

Turbonomic 6.1 Installation Guide

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Introduction

Thank you for choosing Turbonomic, the Intelligent Workload Automation Management solution for Cloud and Virtualized Environments. This guide gives you information you need to install Turbonomic in your virtual environment, install your license, and get started managing your resources.

If you have any questions, please see our support site at <https://support.turbonomic.com>.

Sincerely:

The Turbonomic Team



Task Overview

This *Turbonomic Installation Guide* provides instructions to accomplish the following tasks:

If you need to:	Perform or go to:
Deploy a new Turbonomic installation.	<ul style="list-style-type: none">• Review the <i>Turbonomic Release Notes</i>.• Ensure you satisfy the minimum requirements. See Minimum Requirements on page 8.• Perform the installation procedure in Installing Turbonomic on page 9.• Configure any settings if necessary. See General Configuration Tasks on page 23.• Log in for the first time. See License Installation and First-time Login on page 29.• Install your license. See License Installation and First-time Login on page 29.• Continue to use your Turbonomic instance. See the <i>Turbonomic User Guide</i> and the <i>Turbonomic Target Configuration Guide</i>.
Deploy a new Turbonomic installation on RHEL.	<ul style="list-style-type: none">• Review the <i>Turbonomic Release Notes</i>.• Ensure you satisfy the minimum requirements. See Requirements for RHEL and Setup on page 38.• Perform the installation procedure in Installing and Updating on a RHEL Platform on page 38.
Upgrade a license.	Follow the instructions in Upgrading Your Turbonomic License on page 30.
Update your existing Turbonomic installation.	<ul style="list-style-type: none">• Review the <i>Turbonomic Release Notes</i>.• Ensure you satisfy the minimum requirements for updating Turbonomic on supported hypervisors or the RHEL platform:<ul style="list-style-type: none">• Minimum Requirements on page 8.• Requirements for RHEL and Setup on page 38• Perform one of the following update procedures:<ul style="list-style-type: none">• Updating Turbonomic to a New Version on page 31• Updating the RHEL Deployment on page 41• Upgrade your license, if necessary. See Upgrading Your Turbonomic License on page 30.• Log in.• Continue to use your Turbonomic instance. See the <i>Turbonomic User Guide</i> and the <i>Turbonomic Target Configuration Guide</i>.

If you need to:	Perform or go to:
Migrate your Turbonomic instance to a newer version.	<ul style="list-style-type: none">• Review the <i>Turbonomic Release Notes</i>.• Review the migration decision table. See Do I Need to Migrate? on page 34• Ensure you satisfy the minimum requirements. See Minimum Requirements on page 8.• Perform the migration instructions in Migrating to a New Turbonomic Distribution on page 34.



Minimum Requirements

You can run Turbonomic on hosts that meet the following minimum requirements:

Supported Hypervisors		Storage Requirements	Memory	CPUs
VMware	vCenter versions 4.x, 5.x, 6.x running with ESXi 3.x, 4.x, 5.x, or 6.x	150GB or greater disk storage + swap space to match the RAM allocation (for example, 150GB + 16GB = 166GB)	16 GB	2 vCPUs — 4 vCPUs preferred
Citrix	XenServer versions 5.6.x and 6.x	150GB or greater disk storage		
Microsoft	Hyper-V as bundled with Windows 2016, 2008 R2, Hyper-V Server 2012, or Hyper-V Server 2012 R2			
Red Hat Enterprise Virtualization	RHEV versions 4.x and 3.x			
OpenStack	Icehouse or greater			
Nutanix AHV	All Acropolis versions			

NOTE: Minimum requirements depend on the size of your environment's inventory. The more datastores, hosts, VMs, and applications you have, the more resources you need to run the installation effectively. Also note that other management software might recommend that you run the Turbonomic VM with lower resources. Please be sure to give Turbonomic enough resources, using the guidelines above.

Turbonomic supports DHCP or static IP addressing. For information about using static IP addresses, see [\(Optional\) Specifying a Static IP Address](#) on page 23.



Installing Turbonomic

As you get started with Turbonomic, be aware that there are different downloads available for the supported hypervisors. These downloads all deliver the same version of Turbonomic with the same capabilities, but they are packaged to install and run on different hypervisor platforms. You can also install the Turbonomic software on a VM running Red Hat (see [Installing and Updating on a RHEL Platform](#) on page 38).

NOTE: Turbonomic OVA's are released on CentOS. To check if your operating system is running CentOS, perform the instructions in [How to Determine the Linux Kernel Version Running on Your Turbonomic Instance](#) on page 43. If your operating system is not CentOS, contact Turbonomic Technical Support for assistance.

Each installation manages virtual environments in exactly the same way. The installation you choose depends on the policies and standards for your enterprise. This document describes installation procedures for each of the Turbonomic downloads. *The installation you choose has no effect on the technologies you can manage with Turbonomic. No matter which type of machine hosts Turbonomic, you can manage all workloads running on the supported hypervisors, as well as those managed via cloud platforms and load balancer targets.*

This section describes how to install a new Turbonomic instance. If you are updating a current installation to new version, you should not perform a full install — Instead you should update your current installation. See [Updating Turbonomic to a New Version](#) on page 31. Before you perform an update, you should make sure you do not need to perform a migration, which includes migration of your historical and configuration data. *Check the Turbonomic Release Notes for migration requirements and refer to [Do I Need to Migrate?](#) on page 34 in this document.*

This section includes installation instructions for the following supported virtual platforms:

- [Installing on VMware Systems](#) on page 10
- [Installing on Citrix XenServer](#) on page 10
- [Installing on Microsoft Hyper-V](#) on page 11
- [Installing on RHEV Systems](#) on page 11
- [Installing on Nutanix AHV Systems](#) on page 12
- [Installing on OpenStack Systems](#) on page 13
- [Installing on AWS from the AWS Marketplace](#) on page 13
- [Installing on AWS](#) on page 15
- [Installing on Azure](#) on page 21

NOTE: If you want to use IAM Roles to discover AWS targets, then Turbonomic has to be deployed on AWS and you have to assign the Turbonomic instance to the IAM Role. For instructions, see the Green Circle article: <https://greencircle.vmturbo.com/docs/DOC-5593>. If you need assistance, contact Technical Support.

Installing on VMware Systems

This download of the Turbonomic instance is in the .OVA 1.0 format.

To install Turbonomic:

1. Download the Turbonomic installation package.

Refer to the email you received from Turbonomic for links to the Turbonomic download pages.

2. Import the OVA file into your VMware infrastructure using vCenter.

3. Start the Turbonomic appliance and record its IP address.

Users navigate to the appliance IP address to start up the Web User Interface in a browser.

4. If necessary, specify a static IP address for the appliance.

If your environment does not have DHCP, or if you want to give the Turbonomic instance a static IP address, see [\(Optional\) Specifying a Static IP Address](#) on page 23.

5. Perform the required configuration steps for the Turbonomic instance.

See [General Configuration Tasks](#) on page 23.

Installing on Citrix XenServer

1. Download the Turbonomic installation package.

Refer to the email you received from Turbonomic for links to the Turbonomic download pages.

