



Red Hat Training and Certification

DO467

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1. Installing Red Hat Ansible Automation Platform

1.1. Explaining the Red Hat Ansible Automation Platform Architecture

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1.2.5.1. Gathering Certificates and Private Keys

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1.2.5.3. Trusting Custom CA Certificates

1.2.6. DEMO: Installing Automation Controller and Private Automation Hub

Automation Controller and Private Automation Hub can both be installed from the **same** machine provided that they are both specified in the inventory file and that the installation user and installation machine has access to all systems specified in the **inventory** file and that the user has the ability to SSH/SUDO without passwords.



Automation Hub and Controller Placement

Ansible Controller and Ansible Private Automation Hub must be installed on separate systems and cannot be installed on the same system.

Example 1. DEMO: Installing Automation Hub and Controller

1. Obtain the bundled installer and untar the file

```
[student@workstation ~]$ tar xvf ansible-automation-platform-setup-bundle-2.2.0-6.1.tar.gz

[student@workstation ~]$ mv ansible-automation-platform-setup-bundle-2.2.0-6.1 AAP2

[student@workstation ~]$ cd AAP2/
```

2. Update the inventory file with the system FQDNs or IP Addresses

Listing 1. Update the Inventory File

```
[student@workstation AAP2]$ vim inventory
```

```
[automationcontroller] ①
controller.lab.example.com

[execution_nodes]

[automationhub] ②
hub.lab.example.com

[automationcatalog]

[database] ③
db.lab.example.com

[all:vars]
admin_password='redhat' ④

pg_host='db.lab.example.com' ⑤
pg_port=5432 ⑥

pg_database='awx'
pg_username='awx'
pg_password='redhat' ⑦

registry_url='hub.lab.example.com' ⑧
```

```
registry_username='admin' ⑨
registry_password='redhat' ⑩

# Automation Hub Configuration ⑪
#

automationhub_admin_password='redhat'

automationhub_pg_host='db.lab.example.com'
automationhub_pg_port=5432

automationhub_pg_database='automationhub'
automationhub_pg_username='automationhub'
automationhub_pg_password='redhat'
automationhub_pg_sslmode='prefer'

# SSL Settings ⑫

custom_ca_cert=/home/student/certs/classroom-ca.pem
web_server_ssl_cert=/home/student/certs/controller.lab.example.com.crt
web_server_ssl_key=/home/student/certs/controller.lab.example.com.key
automationhub_ssl_cert=/home/student/certs/hub.lab.example.com.crt
automationhub_ssl_key=/home/student/certs/hub.lab.example.com.key
postgres_use_ssl=True
postgres_ssl_cert=/home/student/certs/db.lab.example.com.crt
postgres_ssl_key=/home/student/certs/db.lab.example.com.key
```

- ① Specify the Controller Node
- ② Specify the Private Automation Hub Node
- ③ Specify the Database Node
- ④ Specify the **admin** password for Controller
- ⑤ Specify the Database FQDN
- ⑥ Specify the Database Port
- ⑦ Specify the Database Password
- ⑧ URL and Registry for Container Images/Execution Environments
- ⑨ Username for Registry
- ⑩ Password for Registry
- ⑪ Ansible Automation Hub Configuration Settings
- ⑫ SSL Settings



Database

If you are running the database locally and not as a separate installation, you can leave the database section blank and the **pg_host** and **pg_port** blank. This will cause the installer to setup the database locally with the deployed AAP application.



Registry

Setting the registry for **hub.example.com** will allow the installer to link and configure Ansible Automation Hub to Ansible Controller. It will also ensure that the execution environments container in the bundled installer will be loaded properly into Ansible Automation Hub.

SSL

The classroom and lab environment has been configured to run with SSL enabled. In order for the certificates to work properly, the SSL certificates have been supplied in the **/home/student/certs** directory. These certificates must be specified in the **inventory** file. In the default inventory file, the certificates and SSL settings are generally commented out, so it is possible to just place the certificate information at the bottom of the inventory file to prevent searching for each line.



