Article

How to create execution environments using ansible-builder

May 8, 2023 Automation, Containers, Python

Tathagata Paul

Intern

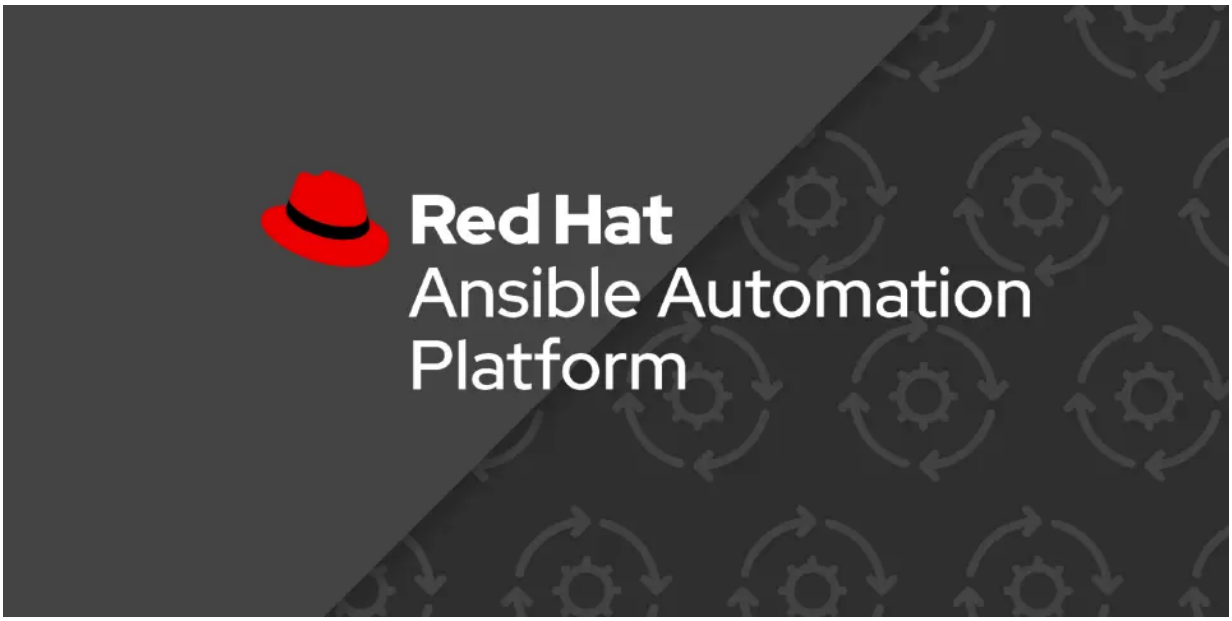


Table of contents:

The execution environment builder (aka Ansible Builder) is a part of Red Hat Ansible Automation Platform. It is a command-line interface (CLI) tool for building and creating custom execution environments. The Ansible Builder project enables users to automate and accelerate the process of creating execution environments. This article will show you how to install and use the execution environment builder CLI tool.

Installing the execution environment builder

The execution environment builder makes it easier for Ansible Automation Platform content creators and administrators to build custom execution environments. They can use dependency information from various Ansible Content Collections and directly from the user.

Step 1: Install the execution environment builder tool

Install the execution environment builder tool from the Python Package Index (PyPI) by using the following command:

```
pip install ansible-builder
```

Copy snippet

Step 2: Access the ansible-builder subcommands

To access the subcommands of `ansible-builder`, run `build` and `create` commands to get help output.

The `build` subcommand will build the execution environment using the definition file.

```
ansible-builder build –help
```

Copy snippet

It populates the build context and then uses Podman or Docker to create the execution environment image. The help output appears as follows:

```
usage: ansible-builder build [-h] [-t TAG] [--container-runtime {podm
                             [--output-filename {Containerfile,Docker

Creates a build context (including a Containerfile) from an executior
supplied tag.

optional arguments:
  -h, --help            show this help message and exit
```

```
  -t TAG, --tag TAG     The name for the container image being built
  --container-runtime {podman,docker}
                        Specifies which container runtime to use (def
  --build-arg BUILD_ARGS
                        Build-time variables to pass to any podman or
                        EE_BUILDER_IMAGE.
  -f FILENAME, --file FILENAME
                        The definition of the execution environment (
  -c BUILD_CONTEXT, --context BUILD_CONTEXT
                        The directory to use for the build context (d
  --output-filename {Containerfile,Dockerfile}
                        Name of file to write image definition to (de
  -v {0,1,2,3}, --verbosity {0,1,2,3}
                        Increase the output verbosity, for up to thre
                        3) (default: 2)
```