2. Unpack the .gzip file to a machine that can be accessed by the XenCenter import operation.

3. In the XenCenter application, select File > Import to open the Import Wizard.

4. Follow the steps in the Wizard and provide this information:

- The location of the Turbonomic instance you want to import
- The home server in which you will import Turbonomic
- The storage repository that provides disks for the Turbonomic instance
- Virtual network interfaces for the Turbonomic instance

5. Click Finish to import the Turbonomic instance.

6. Start the Turbonomic appliance and record its IP address.

Users navigate to the appliance IP address to start up the Web User Interface in a browser.

7. If necessary, specify a static IP address for the appliance.

If your environment does not have DHCP, or if you want to give the Turbonomic instance a static IP address, see [\(Optional\) Specifying a Static IP Address](#) on page 23.

8. Perform the required configuration steps for the Turbonomic instance.

See [General Configuration Tasks](#) on page 23.

Installing on Microsoft Hyper-V

1. Download the Turbonomic installation package.

Refer to the email you received from Turbonomic for links to the Turbonomic download pages.

2. Expand the .zip file and copy the contents, which includes the Virtual Machine image, to your Hyper-V server (either to your cluster shared volume or to a local hard drive).

3. Use the Import Virtual Machine Wizard in the Hyper-V Manager to import the Virtual Machine into your environment.

4. Make sure your virtual network adapter is connected to the correct virtual network.

5. Ensure the Turbonomic instance will have sufficient memory.

Turbonomic recommends that you use static memory for your Turbonomic instance. However, you can specify static or dynamic memory for the instance.

In **Properties** for the instance, navigate to **Hardware Configuration**:

- For Static Memory, set **Virtual machine memory** to at least 16 GB.
- For Dynamic Memory, then set **Startup memory** and **Minimum memory** to 16 GB.

6. Start the Turbonomic appliance and record its IP address.

Users navigate to the appliance IP address to start up the Web User Interface in a browser.

7. If necessary, specify a static IP address for the appliance.

If your environment does not have DHCP, or if you want to give the Turbonomic instance a static IP address, see [\(Optional\) Specifying a Static IP Address](#) on page 23.

8. Perform the required configuration steps for the Turbonomic instance.

See [General Configuration Tasks](#) on page 23.

NOTE: The Turbonomic instance configuration includes a NIC that is not connected to any network. After installing the instance, you should use the Hyper-V Manager to configure the network and VLAN settings to suit the requirements of your cluster's network.

Installing on RHEV Systems

Turbonomic distributes the Turbonomic instance as TGZ archives. RHEV provides a utility named `rhev-image-uploader` that you must use to upload and import the Turbonomic instance to a system in the RHEV environment. This utility must be installed before you can use it. For more information, refer to the RHEV portal article, *RHEV: How do I use an appliance downloaded from the Market Place?* You can find this article at:

<https://access.redhat.com/knowledge/articles/67891>.

The following steps assume you have:

- The `rhev-image-uploader` installed and configured.
- Identified the export domain where you will upload the Turbonomic instance.

1. Download the Turbonomic installation package.

Refer to the email you received from Turbonomic for links to the Turbonomic download pages.

2. Upload the .TGZ file to the identified export domain.

Use the `rhev-image-uploader` utility to upload the .TGZ file. Execute the following command:

```
# rhevm-image-uploader -e <export_domain> --name <name> upload <filename.tgz>
```

where `<export_domain>` is the name of the export domain, and `<name>` is the name of the VM you want to create for the Turbonomic instance. You must execute this command on a system that can mount the NFS export domain.

3. Import a VM from the package into the export domain.

- Open the RHEV admin interface and display the **Storage** tab.
- Locate and select the identified export domain, and click **Import**.
- In the confirmation dialog that appears, click **OK**.

The import operation may take some time — import runs in the background. When the import process is done, an event "Vm <name> was successfully imported" appears under the **Events** tab.

4. Attach the Turbonomic VM to the "rhev" network.

The `rhev-image-uploader` tool does not create any network interfaces. You must manually create a network interface and attach the VM to the `rhev` network.

- In the RHEV admin interface, display the **Virtual Machines** tab.
- Locate and select the Turbonomic virtual machine you just created.
- Click **Network Interfaces** and then **New**.
- Use the provided default values and click **OK**.

5. Start the Turbonomic appliance and record its IP address.

Users navigate to the appliance IP address to start up the Web User Interface in a browser.

6. If necessary, specify a static IP address for the appliance.

If your environment does not have DHCP, or if you want to give the Turbonomic instance a static IP address, see [\(Optional\) Specifying a Static IP Address](#) on page 23.

7. Perform the required configuration steps for the Turbonomic instance.

See [General Configuration Tasks](#) on page 23.

Installing on Nutanix AHV Systems

This download of the Turbonomic instance is in the QCOW2 format.

To install Turbonomic:

1. Download the Turbonomic installation package.

Refer to the email you received from Turbonomic for links to the Turbonomic download pages.

2. Extract the image from the archive.

3. Upload the image in Nutanix using the Image Configuration wizard.

During the wizard process, ensure the image meets the Turbonomic minimum requirements.

4. Verify that the image is active after the configuration is complete.

5. Launch an instance that meets the minimum requirements, using the previously created image.

Installing on OpenStack Systems

This download of the Turbonomic instance is in the QCOW2 format.

To install Turbonomic:

1. **Download the Turbonomic installation package.**

Refer to the email you received from Turbonomic for links to the Turbonomic download pages.

2. **Upload the image in OpenStack using the Create Image wizard.**

NOTE: You may need to extract the image from the archive.

3. **Create a flavor that meets the minimum requirements in the Create Flavor wizard.**

4. **Launch an instance using the previously created flavor and image.**

Installing on AWS from the AWS Marketplace

This installation of Turbonomic is presented as an Amazon Machine Image (AMI).

Turbonomic supports two methods for installing the Turbonomic instance on AWS:

- Use the 1-Click Launch method from the AWS Marketplace which is described in this section.
- Use the CloudFormation template offered by Turbonomic which is described in [Installing on AWS](#) on page 15.

For both methods, you need to ensure that your deployment follows Turbonomic and Amazon best practices, including:

- Automatic scheduling and executing of EBS data volume snapshots
AWS will perform these snapshots daily and store them in a user-created S3 bucket on a rolling 14-day period.
- EBS volume encryption
Turbonomic recommends using a Security Group to only allow access to the Turbonomic instance through HTTPS.
- Setup and use of Identity and Access Management (IAM) Instance Profiles (Instance Roles) for authentication
Turbonomic recommends Instance Roles over Access Keys. Instance Roles are much easier to manage for compliance purposes, and are natively supported by the AWS SDK.
Further, Turbonomic recommends enabling cross-account access for your Instance roles by following the steps found here: <https://aws.amazon.com/blogs/security/how-to-enable-cross-account-access-to-the-aws-management-console/>.
- Utilize auto-scaling for HA/recovery purposes
Through AWS's auto-scaling, Turbonomic ensures that there is an instance running at all times.

The CloudFormation template ensures that these best practices are followed. If you deploy from the AWS Marketplace, you are responsible for ensuring that these best practices are followed.