Listing 2. Default SSL Certificate

```
# SSL-related variables

# If set, this will install a custom CA certificate to the system
trust store.
# custom_ca_cert=/home/student/certs/classroom-ca.pem

# Certificate and key to install in nginx for the web UI and API
# web_server_ssl_cert=/path/to/tower.cert
# web_server_ssl_key=/path/to/tower.key
```

3. View final inventory file

```
[student@workstation AAP2]$ grep -Ev "^#|^$" inventory
[automationcontroller]
controller.lab.example.com
[automationcontroller:vars]
peers=execution_nodes
[execution_nodes]
[automationhub]
hub.lab.example.com
[automationcatalog]
[database]
db.lab.example.com
[sso]
[all:vars]
admin_password='redhat'
pg_host='db.lab.example.com'
pg_port=5432
pg_database='awx'
pg_username='awx'
pg_password='redhat'
pg_sslmode='prefer' # set to 'verify-full' for client-side enforced SSL
registry_url='hub.lab.example.com'
registry_username='admin'
registry_password='redhat'
receptor_listener_port=27199
automationhub_admin_password='redhat'
automationhub_pg_host='db.lab.example.com'
automationhub_pg_port=5432
automationhub_pg_database='automationhub'
automationhub_pg_username='automationhub'
automationhub_pg_password='redhat'
automationhub_pg_sslmode='prefer'
automationcatalog_pg_host=''
automationcatalog_pg_port=5432
automationcatalog_pg_database='automationservicescatalog'
automationcatalog_pg_username='automationservicescatalog'
automationcatalog_pg_password=''
sso_keystore_password=''
sso_console_admin_password=''
custom_ca_cert=/home/student/certs/classroom-ca.pem
web_server_ssl_cert=/home/student/certs/controller.lab.example.com.crt
web_server_ssl_key=/home/student/certs/controller.lab.example.com.key
automationhub_ssl_cert=/home/student/certs/hub.lab.example.com.crt
automationhub_ssl_key=/home/student/certs/hub.lab.example.com.key
postgres_use_ssl=True
postgres_ssl_cert=/home/student/certs/db.lab.example.com.crt
postgres_ssl_key=/home/student/certs/db.lab.example.com.key
```



Using **grep** to remove comments and blank lines

Listing 3. Source Description

```
grep -Ev "^#|^$" <FILENAME>
```

4. Run the installation **setup.sh** script as the root user with **ignore_preflight_errors=true** as the systems in this course don't meet the minimum hardware requirements.

```
[student@workstation AAP2]$ sudo -i
[sudo] password for student:

[root@workstation ~]# cd ~student/AAP2/

[root@workstation AAP2]# ./setup.sh -e ignore_preflight_errors=true
```



Bundled Software Installer

It is important to at least save the bundled software installer archive **TGZ** file or to save the entire bundled installation directory. In addition, you will also want to save the **Inventory** file that was created so that adding additional components later, performing system backups/restores, and other administrative and maintenance tasks can be performed easily.

5. Install the licenses for Controller by providing the **manifest.zip** file to controller in the WebUI.

The screenshot shows the Red Hat Ansible Automation Platform WebUI. On the left, a sidebar lists three steps: 1. Ansible Automation Platform Subscription (active), 2. User and Automation Analytics, and 3. End user license agreement. The main content area has a header 'Welcome to Red Hat Ansible Automation Platform! Please complete the steps below to activate your subscription.' Below this, it says 'If you do not have a subscription, you can visit Red Hat to obtain a trial subscription.' and provides a 'Request subscription' button. Then, it asks to 'Select your Ansible Automation Platform subscription to use.' with a 'Subscription manifest' button and a 'Username / password' input field. Below that, it says 'Upload a Red Hat Subscription Manifest containing your subscription. To generate your subscription manifest, go to [subscription allocations](#) on the Red Hat Customer Portal.' There is a section for 'Red Hat subscription manifest' with a 'Browse' button and a 'Clear' button. An orange arrow points to the 'Browse' button. At the bottom, there are 'Next' and 'Back' buttons.

Figure 1. Ansible Controller License

1. Verify **Automation Hub** is installed

1.3. Initial Configuration of Automation Controller and Private Automation Hub

Section Info Here

1.3.1. Configuration Overview

1.3.2. Making Automation Execution Environments Available from Private Automation Hub

1.3.2.1. Synchronizing Automation Execution Environments

1.3.2.2. Manually Adding Container Images

1.3.2.3. Managing Container Repositories, Images, and Tags

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1.3.3.1. Synchronizing Red Hat Certified Ansible Content Collections

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1.3.5. DEMO: Initial Configuration of Automation Controller and Private Automation Hub

*Example 2. DEMO: Initial Configuration of Automation Controller and Private Automation Hub**Working with Execution Environments*

Manually uploading and adding container images (EEs) to Ansible Private Automation Hub.