Copy snippet

The `create` subcommand works similar to the `build` command.

```
ansible-builder create –help
```

Copy snippet

However, it will not build the execution environment image as you will see in the following output:

```
usage: ansible-builder build [-h] [-t TAG] [--container-runtime {podm
                             [--output-filename {Containerfile,Docker

Creates a build context (including a Containerfile) from an execution
the specified container runtime podman/docker will be invoked to buil
supplied tag.

optional arguments:
  -h, --help            show this help message and exit
  -t TAG, --tag TAG     The name for the container image being built
  --container-runtime {podman,docker}
                        Specifies which container runtime to use (def
```

```
  --build-arg BUILD_ARGS
                        Build-time variables to pass to any podman or
                        EE_BUILDER_IMAGE.
  -f FILENAME, --file FILENAME
                        The definition of the execution environment (
  -c BUILD_CONTEXT, --context BUILD_CONTEXT
                        The directory to use for the build context (d
  --output-filename {Containerfile,Dockerfile}
                        Name of file to write image definition to (de
  -v {0,1,2,3}, --verbosity {0,1,2,3}
                        Increase the output verbosity, for up to thre
                        3) (default: 2)
```

Copy snippet

Step 3: Populate the ansible-builder spec

Populate the `ansible-builder` spec to build the custom execution environment by running the following command:

```
mkdir project_directory && cd project_directory
```

Copy snippet

Populate the `execution-environment.yml` file:

```
cat <<EOT >> execution-environment.yml
---
version: 1
dependencies:
  galaxy: requirements.yml
EOT
```

Copy snippet

Create a `requirements.yml` file and populate the contents with the following:

```
cat <<EOT >> requirements.yml
---
collections:
  - name: servicenow.itsm
EOT
```

Copy snippet

Through the spec and requirements file, we ensure that execution environment builder will download the **servicenow.itsm collection** while building the execution environment. The default download location is **galaxy.ansible.com**. You can also point to an automation hub or your own hub instance in the spec file.

Step 4: Build the execution environment

Build the execution environment using the previously created files. Run the following command to create a new custom execution environment called **custom-ee:**

```
ansible-builder build -v3 -t custom-ee
```

Copy snippet

The `-v3` flag adds verbosity to the CLI run, and `-t custom-ee` will tag your image with the name you provided.

The output appears as follows:

```
Ansible Builder is building your execution environment image, "custom
File context/_build/requirements.yml will be created.
Rewriting Containerfile to capture collection requirements
Running command:
  podman build -f context/Containerfile -t custom-ee context
[1/3] STEP 1/7: FROM registry.redhat.io/ansible-automation-platform-2
[1/3] STEP 2/7: ARG ANSIBLE_GALAXY_CLI_COLLECTION_OPTS=
--> 88d9ea223d0
[1/3] STEP 3/7: USER root
--> 549f29055c2
```

```
[1/3] STEP 4/7: ADD _build /build
--> 0d3e9515b12
[1/3] STEP 5/7: WORKDIR /build
--> 3b290acf78c
[1/3] STEP 6/7: RUN ansible-galaxy role install -r requirements.yml -
Skipping install, no requirements found
--> 8af36370e78
[1/3] STEP 7/7: RUN ansible-galaxy collection install $ANSIBLE_GALAXY
Starting galaxy collection install process
Process install dependency map
…
```

Copy snippet

Run the following commands to check the image list:

```
podman images
```

Copy snippet

The output appears as follows:

```
REPOSITORY                                                      TAG
localhost/custom-ee                                           latest
```

Copy snippet

Step 5: Build a complex execution environment

To build a complex execution environment, go back into the project directory with the following command:

```
cd project_directory
```

Copy snippet

Edit the `execution-environment.yml` file and add the following content:

```
cat <<EOT >> execution-environment.yml
---
version: 1
dependencies:
  galaxy: requirements.yml
  python: requirements.txt
  system: bindep.txt
additional_build_steps:
  prepend: |
    RUN whoami
    RUN cat /etc/os-release
  append:
    - RUN echo This is a post-install command!
    - RUN ls -la /etc
EOT
```

Copy snippet

We can see the following:

- Python requirements were added through the **requirements.txt** file, which will hold the pip dependencies.
- We added a **bindep.txt**, which will hold the rpm installs.
- Additional build steps that will run before (prepend) and after (append) the build steps.