(Optional) 1-Click Launch Method: Creating a Security Group

When you install Turbonomic using the 1-Click Launch on the AWS Marketplace, you can select a security group that you created or use the Turbonomic default security group.

If you create your own security group, the minimum Turbonomic requirements are:

- The security group restricts access to HTTPS only for the Turbonomic instance.
- For the Outbound rule (outgoing browser connection from Turbonomic), it can be any TCP to anywhere.
- For the Inbound rule (incoming browser connection to Turbonomic), it needs to allow SSH according to your company's SSH policies from anywhere and uses ports 443 or 80. If you configure the Turbonomic User Interface to only accept incoming connections from port 443, then the security group also needs to use port 443.

As an alternative, you can also modify the Turbonomic default security group afterwards in AWS EC2 by editing the security group after the VM is deployed.

Read the Amazon documentation for more information on security groups. See http://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC_SecurityGroups.html.

Using 1-Click Launch on the AWS Marketplace

This section describes how to install the Turbonomic instance on AWS from the AWS Marketplace.

You can install the Turbonomic instance from the AWS Marketplace as described in the Green Circle article: <https://greencircle.vmturbo.com/docs/DOC-5413>.

Before you begin, make sure that you have:

- AWS Account Access
- (Optional) A security group that you created instead of the Turbonomic default security group.

To install Turbonomic from the AWS Marketplace:

- 1. Navigate your Web browser to the AWS Marketplace: Hybrid Cloud Management Platform.**
Use the URL: <https://aws.amazon.com/marketplace/pp/B073FDDGRP>.
- 2. Click Continue to Subscribe.**
- 3. Log in to your AWS account.**
- 4. Choose values for the following items:**
 - Region
 - EC2 Instance Type
 - Security group. Select an existing security group or accept the default one provided by Turbonomic.
 - Key Pair
- 5. Click Launch with 1-click.**
- 6. Verify in the EC2 console that your AMI EC2 instance is running and passed the status check.**

IMPORTANT: Make a record of the instance ID displayed in this screen. It is the default password for the Turbonomic administrator user.

7. Log in to your Turbonomic instance.

Launch your Turbonomic instance in a Web browser.

- Use the default credential for **Username**: administrator.
- Type the <instance ID> for **Password**.

Make sure to use the `https://` protocol.

You can change the administrator password after your initial login.

Installing on AWS

This installation of Turbonomic is presented as an Amazon Machine Image (AMI).

Turbonomic supports two methods for installing the Turbonomic instance on AWS:

- Use the 1-Click Launch method from the AWS Marketplace. See [Installing on AWS from the AWS Marketplace](#) on page 13.
- Use the CloudFormation template offered by Turbonomic which is described in this section.

For both methods, you need to ensure that your deployment follows Turbonomic and Amazon best practices, including:

- Automatic scheduling and executing of EBS data volume snapshots
AWS will perform these snapshots daily and store them in a user-created S3 bucket on a rolling 14-day period.
- EBS volume encryption
Turbonomic recommends using a Security Group to only allow access to the Turbonomic instance through HTTPS.
- Setup and use of Identity and Access Management (IAM) Instance Profiles (Instance Roles) for authentication
Turbonomic recommends Instance Roles over Access Keys. Instance Roles are much easier to manage for compliance purposes, and are natively supported by the AWS SDK.
Further, Turbonomic recommends enabling cross-account access for your Instance roles by following the steps found here: <https://aws.amazon.com/blogs/security/how-to-enable-cross-account-access-to-the-aws-management-console/>.
- Utilize auto-scaling for HA/recovery purposes
Through AWS's auto-scaling, Turbonomic ensures that there is an instance running at all times.

The CloudFormation template ensures that these best practices are followed. If you deploy from the AWS Marketplace, you are responsible for ensuring that these best practices are followed.

Installing using the CloudFormation Template

This template directs you through launching a VM that runs CentOS and that hosts a Turbonomic instance. This template ensures that your deployment will follow both Turbonomic and Amazon best practices.

To install Turbonomic using the CloudFormation template:

1. Download the Turbonomic CloudFormation template.

The template is provided from the Green Circle article:

<https://greencircle.vmturbo.com/docs/DOC-5274>

2. Modify the template to set parameters depending on your AWS environment.

For information, review the [CloudFormation Template Summary](#) on page 16.

3. Log in to your AWS console and select the CloudFormation service.

4. Create a new Stack.

When you are prompted for your template:

- a) Select **Upload a template to Amazon S3**.
- b) Choose the template you downloaded and modified.
- c) Click **Next**.

5. On the Specify Details page, enter your stack information.

Enter a stack name and choose the image size. Click **Next**.

NOTE: *Turbonomic recommends the `m4.xlarge` template, but you can also use `m4.large` or `m4.2xlarge`.*

6. On the Options page, enter any tags you need.

For example, change the default values for the Key-Value pair to set periodic backups of your data.

After you add any tags, click **Next**.

Tags are a convenient way to group instances based on security needs, business requirements, and more. See <https://aws.amazon.com/answers/account-management/aws-tagging-strategies/> for more information.

7. On the Review page, ensure that your selections are correct.

Once you have reviewed your selections and are satisfied, click **Create**.

(Optional) Creating a Security Group

NOTE: *When you install Turbonomic via the CloudFormation template, that installation automatically performs this step.*

If you install Turbonomic without using the CloudFormation template, Turbonomic recommends that you create a security group to restrict access to HTTPS only for the Turbonomic instance and attach this group to the Turbonomic instance.

Read the Amazon documentation for more information on security groups. See http://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC_SecurityGroups.html

CloudFormation Template Summary

This section provides additional explanations about portions of the CloudFormation template which may be useful when you are preparing your template.

This snippet creates the structure of the CloudFormation template, used by the rest of the template.

Metadata:

Instances:

Description: Your Turbonomic instance is created with an encrypted EBS Volume. If you create an encrypted volume and don't specify this property, AWS CloudFormation uses the default master key.

```
'AWS::CloudFormation::Designer':
  5979b605-17c1-4e1a-9158-ae132fb86736:
    size:
```



```

    width: 60
    height: 60
  position:
    x: 30
    'y': -20
    z: 1
  embeds: []
ef20cdef-19a0-4d61-9f16-0108bb0330e1:
  size:
    width: 60
    height: 60
  position:
    x: 150
    'y': 10
    z: 1
  embeds: []
  dependson:
    - ea836120-be24-44ab-bd80-e2c9749fad84
    - b4bc499e-9882-4ab9-9c37-e165e51fe589
ea836120-be24-44ab-bd80-e2c9749fad84:
  size:
    width: 60
    height: 60
  position:
    x: -60
    'y': 210
    z: 1
  embeds: []
b4bc499e-9882-4ab9-9c37-e165e51fe589:
  size:
    width: 60
    height: 60
  position:
    x: 180
    'y': 210
    z: 1
  embeds: []
  dependson:
    - ea836120-be24-44ab-bd80-e2c9749fad84
  isrelatedto:
    - ea836120-be24-44ab-bd80-e2c9749fad84
6e649c64-891f-4e11-a83a-2df5cf26d0b5:
  source:
    id: ef20cdef-19a0-4d61-9f16-0108bb0330e1
  target:
    id: ea836120-be24-44ab-bd80-e2c9749fad84
  z: 2
7c216255-250c-4574-9bcf-fb02673b306e:
  source:
    id: ef20cdef-19a0-4d61-9f16-0108bb0330e1
  target:
    id: b4bc499e-9882-4ab9-9c37-e165e51fe589
  z: 2
84fca9b5-0bb0-4a88-b0e3-c74af6b00b80:
  source:

```

```

    id: b4bc499e-9882-4ab9-9c37-e165e51fe589
  target:
    id: ea836120-be24-44ab-bd80-e2c9749fad84
  z: 2

```

The following snippet sets the allowable deployment templates, and defines your VPC ID to use later in the template.

