugins.kubernetes.PodTemplate>

```

3. Import the configuration into the project:

```
$ oc create -f dotnet-jenkins-slave.yaml
```

The slave image can now be used.

Example

The following example shows a Jenkins pipeline added to OpenShift Container Platform. Note that when a Jenkins pipeline is added and no Jenkins master is running, OpenShift automatically deploys a master. See [OpenShift Container Platform and Jenkins](#) for additional information about deploying and configuring a Jenkins server instance.

In the example steps, the **BuildConfig** yaml file includes a simple Jenkins pipeline configured using the **dotnet-21** Jenkins slave. There are three stages in the example **BuildConfig** yaml file:

1. The sources are checked out.
2. The application is published.
3. The image is assembled using a binary build.
See [Section 3.3, "Deploying applications from binary artifacts using oc"](#) for additional information about binary builds.

Procedure

To configure the Jenkins master-slave pipeline:

1. Create the **buildconfig.yaml** file:

```

kind: BuildConfig
apiVersion: v1
metadata:
  name: dotnetapp-build
spec:
  strategy:
    type: JenkinsPipeline
    jenkinsPipelineStrategy:
      jenkinsfile: |-
        node("dotnet-21") {
          stage('clone sources') {
            sh "git clone https://github.com/redhat-developer/s2i-dotnetcore-ex --branch
dotnetcore-2.1 ."
          }
          stage('publish') {
            dir('app') {
              sh "dotnet publish -c Release
/p:MicrosoftNETPlatformLibrary=Microsoft.NETCore.App"
            }
          }
        }

```

```

stage('create image') {
  dir('app') {
    sh 'oc new-build --name=dotnetapp dotnet:2.1 --binary=true || true'
    sh 'oc start-build dotnetapp --from-dir=bin/Release/netcoreapp2.1/publish --follow'
  }
}
}

```

2. Import the **BuildConfig** file to OpenShift:

```
$ oc create -f buildconfig.yaml
```

3. Open the OpenShift console.

4. Go to Builds → Pipelines.

The **dotnetapp-build** pipeline is available.

5. Click Start Pipeline.

Note that it may take a while for the build to start because the Jenkins image(s) need to be downloaded first.

During the build you can watch the different pipeline stages complete in the OpenShift console. You can also click View Log to see the pipeline stages complete in Jenkins.

6. When the Jenkins pipeline build is complete, go to Builds → Images.

The **dotnetapp** image is built and available.

3.5. ENVIRONMENTAL VARIABLES FOR .NET CORE 2.1

The .NET Core images support several environment variables to control the build behavior of your .NET Core application. You can set these variables as part of the build configuration, or add them to the **.s2i/environment** file in the application source code repository.

Variable Name	Description	Default
DOTNET_STARTUP_PROJECT	Selects the project to run. This must be a project file (for example, csproj or fsproj) or a folder containing a single project file.	.
DOTNET_ASSEMBLY_NAME	Selects the assembly to run. This must not include the .dll extension. Set this to the output assembly name specified in csproj (PropertyGroup/AssemblyName).	The name of the csproj file
DOTNET_RESTORE_SOURCES	Specifies the space-separated list of NuGet package sources used during the restore operation. This overrides all of the sources specified in the NuGet.config file.	

Variable Name	Description	Default
DOTNET_TOOLS	Specifies a list of .NET tools to install before building the app. It is possible to install a specific version by post pending the package name with @<version> .	
DOTNET_NPM_TOOLS	Specifies a list of NPM packages to install before building the application.	
DOTNET_TEST_PROJECTS	Specifies the list of test projects to test. This must be project files or folders containing a single project file. dotnet test is invoked for each item.	
DOTNET_CONFIGURATION	Runs the application in Debug or Release mode. This value should be either Release or Debug .	Release
DOTNET_VERBOSITY	Specifies the verbosity of the dotnet build commands. When set, the environment variables are printed at the start of the build. This variable can be set to one of the msbuild verbosity values (q[uiet] , m[inimal] , n[ormal] , d[etailed] , and diag[nostic]).	
HTTP_PROXY, HTTPS_PROXY	Configures the HTTP or HTTPS proxy used when building and running the application, respectively.	
DOTNET_RM_SRC	When set to true , the source code will not be included in the image.	
DOTNET_SSL_DIRS	Specifies a list of folders or files with additional SSL certificates to trust. The certificates are trusted by each process that runs during the build and all processes that run in the image after the build (including the application that was built). The items can be absolute paths (starting with /) or paths in the source repository (for example, certificates).	

Variable Name	Description	Default
NPM_MIRROR	Uses a custom NPM registry mirror to download packages during the build process.	
ASPNETCORE_URLS	This variable is set to http://*:8080 to configure ASP.NET Core to use the port exposed by the image. Changing this is not recommended.	http://*:8080
DOTNET_RESTORE_DISABLE_PARALLEL	When set to true , disables restoring multiple projects in parallel. This reduces restore timeout errors when the build container is running with low CPU limits.	false
DOTNET_INCREMENTAL	When set to true , the NuGet packages will be kept so they can be re-used for an incremental build. Defaults to false.	
DOTNET_PACK	When set to true , creates a tar.gz file at /opt/app-root/app.tar.gz that contains the published application.	
[OBSOLETE: April 2019] - DOTNET_SDK_VERSION	Selects the default sdk version when building. If there is a global.json file in the source repository, that takes precedence. When set to latest , the latest sdk in the image is used.	Lowest sdk version available in the image

3.6. CREATING SAMPLE APPLICATIONS FOR .NET CORE 2.1

Three sample applications are available:

- [dotnet-example](#): This is the default model–view–controller (MVC) application.
- [dotnet-runtime-example](#): This shows how to build an MVC application using a chained build. The application is built in **dotnet/dotnet-21-rhel7**. The result is deployed in **ubi8/dotnet-21-runtime-rhel7**. Note that chained builds are not supported on OpenShift Online.
- [dotnet-pgsql-persistent](#): This is the Microsoft ASP.NET Core MusicStore sample application using a PostgreSQL backend.

To add the samples using the OpenShift Web Console, browse to your project and click Add to project. You can filter for dotnet. If the samples do not show up, you can add them to your installation by running the following commands:

```
$ oc create -f https://raw.githubusercontent.com/redhat-developer/s2i-dotnetcore/master/templates/dotnet-example.json
$ oc create -f https://raw.githubusercontent.com/redhat-developer/s2i-dotnetcore/master/templates/dotnet-runtime-example.json
$ oc create -f https://raw.githubusercontent.com/redhat-developer/s2i-dotnetcore/master/templates/dotnet-pgsql-persistent.json
```

CHAPTER 4. MIGRATION FROM PREVIOUS VERSIONS OF .NET CORE

Microsoft provides instructions for migrating from most previous versions of .NET Core. When migrating, the following ASP.NET Core 2.0 property should no longer be specified. It should remain the default value for .NET Core 2.1. Make sure to remove this property from the project file and command line, if it is being specified there.

<PublishWithAspNetCoreTargetManifest>false</PublishWithAspNetCoreTargetManifest>

If you are using a version of .NET Core that is no longer supported or want to migrate to a newer .NET Core version to expand functionality, see the following articles:

- [Migrate from .NET Core 2.0 to 2.1](#)
- [Migrate from ASP.NET Core 2.2 to 3.0](#)
- [Migrate from ASP.NET Core 2.1 to 2.2](#)
- [Migrate to ASP.NET Core](#)
- [Migrate from project.json to .csproj format](#)

NOTE

If migrating from .NET Core 1.x to 2.0, see the first few related sections in [Migrate from ASP.NET Core 1.x to 2.0](#). These sections provide guidance that is appropriate for a .NET Core 1.x to 2.0 migration path.

CHAPTER 5. MIGRATION FROM .NET FRAMEWORK TO .NET CORE 2.1

Review the following sections to find the instructions on how to migrate from the .NET Framework.

5.1. MIGRATION CONSIDERATIONS

Several technologies and APIs present in the .NET Framework are not available in .NET Core. If your application or library requires these APIs, consider finding alternatives or continue using the .NET Framework. .NET Core does not support the following technologies and APIs:

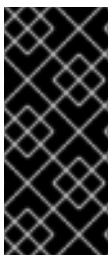
- Desktop applications, for example, Windows Forms and Windows Presentation Foundation (WPF)
- Windows Communication Foundation (WCF) servers (WCF clients are supported)
- .NET remoting

Additionally, several .NET APIs can only be used in Microsoft Windows environments. The following list shows examples of these Windows-specific APIs:

- **Microsoft.Win32.Registry**
- **System.AppDomains**
- **System.Drawing**
- **System.Security.Principal.Windows**

Consider using the [.NET Portability Analyzer](#) to identify API gaps and potential replacements. For example, enter the following command to find out how much of the API used by your .NET Framework 4.6 application is supported by .NET Core 2.1:

```
$ dotnet /path/to/ApiPort.dll analyze -f . -r html --target '.NET Framework,Version=4.6' --target '.NET Core,Version=2.1'
```



IMPORTANT

Several APIs that are not supported in the default version of .NET Core may be available from the [Microsoft.Windows.Compatibility](#) NuGet package. Be careful when using this NuGet package. Some of the APIs provided (such as **Microsoft.Win32.Registry**) only work on Windows, making your application incompatible with Red Hat Enterprise Linux.

5.2. .NET FRAMEWORK MIGRATION INSTRUCTIONS

Refer to the following Microsoft articles when migrating from .NET Framework:

- For general guidelines, see [Porting to .NET Core from .NET Framework](#)
- For porting libraries, see [Porting to .NET Core - Libraries](#)
- For migrating to ASP.NET Core, see [Migrating to ASP.NET Core](#)

APPENDIX A. REVISION HISTORY

Date	Version	Author	Changes
08/21/2017	2.0	Les Williams	Generally available
08/30/2017	2.0	Les Williams	Revised DOTNET_STARTUP_PROJECT and DOTNET_TEST_PROJECTS entries in Section 2.3
09/13/2017	2.0	Les Williams	Revised Section 1.2 to include a note about how to permanently enable rh-dotnet20
02/14/2018	2.0	Les Williams	Revised Section 2.2 to resolve BZ 1500230; added quoting for zsh and other shells
02/28/2018	2.0.3	Les Williams	Revised to include SDK 2.0 and 2.1
06/14/2018	2.1	Les Williams	Generally available
08/01/2018	2.1	Toby Drake	Added Chapter 3 to provide migration instructions
08/24/2018	2.1	Toby Drake	Added steps to enable a user to get new image streams
09/18/2018	2.1	Toby Drake	Revised Section 2.1 to include -n openshift in a command for listing .NET Core image versions. Modified the grep command to enable better search results.

Date	Version	Author	Changes
10/12/2018	2.1	Toby Drake	Added DOTNET_SSL_DIRS and DOTNET_RM_SRC to]. Added xref:deploying-applications-from-binary-artifacts_using-dotnet-on-openshift-container-platform[.
11/08/2018	2.1	Toby Drake	Changed references from docker to podman. Changed registry server to registry.redhat.io . Added procedure to set up Jenkins master-slave pipeline. See Section 3.4, "Using Jenkins slave" .
11/27/2018	2.1	Toby Drake	Added reference to support for RHEL 8.
04/16/2019	2.2	Les Williams	Revised environment variables section for DOTNET_INCREMENTAL and DOTNET_PACK variables