1. Login to Registries to both Push/Pull and Copy container images

```
[student@workstation Add_EEs]$ skopeo login hub.lab.example.com
```

2. Inspect available containers and tags

```
[student@workstation Add_EEs]$ skopeo inspect docker://hub.lab.example.com/ee-29-rhel8
```

Grabbing Tags and Release Information from the CLI

*Listing 4. **skopeo inspect** to get release and **skopeo tags** to get tags*

```
[student@workstation Add_EEs]$ skopeo inspect
docker://hub.lab.example.com/ee-29-rhel8 --format "{{
.Labels.version }}-{{ .Labels.release }}"
1.0.0-119

[student@workstation Add_EEs]$ skopeo list-tags
docker://hub.lab.example.com/ee-29-rhel8
```



It is also possible to use **podman** to search and list tags, but that is generally considered less reliable. It should also be noted that only **skopeo** has the ability to inspect and act with images remotely. As such, this course will leverage **skopeo** over Podman for many of the exercises.

*Listing 5. **podman Tag Listing***

```
[student@workstation Add_EEs]$ podman search --list-tags
docker://hub.lab.example.com/ee-29-rhel8
```

*The **skopeo** Command*

Skopeo is another command that can be used with containers and was introduced as part of the **container-tools** suite with RHEL8. The **container-tools** suite installs the RHEL 8 toolchain to work with containers which includes: **podman**, **buildah**, and **skopeo**.

2. Managing User Access

2.1. Creating and Managing Automation Controller Users

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2.1.1. Role-based Access Controls

2.1.2. Automation Controller Organizations

2.1.3. Types of Users

2.1.4. Creating Users

2.1.5. Editing Users

2.1.6. Organization Roles

2.1.7. Managing User Organization Roles

2.2. Managing Automation Controller Access with Teams

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2.2.1. Teams in Automation Controller

2.2.2. Creating Teams

2.2.3. Team Roles

2.2.4. Adding Users to a Team and Assigning Team Roles

2.2.5. Organization Roles

2.2.6. Managing Organization Roles

2.3. Creating and Managing Users and Groups for Private Automation Hub

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2.3.1.1. Creating Groups

2.3.1.2. Creating Users

2.3.1.3. Creating Groups to Manage Content

3. Managing Inventories and Machine Credentials

3.1. Creating a Static Inventory

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3.1.1. Red Hat Ansible Inventory

3.1.2. Creating an Inventory Using the Automation Controller Web UI

3.1.2.1. Creating a New Inventory

3.1.2.2. Creating a Host Group in an Inventory

3.1.2.3. Creating Hosts in an Inventory

3.1.3. Inventory Roles

3.1.3.1. Assigning Roles

3.1.4. Inventory Variables

3.2. Creating Machine Credentials for Access to Inventory Hosts

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3.2.1. Storing Secrets in Credentials

3.2.2. Credential Types

3.2.3. Creating Machine Credentials

3.2.4. Editing Machine Credentials

3.2.5. Credential Roles

3.2.6. Managing Credential Access

3.2.7. Common Credential Scenarios

3.2.7.1. Credentials Protected by Automation Controller, Not Known to Users

3.2.7.2. Credential Prompts for Sensitive Password, Not Stored in Automation Controller

4. Managing Projects and Launching Ansible Jobs

4.1. Creating a Project for Ansible Playbooks

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4.1.2. Creating a Project

4.1.3. Project Roles

4.1.4. Managing Project Access

4.1.5. Creating SCM Credentials

4.1.6. SCM Credential Roles

4.1.7. Managing Access to SCM Credentials

4.1.8. Updating Projects

4.1.8.1. Update Revision on Launch

4.1.8.2. Manual Updates

4.1.9. Support for Ansible Content Collections and Roles

4.2. Creating Job Templates and Launching Jobs

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4.2.3. Modifying Job Execution

4.2.4. Prompting for Job Parameters

4.2.5. Job Template Roles

4.2.6. Managing Job Template Access

4.2.7. Launching Jobs

4.2.8. Evaluating the Results of a Job

5. Advanced Job Configuration

5.1. Improving Performance with Fact Caching

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5.1.1. Fact Caching

5.1.1.1. Enabling Fact Caching in Automation Controller

5.2. Creating Job Template Surveys to Set Variables for Jobs

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5.2.1. Managing Variables

5.2.2. Defining Extra Variables

5.2.3. Job Template Surveys

5.2.3.1. Managing Answers to Survey Questions

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5.3. Scheduling Jobs and Configuring Notifications