Parameters:

```

InstanceTypeParameter:
  Type: String
  Default: m4.xlarge
  AllowedValues:
    - m4.large
    - m4.xlarge
    - m4.2xlarge
  Description: 'Enter m4.large, m4.xlarge, or m4.2xlarge. Default is m4.xlarge.'
VpcIdParameter:
  Type: 'List<AWS::EC2::VPC::Id>'
  Description: VpcId of your existing Virtual Private Cloud (VPC)
  ConstraintDescription: must be the VPC Id of an existing Virtual Private Cloud.

```

The following snippet maps the various AWS regions to ensure that your Turbonomic instance is deployed in your default region.

NOTE: The list of available AMIs by region changes periodically. To obtain the latest list of AMIs for Turbonomic, go to the AWS Marketplace and log in with your AWS credentials. Select the Manual Launch tab. Then, select the latest version of Turbonomic to display the regions and AMI IDs. Make a record of the regions and AMI IDs for use in your template.

Mappings:

```

RegionMaptoAMI:
  us-east-2:
    AMI:
      - "ami-366f4e53"
  us-east-1:
    AMI:
      - "ami-7ae9c16c"
  us-west-1:
    AMI:
      - "ami-898fa2e9"
  us-west-2:
    AMI:
      - "ami-f656428f"
  ap-south-1:
    AMI:
      - "ami-f23f419d"
  ap-northeast-2:
    AMI:
      - "ami-76f02f18"
  ap-southeast-1:
    AMI:
      - "ami-756fe316"
  ap-southeast-2:
    AMI:
      - "ami-f32d3d90"
  ap-northeast-1:

```

```

AMI:
- "ami-e834208f"
ca-central-1:
AMI:
- "ami-28cd724c"
eu-central-1:
AMI:
- "ami-72eb4d1d"
eu-west-1:
AMI:
- "ami-1d7b607b"
eu-west-2:
AMI:
- "ami-eb61778f"
sa-east-1:
AMI:
- "ami-cce289a0"

```

The following snippet creates the Turbonomic security group, which limits access to the Turbonomic instance to HTTPS only:

Resources:

```

TurbonomicSecurityGroup:
Type: AWS::EC2::SecurityGroup
Properties:
GroupName: TurbonomicSecurityGroup
GroupDescription: Creates and limits access to Turbonomic instance through port
443 only
VpcId:
Ref: VpcIdParameter
SecurityGroupIngress:
- IpProtocol: tcp
FromPort: '443'
ToPort: '443'
CidrIp: 0.0.0.0/0
Metadata:
  'AWS::CloudFormation::Designer':
    id: ef20cdef-19a0-4d61-9f16-0108bb0330e1
DependsOn:
- Turbonomic

```

The following snippet sets the following items for the Turbonomic instance:

- Instance size
- Instance region
- Block storage properties, including access, backup, and encryption
- Security Group

NOTE: `DeleteOnTermination` is set to `false` by default. This ensures that even if the EC2 instance is terminated at a later time, the data will persist.

```

Turbonomic:
Type: 'AWS::EC2::Instance'
Properties:
  InstanceType:
    Ref: InstanceTypeParameter

```

```

ImageId:
  'Fn::FindInMap':
    - RegionMaptoAMI
    - Ref: 'AWS::Region'
    - AMI
BlockDeviceMappings:
  - DeviceName: /dev/sdi
    Ebs:
      VolumeType: gp2
      DeleteOnTermination: false
      VolumeSize: 150
      Encrypted: true
EbsOptimized: true
InstanceInitiatedShutdownBehavior: stop
Metadata:
  'AWS::CloudFormation::Designer':
    id: ea836120-be24-44ab-bd80-e2c9749fad84

```

The following snippet creates an auto scaling group of 1, which ensures that a Turbonomic EC2 instance is always running:

```

TurbonomicAutoScalingGroup:
  Type: 'AWS::AutoScaling::AutoScalingGroup'
  Properties:
    AvailabilityZones:
      - !GetAtt Turbonomic.AvailabilityZone
    InstanceId:
      Ref: Turbonomic
    Cooldown: '1800'
    MinSize: '1'
    MaxSize: '1'
    DesiredCapacity: '1'
    HealthCheckType: EC2
    HealthCheckGracePeriod: 900
  Metadata:
    'AWS::CloudFormation::Designer':
      id: b4bc499e-9882-4ab9-9c37-e165e51fe589
  DependsOn:
    - Turbonomic

```

The following snippet creates the S3 bucket required for the daily backups:

```

TurbonomicS3BackupBucket:
  Type: 'AWS::S3::Bucket'
  Properties:
    AccessControl: AuthenticatedRead
    BucketName: turbonomic-s3-volume-backup-bucket
  Metadata:
    'AWS::CloudFormation::Designer':
      id: 5979b605-17c1-4e1a-9158-ae132fb86736

```

Installing on Azure

Turbonomic provides the Azure Marketplace Template that you can use to deploy a Turbonomic instance on an Azure cloud account. This template simplifies setup, and ensures compliance with Turbonomic minimum requirements.

Prerequisites

Before you begin, make sure you have the following:

- Access to the Azure portal.
- An active Azure subscription with permissions to deploy VMs.
- A valid Turbonomic license.

Installing Turbonomic

To install Turbonomic on Azure:

1. Log in to your Azure portal.

Use the URL: `https://portal.azure.com` and log in with your Azure credentials.

2. Open the Turbonomic template.

Navigate to

`https://azuremarketplace.microsoft.com/en-us/marketplace/apps/vmturbo.turbonomic?tab=Overview`

Then, click **Get It Now**.

3. Specify deployment details for the new template.

On the template details page, click **Create**. In the new window, enter the following details:

- Name:
The name of the Turbonomic Server
- VM Disk Type:
HDD
- Username:
`azureuser`

NOTE: You must enter `azureuser` in this Username field. It is a required value.

- Authentication Type:
Select either **SSH public key** or **password**, and provide the required information.
- Subscription:
Select the Azure subscription for the deployment.
- Resource Group:
Select an existing or create a new Resource Group in which you will deploy the Turbonomic VM.