Now create a new file called `requirements.yml` and append the following content:

```
cat <<EOT >> requirements.yml
---

collections:

  - name: servicenow.itsm
  - name: ansible.utils
EOT
```

Copy snippet

We added a new collection called **ansible.utils** alongside the **servicenow.itsm** file.

Create a new file called `requirements.txt` and then append the following:

```
cat <<EOT >> requirements.txt
gcp-cli
ncclient
netaddr
paramiko
EOT
```

Copy snippet

This contains the Python requirements that need to be installed via pip.

Create a new file called `bindep.txt` and then append the following:

```
cat <<EOT >> bindep.txt
findutils [compile platform:centos-8 platform:rhel-8]
gcc [compile platform:centos-8 platform:rhel-8]
make [compile platform:centos-8 platform:rhel-8]
python38-devel [compile platform:centos-8 platform:rhel-8]
python38-cffi [platform:centos-8 platform:rhel-8]
python38-cryptography [platform:centos-8 platform:rhel-8]
python38-pycparser [platform:centos-8 platform:rhel-8]
EOT
```

Copy snippet

This file contains the rpm requirements needed to be installed using dnf.

Run the following build:

```
ansible-builder build -v3 -t custom-ee
```

Copy snippet

The output is as follows:

```
Ansible Builder is building your execution environment image, "custom
File context/_build/requirements.yml will be created.
File context/_build/requirements.txt will be created.
File context/_build/bindep.txt will be created.
Rewriting Containerfile to capture collection requirements
Running command:
  podman build -f context/Containerfile -t custom-ee context
[1/3] STEP 1/7: FROM registry.redhat.io/ansible-automation-platform-2
[1/3] STEP 2/7: ARG ANSIBLE_GALAXY_CLI_COLLECTION_OPTS=
--> Using cache 88d9ea223d01bec0d53eb7efcf0e76b5f7da0285a411f2ce0116f
--> 88d9ea223d0
[1/3] STEP 3/7: USER root
--> Using cache 549f29055c2f1ba0ef3f7c5dfdc67a40302ff0330af927adb94fb
--> 549f29055c2
[1/3] STEP 4/7: ADD _build /build
--> 6b9ee91e773
[1/3] STEP 5/7: WORKDIR /build
--> 5518e019f2d
[1/3] STEP 6/7: RUN ansible-galaxy role install -r requirements.yml -
Skipping install, no requirements found
--> 60c1605d66c
[1/3] STEP 7/7: RUN ansible-galaxy collection install $ANSIBLE_GALAXY
Starting galaxy collection install process
Process install dependency map
```

Copy snippet

You can check the context or `Containerfile` to see all the steps you took to build the execution environment. You can transfer the context directory to a different server and replicate the image creation via `docker` or `podman` commands.

Pushing the execution environment to a private automation hub

Log in to the private automation hub by using the `podman` command:

```
podman login <automation hub url>
```

Copy snippet

Then tag the image before pushing it to the hub as follows:

```
podman tag localhost/custom-ee <automation hub url>/developers-bu-aap
```

Copy snippet

Finally, push it to the private automation hub as follows:

```
podman push <automation hub url>/developers-bu-aap-builder
```

Copy snippet

We can see the image pushed to the private automation hub in Figure 1:

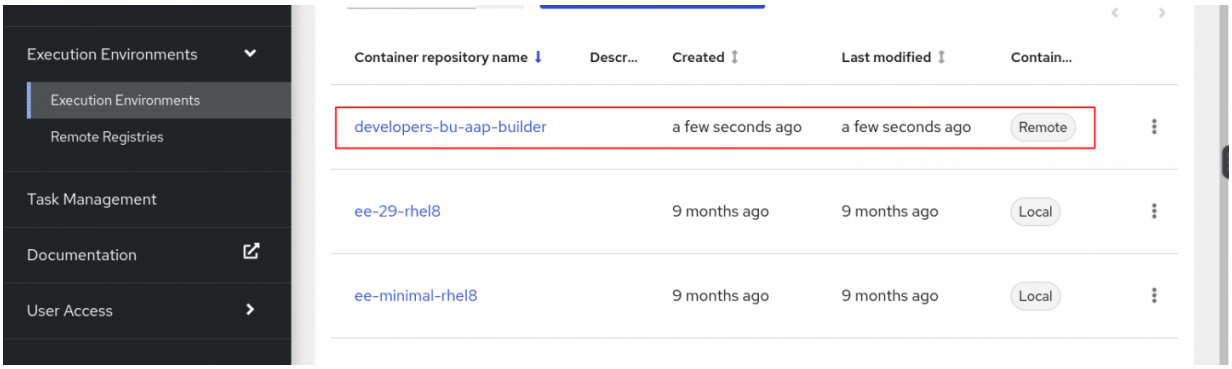


Figure 1: The private automation hub page showing multiple pushed execution environment images.