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5.3.1.1. Temporarily Disabling a Schedule

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5.3.2. Reporting Job Execution Results

5.3.2.1. Notification Templates

5.3.2.2. Creating Notification Templates

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6. Constructing Job Workflows

6.1. Creating Workflow Job Templates and Launching Workflow Jobs

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7. Managing Advanced Inventories

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7.1.1. Importing Existing Static Inventories

7.1.2. Storing an Inventory in a Project

7.2. Configuring Dynamic Inventory Plug-ins

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7.2.1. Dynamic Inventories

7.2.2. OpenStack Dynamic Inventories

7.2.3. Red Hat Satellite 6 Dynamic Inventories

7.3. Filtering Hosts with Smart Inventories

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7.3.1. Defining Smart Inventories

7.3.2. Using Ansible Facts in Smart Inventory Filters

7.3.2.1. Creating a Smart Inventory Based on Ansible Facts

7.3.3. Other Smart Inventory Filters

8. Automating Configuration of Ansible Automation Platform

8.1. Configuring Red Hat Ansible Automation Platform with Collections

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8.1.2. Getting the Supported Ansible Content Collection

8.1.3. Exploring the Supported Ansible Content Collection

8.1.3.1. Reading Documentation with Ansible Content Navigator

8.1.3.2. Reading Documentation on Automation Hub

8.1.4. Examples of Automation with `ansible.controller`

8.1.4.1. Creating Automation Controller Users

8.1.4.2. Creating Automation Controller Teams

8.1.4.3. Adding Users to Organizations and Teams

8.1.5. Community-supported Ansible Content Collections

8.2. Automating Configuration Updates with Git Webhooks

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8.2.1. Introducing Red Hat Ansible Automation Platform Webhooks

8.2.1.1. What Are the Benefits of Webhooks

8.2.2. Configuring Webhooks

8.2.2.1. Configuring a Webhook for a Job Template

8.2.2.2. Creating the Webhook for the Repository in GitLab

8.2.3. Use Cases for Using Webhooks

8.2.3.1. Triggering Different Job Templates Using Branches

8.2.3.2. Configuration as Code for Automation Controller

8.3. Launching Jobs with the Automation Controller API

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8.3.1. The Automation Controller REST API

8.3.1.1. Using the REST API

8.3.1.2. JSON Pagination

8.3.1.3. Accessing the REST API From a Graphical Web Browser

8.3.2. Launching a Job Template Using the API

8.3.3. Launching a Job Using the API from an Ansible Playbook

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8.3.4. Token-based Authentication

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9.1. Performing Basic Troubleshooting of Automation Controller

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9.1.1.1. Starting, Stopping, and Restarting Automation Controller

9.1.1.2. Supervisord Components

9.1.2. Automation Controller Configuration and Log Files

9.1.2.1. Configuration Files

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9.1.2.3. Other Automation Controller Files

9.1.3. Common Troubleshooting Scenarios

9.1.3.1. Problems Running Playbooks

9.1.3.2. Problems Connecting to Your Host

9.1.3.3. Playbooks Do Not Appear in the List of Job Templates

9.1.3.4. Playbook Stays in Pending State

9.1.3.5. Error: Provided Hosts List Is Empty

9.1.4. Performing Command-Line Management

9.1.4.1. Changing the Automation Controller Admin Password

9.2. Backing Up and Restoring Red Hat Ansible Automation Platform

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9.2.1. Backing Up Red Hat Ansible Automation Platform

9.2.1.1. Backup Procedure

9.2.2. Restoring Ansible Automation Platform From Backup

9.2.2.1. Restoration Procedure

10. Getting Insights into Automation Performance

10.1. Gathering Data for Cloud-based Analysis

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10.1.1. Introducing Red Hat Hybrid Cloud Console Services

10.1.2. Collecting Data for Cloud Services

10.1.3. Registering Managed Hosts with Insights for Ansible Automation Platform

10.1.4. Accessing the Red Hat Hybrid Cloud Console

10.2. Getting Insights into Automation Performance

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10.2.1. Insights for Ansible Automation Platform

10.2.2. Generating Remediation Playbooks with Advisor

10.2.2.1. Automating Remediation of an Issue for Multiple Systems

10.2.2.2. Automating Remediation of Multiple Issues for One System

10.2.3. Comparing Systems with Drift

10.2.3.1. Finding Differences Between Systems

10.2.3.2. Comparing the State of One System at Different Times

10.2.3.3. Comparing Systems to a Standard Baseline

10.2.4. Sending Alerts Based on Ansible Facts with Policies

10.3. Evaluating Performance with Automation Analytics

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10.4. Producing Reports from Automation Analytics