- Location:
Select the Azure region in which you will deploy the Turbonomic VM.
Click **OK** to advance to the next window.
- 4. Choose the Azure VM Template for the VM that will host the Turbonomic instance.**
In the Template Selection window, select an Azure VM Template for the Turbonomic instance. Turbonomic recommends `D3_V2 Standard`, but you may use any template that meets the Turbonomic minimum requirements.
Click **OK** to advance to the next window.
- 5. Configure the VM to enable Turbonomic monitoring.**
To collect all necessary information about your environment, Turbonomic requires the following values be used (You may set values not mentioned specifically according to company policy):
 - Firewall:
Do not remove the default ports
 - Auto Shutdown:
Off
 - Boot Diagnostics:
Enabled
 - Guest OS Diagnostics:
EnabledClick **OK** to advance to the next window.
- 6. Verify your settings and purchase the template.**
Before you purchase the template, be sure to verify your settings. When you are satisfied, click **Purchase**.
- 7. Finalize the VM setup.**
Once Azure has deployed the Turbonomic template, navigate a browser to the Azure-assigned IP. Make sure to use the `https://` protocol.
Follow the on-screen prompts to set up and begin using your Turbonomic instance.

NOTE: You may see an HTTPS certificate error when navigating to the instance. Ignore this warning.



General Configuration Tasks

After you install the Turbonomic instance, perform the following configuration tasks:

- (Optional) Specify a static IP address.
- (Best practice) Synchronize the system clock.
- (Optional) Configure remote MariaDB connections.
- (Required) Ensure the ports that Turbonomic needs for network communication are open.
- (Optional) Enforce secure access by installing a trusted certificate.

(Optional) Specifying a Static IP Address

Many installations use DHCP for dynamic IP address allocation. You can also specify a static address via the virtual machine's IP configuration.

Only if you need to specify a static IP address, choose one of the following methods:

- Use the `ipsetup` script from Turbonomic.
- Configure the static IP address manually as described in this topic.

The `ipsetup` Script

Turbonomic provides the `ipsetup` script to assist you with this task.

1. Open an SSH terminal session to your Turbonomic instance.

Use the following default credentials:

- Username: `root`
- Password: `vmturbo`

2. Once the session is open, execute the script with the `ipsetup` command.

Manually Configuring a Static IP Address

NOTE: If you are configuring a static IP for an installation running on a XenServer VM, use the instructions in the following support article:

<https://support.turbonomic.com/hc/en-us/articles/200681546>

To specify a static IP address, perform these steps:

1. Open an SSH terminal session to your Turbonomic instance.

Use the following default credentials:

- Username: `root`
- Password: `vmturbo`

2. Open the connection editor.

- a) Execute the `nmtui` command.
This opens the user interface for the NetworkManager.
- b) Select **Edit a connection** to open the editor.

3. Add a new connection.

Select the **Add** option on the screen to open the New Connection dialog box.

4. Add an Ethernet connection.

- a) Select **Ethernet** from the list of options and complete the following information (values given are examples only):
 - Profile Name: `eth0`
 - Device: `eth0`
 - IPv4 Configuration: `Manual`
 - Select **Show** and complete the Configuration sub-settings based on your environment.
- b) Select **OK** to return to the configuration list.

5. Verify that the connection you created is present.

6. Select Quit to return to the command line.

7. Restart the network services.

```
service network restart
```

The network service restarts successfully.

8. Verify that your machine is accessible and the static IP address is correct.

```
ifconfig eth0
```

This procedure applies the IP address to the Turbonomic instance. You can now access the Web user interface using this IP address.

(Best practice) Synchronizing Time

It is important that you synchronize the clock on the Turbonomic instance with the devices on the same network. For performance reasons, Turbonomic recommends that you set your Turbonomic system clock to your time zone, because Turbonomic runs regular data maintenance processes at night. Use the Network Time Protocol daemon (`ntpd`) to set your Turbonomic system clock.

(Optional) Configuring remote MariaDB connections for the Turbonomic instance

If you want to allow remote client connections to the MariaDB database in the Turbonomic instance, you can replace the local host bind address (`127.0.0.1`) with the IP address of your Turbonomic instance.

To configure remote client connections to the MariaDB database, perform these steps:

1. **Open an SSH terminal session to your Turbonomic instance.**
Use the following default credentials:
 - Username: `root`
 - Password: `vmturbo`
2. **Open the `bind-addr` configuration file.**
For example, use the `vi /etc/my.cnf.d/bind-addr.cnf` command.
3. **Set the `bind_address` parameter to the IP address of your Turbonomic instance.**
For example: `bind_address=10.10.10.123`
4. **Save the file.**
5. **Restart the MariaDB service.**
Execute the `systemctl restart mariadb` command.

(Required) Ports

Ensure the ports for network communication are open.

Turbonomic uses the following ports:

Port:	To support:
80	Incoming browser connections over HTTP
443	<ul style="list-style-type: none"> • Incoming browser connections over HTTPS • Proactive Support (automatically generate support tickets for Turbonomic issues)

For browser connections with the Turbonomic instance, you should use either port 80 or 443.

NOTE: Various targets that you use with Turbonomic may require you to open ports on those target servers to allow communications with Turbonomic. For more information, see the *Turbonomic Target Configuration Guide*.

(Optional) Enforcing Secure Access

If your company policy requires a trusted certificate, Turbonomic enables you to install a trusted certificate from a known certificate authority. For more information, see:

<https://greencircle.vmturbo.com/docs/DOC-4630>

1. Request a certificate.

a) Open an SSH terminal session to your Turbonomic instance.

The default credentials are:

- Username: root
- Password: vmturbo

b) Change to the `/private` directory where you will store the private key.

```
cd /etc/pki/tls/private
```

c) Execute the command to create the private key file.

```
openssl genrsa -out turbonomic.key 2048
```

d) Create a file containing the information used to generate the CSR.

```
vi certsignreq.cfg
```

e) In the file, insert the following code and specify the fields:

```
[req]
ts = 2048
prompt = no
default_md = sha256
req_extensions = req_ext
distinguished_name = dn

[dn]
C=<country, 2 letter code>
L=<city>
O=<company>
OU=<organizational unit name>
CN=<FQDN>
emailAddress=<email address>

[req_ext]
subjectAltName = <alternate domains to use with the SSL Certificate>

[alt_names]
DNS.1 = <FQDN>
DNS.2 = <server's short name>
DNS.3 = <server's IP address>
```

NOTE:

- For the CN field, specify the fully-qualified domain name of the Turbonomic instance.
- Alternate names are other ways to access the Turbonomic instance. In the alternate names ([alt_names]) section, the value for the DNS.1 field is required. For the DNS.1 field, specify the fully-qualified domain name of the Turbonomic instance. Values for the DNS.2 and DNS.3 fields are optional. You can add more DNS.<n> fields if needed.

For example:

```

root@turbonomic:/etc/pki/tls/private
[root@turbonomic private] vim certsignreq.cfg

ts = 2048
prompt = no
default_md = sha256
req_extensions = req_ext
distinguished_name = dn

[dn]
C=US
ST=New York
L=White Plains
O=Turbonomic
OU=Educational Services
CN=demo.turbonomic.com
emailAddress= <first.lastname>@turbonomic.com

[req_ext]
subjectAltName = @alt_names

[alt_names]
DNS.1 = demo.turbonomic.com
DNS.2 = demo
DNS.3 = my.ip.add.ress
  
```

f) Write and quit the file.

Press **esc**, type `:wq!`, and press **Enter**.

g) Create the certificate request file.