Continue your automation journey with Ansible Automation Platform

Get started with Ansible Automation Platform by exploring interactive labs. Check out Red Hat's hands-on labs for all skill levels to learn more. The wide range of labs include useful Linux commands, Install software using package managers, and Deploying containers using container tools [podman]. Try these labs to see your favorite products in action. Ansible Automation

Platform is also available as a managed offering on Microsoft Azure and as a self-managed offering on AWS.

Last updated: August 14, 2023

Recent Articles

How to use Helm charts to deploy Data Grid on OpenShift

How to use JBoss EAP 8.0's new provisioning system

Create an efficient Ansible development environment in VS Code IDE

Test Kubernetes performance and scale with kube-burner

Deploying Microservices to OpenShift- Tutorial using Pedal

Related Content

Ansible and automation: The best of 2021

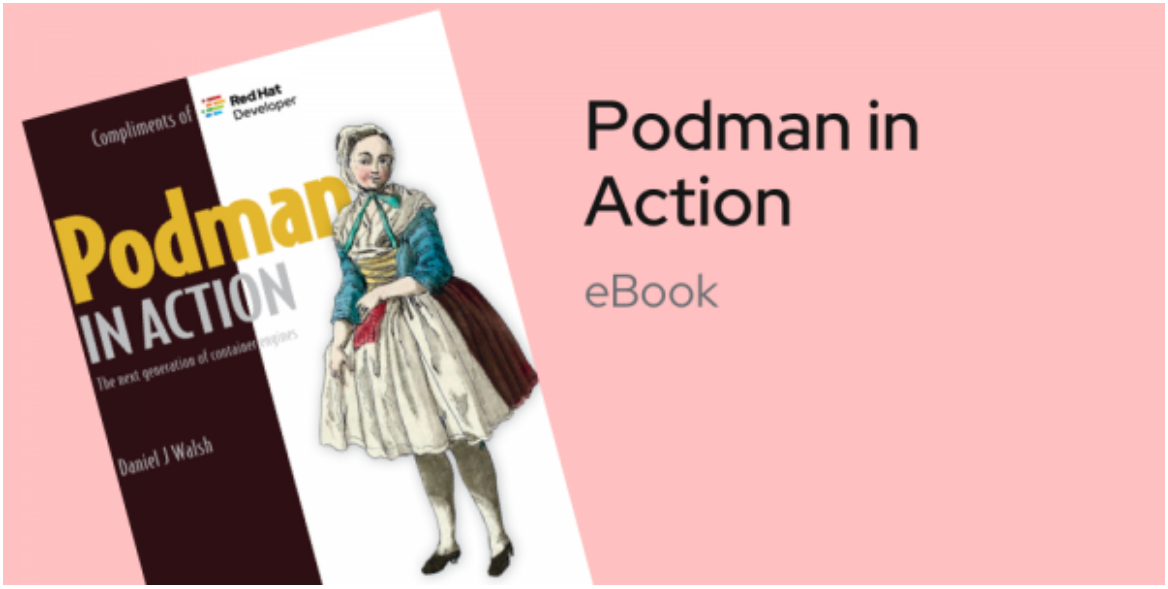
Best practices for building images that pass Red Hat Container Certification

Build your first application using Python 3.5 on RHEL 7 with containers and Red Hat Software Collections

Four reasons developers should use Ansible

What's new in Ansible Automation Platform 2.2

What's up next?



Read **Podman in Action** for easy-to-follow examples to help you learn Podman quickly, including steps to deploy a complete containerized web service.

Get the e-book →

Products

Build

Quicklinks

Communicate

RED HAT DEVELOPER

Build here. Go anywhere.

We serve the builders. The problem solvers who create careers with code.

Join us if you're a developer, software engineer, web designer, front-end designer, UX designer, computer scientist, architect, tester, product manager, project manager or team lead.

Sign me up →