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10.4.1.1. Choosing an Appropriate Report

10.4.1.2. Using Automation Calculator to Compute Savings

10.4.1.3. Exporting a Report

10.4.2. Predicting the Cost Savings of Automation

10.4.2.1. Creating a Savings Plan

10.4.2.2. Reviewing the Cost Savings Calculations

11. Building a Large Scale Red Hat Ansible Automation Platform Deployment

11.1. Designing a Clustered Ansible Automation Platform Implementation

11.1.1. Running Red Hat Ansible Automation Platform at Scale

11.1.2. Automation Mesh

11.1.2.1. Benefits of Automation Mesh

11.1.2.2. Types of Nodes on Automation Mesh

11.1.2.3. What Are Instance Groups?

11.1.3. Planning Network Communication and Firewalls

11.1.3.1. Requirements for Control Nodes and Hybrid Nodes

11.1.3.2. Requirements for Hop Nodes

11.1.3.3. Requirements for Execution Nodes

11.1.4. Planning for Automation Mesh

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11.2. Deploying Distributed Execution with Automation Mesh

11.2.1. Configuring Automation Mesh

11.2.1.1. Creating Instance Groups

11.2.1.2. Adding Nodes to the Automation Mesh

11.2.1.3. Removing Nodes from the Automation Mesh

11.2.2. Visualizing Automation Mesh Topology

11.2.3. Automation Mesh Design Patterns

11.2.4. Validation Checks

11.3. Managing Distributed Execution with Automation Mesh

11.3.1. Managing Instance Groups in Automation Controller

11.3.1.1. Creating Instance Groups

11.3.1.2. Assigning Execution Nodes to an Instance Group

11.3.1.3. Running a Health Check on the Nodes

11.3.1.4. Disassociating a Node from an Instance Group

11.3.2. Assigning Default Instance Groups to Inventories and Job Templates

11.3.2.1. Configuring an Inventory to Use Instance Groups

11.3.2.2. Configure a Job Template to Use Instance Groups

11.3.2.3. Running a Job Template with Instance Groups

11.3.3. Testing the Resilience of Automation Mesh

11.3.3.1. Testing Control Plane Resilience

11.3.3.2. Testing Execution Plane Resilience

11.3.4. Monitoring Automation Mesh from the Web UI

11.3.5. Monitoring Automation Mesh from the Command Line

11.3.5.1. Listing Nodes and Instance Groups

11.3.5.2. Monitoring Automation Mesh Using the `receptorctl` Command

Appendix A: References and Additional Information

Ansible Docs/Tips and Tricks

- **Installing Software and other Packages:** https://ansible-tips-and-tricks.readthedocs.io/en/latest/os-dependent-tasks/installing_packages/
- **Ansible Tips and Tricks (Examples):** <https://github.com/nfaction/ansible-tips-and-tricks/wiki>
- **Ansible Product Demos:** <https://github.com/ansible/product-demos>
- **Ansible Workshops:** <https://github.com/ansible/workshops/tree/devel/provisioner>
- **Red Hat CoP - Automation Good Practices:**
 - <https://redhat-cop.github.io/automation-good-practices/>
 - <https://github.com/redhat-cop/automation-good-practices/>
- **Ansible Controller Collection:** <https://console.redhat.com/ansible/automation-hub/repo/published/ansible/controller/docs?keywords=>

Ansible KB Articles and Solutions

- **How Do I Perform Security Patching / OS Package Upgrades On Ansible Tower/Automation Controller Nodes Without Breaking Any Ansible Tower/Automation Controller Functionality ?:** <https://access.redhat.com/solutions/4566711>

Ansible Filters and Collections

- **Using filters to manipulate data (Jinja2 Templating):** https://docs.ansible.com/ansible/latest/user_guide/playbooks_filters.html
- **Community General:** <https://docs.ansible.com/ansible/latest/collections/community/general/index.html>

Ansible Blogs and Articles

- **When localhost isn't what it seems in Red Hat Ansible Automation Platform 2:** <https://www.ansible.com/blog/when-localhost-isnt-what-it-seems-in-red-hat-ansible-automation-platform-2>

Ansible Execution Environments

- **Execution Environments:** https://docs.ansible.com/automation-controller/4.2.0/html/userguide/execution_environments.html#ee-mount-options