Execute the command:

```
openssl req -new -sha256 -nodes -out turbonomic.csr -key turbonomic.key -
config certsignreq.cfg
```

h) Transfer the certificate request file to your local machine.

The path to the certificate request file (turbonomic.csr) on your remote machine is `/etc/pki/tls/private`.

i) Send this file to your certificate authority.

Your certificate authority will use this file to create the certificate for you.

2. Rename the certificate file.

When you receive the certificate file from your certificate authority (CA), check the name of the certificate file.

Rename it to `turbonomic.crt`.

For an Intermediate Certificate Bundle, certificate authorities (for example, GoDaddy or Symantec) may use intermediate certificates as a proxy to their root certificate for security purposes – if so, you will also receive a certificate chain bundle. If this is the case, also name the certificate chain with the `.crt` extension (for example: `<intermediate>.crt`).

3. Upload the certificate.

Transfer the above certificate file(s) to the `/etc/pki/tls/certs` directory of the Turbonomic instance.

4. Apply the certificate.

a) Open an SSH terminal session to your Turbonomic instance.

The default credentials are:

- Username: `root`
- Password: `vmturbo`

b) Make a backup file of the `ssl.conf` file.

```
cp /etc/httpd/conf.d/ssl.conf /etc/httpd/conf.d/ssl.conf-LOCALHOST
```

c) Open the `ssl.conf` file.

```
vi /etc/httpd/conf.d/ssl.conf
```

d) Edit the `ssl.conf` file to specify the file paths for the new key and crt files.

- Replace the `localhost.crt` with the name of the new certificate (`turbonomic.crt`).

```
# Server Certificate
```

```
SSLCertificateFile /etc/pki/tls/certs/localhost.crt
```

- Also, replace the `localhost.key` with the name of the new key file (`turbonomic.key`).

```
# Server Private Key
```

```
SSLCertificateKeyFile /etc/pki/tls/private/localhost.key
```

- If you received an intermediate certificate bundle, replace the `server-chain.crt` with the name of the new intermediate file (`<intermediate>.crt`).

```
# Server Certificate Chain
```

```
SSLCertificateChainFile /etc/pki/tls/certs/server-chain.crt
```

e) Write and quit the `ssl.conf` file.

```
esc :wq!
```

f) Restart the `httpd` service.

```
service httpd restart
```

5. (Optional) Set up secure LDAP.

a) Save the SSL Certificate information from your LDAPS Server to a `.CER` file.

For example, view the certificate properties and click **Save As** or **Export** to create a `.CER` file.

b) Transfer this `.CER` file from your system to the Turbonomic appliance.

For example, use the SCP (secure copy) command with the default credentials (`root/vmturbo`) to copy the `.CER` file to the `/tmp` directory of the Turbonomic instance.

c) In the Turbonomic instance, copy the `.CER` file to the `/anchors` directory.

For example, copy the `rootca.cer` file to the `/usr/share/pki/ca-trust-source/anchors/` directory.

d) Run the `update-ca-trust` command as `root`.

This automatically updates the built-in `cacerts` jks and puts the certificates in the proper location to be used by `curl` without additional options.

e) Restart the `Tomcat` service.

```
/bin/service tomcat restart
```



License Installation and First-time Login

Before you begin, make sure you have your full or trial license key file that was sent to you in a separate email.

To use Turbonomic for the first time, perform the following steps:

1. Type the IP address of your installed Turbonomic instance in a Web browser to connect to it.

2. Log in to Turbonomic.

- Use the default credential for **Username**: administrator.
- Type a password for **Password**.
- Type the password again to verify it.

3. Install your license.

A wizard directs you to install your license:

- In the License Page of the wizard, copy your license key file into the license window.
- Then complete the wizard.

Depending on which license you have installed, the license enables either a trial or a full unlimited license for Turbonomic.

License Installation: Alternate procedure

You can also install a license without using the wizard interface.

1. Log in to Turbonomic.

2. Select Settings > License.

3. Copy your license key file into the License Configuration window.

4. Click Save.

Depending on which license you have installed, the license enables either a trial or a full unlimited license for Turbonomic.

Upgrading Your Turbonomic License

If you purchased a license to upgrade from a trial version to a full version, or if you purchased a license to add more workload capacity to your installation, you will receive a new license in an email message.

To install this new license, perform the following steps:

1. **Select Settings > License.**
2. **Click Update License.**
3. **Copy your license key file into the License Configuration window.**
4. **Click Save.**

Once you install the new license, the additional workload capacity automatically becomes available to you. For an upgrade from a trial license to a full or different license, the features become available as well as any data collected in a database during a trial evaluation.



Updating Turbonomic to a New Version

IMPORTANT: ONLY PERFORM THESE UPDATE STEPS IF YOU ARE SURE YOU DO NOT NEED TO MIGRATE TO A NEW DISTRIBUTION. *It is important to verify that you do not need to migrate to a newer Turbonomic VM distribution.* For more information, see [Migrating to a New Turbonomic Distribution](#) on page 34.

Turbonomic continually and rapidly innovates and improves all aspects of this product. This means that Turbonomic periodically releases newer versions of this product. You should check regularly to see if a new version is available.

When a new version is available, it is important to properly update your existing installed instance, rather than just install a new one. When you first installed Turbonomic, you put into place sophisticated data collection and analysis processes. Internal to the installation is an integrated database that retains performance data from across your virtual environment. Turbonomic uses this historical data for right-sizing, projecting trends, and other analysis. This means that the database is important to Turbonomic *and becomes more so over time*. Properly updating your installation of Turbonomic preserves the database for continued use.

For free evaluation versions of Turbonomic, these installations also use the database, even though the more advanced functionality based on this data might not be available. If you later install a different license, the newly added features can use the stored data.

To perform an online update of your Turbonomic installation:

1. Ensure your server has external Internet access.

External access is necessary to perform an online update. If your installation does not have external Internet access, navigate to the following location to get started with an offline update:

`https://greencircle.turbonomic.com/docs/DOC-1292`

2. Save a snapshot of your current Turbonomic VM.

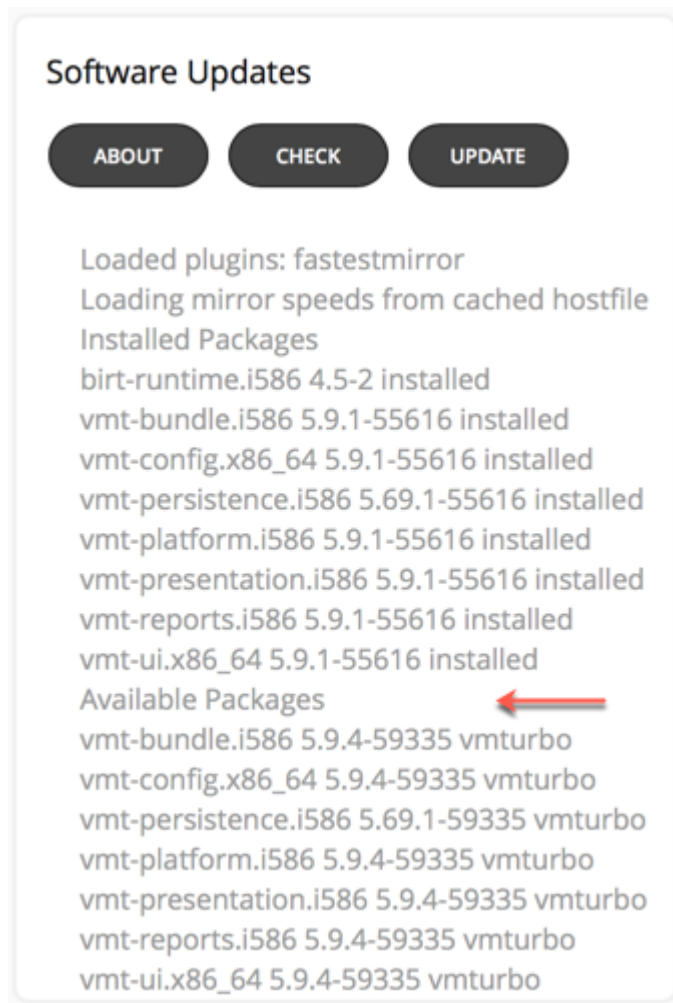
Before updating, you should properly shut down (not power off) the Turbonomic VM and perform a snapshot (or clone the VM). This provides a reliable restore point you can turn to in the event that trouble occurs during the update. After you have the snapshot, bring the VM back online.

3. Check the version of your current installation and check to see whether a new version is available.

To check for newer versions, select **Settings > Updates**. In the Software Updates section, click **Check** to compare your current version with the latest available version.

The listing shows numbers for the current and available versions of the packages that make up Turbonomic. If the listing shows a higher version number for the available version, you can update your installation.

In this example, a newer version 5.9.4 is available for the 5.9.1 installation:



4. Update your current product to the newer version.

To update your current installation, click **Update**.

Turbonomic updates automatically, and the update completes in a few minutes.

5. Refresh your browser.

If you use the Classic UI, you also need to clear the Flash cache. Refer to [When do I need to clear my local Adobe Flash cache?](#) on page 44 for more information.

After refreshing, you have full access to Turbonomic features. However, features that rely on current analysis data will not be available until after a full market cycle — usually 10 minutes. For example, the Lists of Pending Actions will not show any actions until after a full market cycle.

6. Verify the new version.

Navigate to **Settings > Updates** and click **About**.

7. (Optional) Allow remote client connections.

For instructions, see [\(Optional\) Configuring remote MariaDB connections for the Turbonomic instance](#) on page 25.

8. Notify your fellow users to refresh their Turbonomic browser sessions.

If your fellow users use the Classic UI, they also need to clear the Flash cache. Refer to [When do I need to clear my local Adobe Flash cache?](#) on page 44 for more information.



Migrating to a New Turbonomic Distribution

IMPORTANT: PERFORM THESE MIGRATION STEPS ONLY IF YOU INTEND TO MIGRATE TO A NEWER VERSION OF THE VM OS AND PLATFORM. Occasionally, a new version of Turbonomic includes improvements that require a full installation of a new VM. This new VM will replace your current installation of Turbonomic. *Simply updating your current installation will not properly migrate your data to the newer version of Turbonomic .*

There are occasions when the new version of Turbonomic includes changes to the platform. These changes can include an upgraded version of the CentOS, a newer version of the JVM, newer versions of the application containers that serve up Turbonomic, or changes to the Turbonomic database. The standard Turbonomic Update functions do not replace the platform — to take advantages of these changes you must install a new instance of the Turbonomic VM, and migrate your existing configuration and database to that new instance.

At a high-level, the migration process involves:

- Saving a snapshot of your current installation.
- Updating your current installation to the desired version.
- Backing up the updated installation.
- Installing a new Turbonomic installation.
- Restoring the data from the current installation into the new instance.

During the migration process, the current installation and the new instance must be the same Turbonomic version.

Do I Need to Migrate?

Migrating to a new distribution of Turbonomic is not difficult, but it requires preparation and it will disrupt your Turbonomic services for a short time. You should not perform a migration unless the latest distribution includes changes to the underlying platform that are not in your current installation.

First, determine which version of Turbonomic you have installed. To do so, select **Settings > Updates** and click **Check** to view your current version.

Then, locate your version and the appropriate action in the following table:

If you have Turbonomic version:	To migrate to Turbonomic 6.1, do the following:
5.7 or earlier	Contact Turbonomic Technical Support for the proper steps to migrate.
5.7 through 5.9	Check if your operating system is running CentOS in How to Determine the Linux Kernel Version Running on Your Turbonomic Instance on page 43. <ul style="list-style-type: none"> • If your operating system is running OpenSUSE, contact Turbonomic Technical Support first to discuss the migration process for your installation. Technical Support can assist you with the migration or you can perform the procedure in Migrating to a New Installation on page 35. • If your operating system is running CentOS, perform the update procedure in Updating Turbonomic to a New Version on page 31.
6.0 through 6.0.x	Perform the update procedure in Updating Turbonomic to a New Version on page 31.

Starting with the release of Turbonomic 5.9, the OVA is only available on CentOS.

Migrating to a New Installation

If you have looked up your Turbonomic version in the table in [Do I Need to Migrate?](#) on page 34, and you need to perform a migration, follow these steps:

1. Ensure your VM has external Internet access.

External access is necessary to perform an online update.

If your installation does not have external Internet access, navigate to the following location to access the files for an offline update:

`https://greencircle.turbonomic.com/docs/DOC-1292`

2. Save a snapshot of your current Turbonomic VM.

Before migrating to a later version, you should properly shut down (not power off) the Turbonomic VM and perform a snapshot (or clone the VM). This provides a reliable restore point you can turn to in the event that trouble occurs during the migration. After you have the snapshot, bring the VM back online.

3. Check the version of your current installation and check to see whether a new version is available.


To check for newer versions, select **Settings > Updates**. In the Software Updates section, click **Check** to compare your current version with the latest available version.

The listing shows numbers for the current and available versions of the packages that make up Turbonomic. If the listing shows a higher version number for the available version, you can update your installation.

In this example, a newer version 5.9.4 is available for the 5.9.1 installation:

Software Updates

ABOUT
CHECK
UPDATE

Loaded plugins: fastestmirror
 Loading mirror speeds from cached hostfile
 Installed Packages
 birt-runtime.i586 4.5-2 installed
 vmt-bundle.i586 5.9.1-55616 installed
 vmt-config.x86_64 5.9.1-55616 installed
 vmt-persistence.i586 5.69.1-55616 installed
 vmt-platform.i586 5.9.1-55616 installed
 vmt-presentation.i586 5.9.1-55616 installed
 vmt-reports.i586 5.9.1-55616 installed
 vmt-ui.x86_64 5.9.1-55616 installed
 Available Packages 
 vmt-bundle.i586 5.9.4-59335 vmturbo
 vmt-config.x86_64 5.9.4-59335 vmturbo
 vmt-persistence.i586 5.69.1-59335 vmturbo
 vmt-platform.i586 5.9.4-59335 vmturbo
 vmt-presentation.i586 5.9.4-59335 vmturbo
 vmt-reports.i586 5.9.4-59335 vmturbo
 vmt-ui.x86_64 5.9.4-59335 vmturbo

4. Update your current installation to the latest version.

Before migrating your data, you must update the current installation to the latest version. The migration involves backing up your current installation, and restoring the data to an installation of a new distribution. The backup and restore must be performed on installations of the same version.

For update instructions, see [Updating Turbonomic to a New Version](#) on page 31.

5. Back up the updated version of your current installation.

NOTE: You must back up your current installation *after you have updated it to the new version*.

To perform a backup:

- Establish a console or Putty SSH session to the Turbonomic instance.

Log in as `root`. The default password is `vmturbo`.

- Execute the backup.

Run the following command to create the backup file:

```
vmturbo:~ # /srv/tomcat6/script/appliance/vmtbackup.sh -o full
```

The command executes a full backup which includes the historical database, retained reports, and the configuration files.

This command saves the backup file to `/tmp/vmtbackup.zip`.

- Make a record of any SMTP, HTTP Proxy, or HTTPS protocol settings.

At the end of this procedure, you might need to manually configure the settings.

6. Download and install a new Turbonomic.

You will migrate your saved backup data to this new installation of Turbonomic.

See [Installing Turbonomic](#) on page 9.

7. Copy your saved backup file to the new Turbonomic installation.

To restore a backup to a Turbonomic installation, you first need to copy the backup file from the original Turbonomic instance over to the new Turbonomic instance. To do this:

- Establish a console or Putty SSH session to the original Turbonomic instance.

Log in as `root`. The default password is `vmturbo`.

- Copy the backup file to your new Turbonomic instance.

Run the following command:

```
vmturbo:~ # scp /tmp/vmtbackup.zip <IP_addr>:/tmp
```

For example, assuming the IP address is 10.25.100.115, the command is:

```
vmturbo:~ # scp /tmp/vmtbackup.zip 10.25.100.115:/tmp
```

- When prompted, provide your root password for the new instance.

The command copies your backup file to the new instance of Turbonomic, to the following location:

```
/tmp/vmtbackup.zip
```

8. Restore your saved backup file to the new Turbonomic installation.

WARNING: Before restoring your backup to the new installation, you must shut down the older installation of Turbonomic. This ensures there is only one Turbonomic installation operating in your environment with the same configuration.

To restore a backup to the new Turbonomic installation:

- Establish a console or Putty SSH session to the new Turbonomic instance.

Log in as `root`. The default password is `vmturbo`.

- Make sure the shell is at the path root.

Execute the command:

```
vmturbo:~ # cd /
```

- Perform the backup restore.

Execute the command:

```
vmturbo:~ # /srv/tomcat/script/appliance/vmtrestore.sh -o full
```

This performs a full restore from the backup file. It assumes the backup file is in the following location:

```
/tmp/vmtbackup.zip.
```

9. Verify that the migration was successful.

Log in to the new Turbonomic user interface and confirm that the migration is complete and successful. Check at least the following items:

- Settings — Check the configuration data such as license, user accounts, and target configurations, and check operational data such as custom groups and policies.
- Landing Page — Check the widgets and move the time slider to verify import of historical data.

10. Manually configure your protocol settings, because the migration process does not update them.

Refer to your notes that you made earlier while performing the step to create a backup.

Configure:

- SMTP configuration.
- HTTP Proxy configuration.
- If you had configured your original Turbonomic instance to use HTTPS protocol only, you will need to configure this setting for the new instance of Turbonomic.



Installing and Updating on a RHEL Platform

Turbonomic delivers a server that runs on the Red Hat Linux (RHEL) 7.x platform installed on a VM with x86 architecture. This is to support environments for which administrative policies require RHEL.

NOTE: The most common delivery of Turbonomic is on a VM with x86 architecture, that runs CentOS as an OS. The CentOS deliveries include all the necessary components — If an upgrade to the CentOS platform becomes necessary, Turbonomic releases a new delivery that includes the platform update. This section describes the less common deployment on a VM running RHEL. For RHEL platforms, you are responsible for keeping the platform up-to-date.

Requirements for RHEL and Setup

Whether you are performing a new installation, or updating an existing Turbonomic installation, you should ensure that your platform is up-to-date.

In addition, you must run an openJDK version that corresponds with the Turbonomic version you want to run. Current Turbonomic versions require openJDK 1.8.

Turbonomic makes the following setup recommendations for your RHEL VM:

- The VM should have 4 VCPUs and 16 GB of RAM.
- You should create a boot partition for the OS kernel, giving it 250 MB.
- You should create LVM volumes for the following purposes:
 - A swap partition following Red Hat recommendation for partition schemes.
 - 100 GB for the database on `/var/lib/mysql`
 - 10 GB for system logs to be stored on `/var/log/`
 - 10 GB for system temp storage on `/tmp/`
 - 25 GB for the product installation on `/srv`

In addition, the VM must meet the following prerequisites:

- The OS platform is RHEL 7.x.
- The firewall is configured to allow connections on ports 80 and 443.
- SELinux is configured to allow communication between Apache and Tomcat.

Execute the following command:

```
setsebool -P httpd_can_network_connect=1
```

- The `unzip` utility must be installed.
- The following DejaVu fonts are installed:
 - `dejavu-fonts-common`
 - `dejavu-sans-fonts`
 - `dejavu-sans-mono-fonts`
 - `dejavu-serif-fonts`

To check for the fonts, use the command:

```
rpm -qa | grep dejavu
```

If the DejaVu fonts are not installed, perform the instructions in [How Do I Add Fonts to Enable Reporting for the RHEL Platform?](#) on page 46.

Installing on a RHEL VM

To create a RHEL deployment of Turbonomic, you will create a VM running RHEL 7.x, download a Turbonomic update, and install the necessary components. In addition, you will have to modify the directory structure on your VM, make changes to the database config file, and start up the required services.

1. **Create a VM running the RHEL 7.x operating system.**
2. **Install the Turbonomic product on your RHEL VM.**

You can configure an offline update or an online update to install the initial version of Turbonomic:

- **Offline Update:**

You can find links to offline updates on the following Green Circle document:

<https://greencircle.turbonomic.com/docs/DOC-1292>

When you have identified the offline update version that you want, open a shell with root permissions and perform the following commands:

```
cd /root
curl -O http://download.vmturbo.com/appliance/download/updates/update64_redhat-XXXXX-X.X.X.zip
cd /tmp
unzip /root/update64_redhat-XXXXX-X.X.X.zip
cp /tmp/vmturbo_temp.repo /etc/yum.repos.d/
```

- **Online Update:**

Create a YUM Repository configuration file named `vmturbo.repo` in the following location:

`/etc/yum.repos.d/vmturbo.repo`

Give the file the following content:

```
[vmturbo]
name=vmturbo
baseurl=http://download.vmturbo.com/appliance/download/vmturbo-redhat
type=rpm-md
enabled=1
autorefresh=1
gpgcheck=0
```

3. Install the other required components.

To install the components, execute the following commands, in this order:

- apache/mod_ssl

```
yum install mod_ssl
```

- The Java Runtime Environment

Note that you must install the JRE version that matches the version of Turbonomic that you are installing.

This example shows installation for JRE 1.8:

```
yum install java-1.8.0-openjdk
```

```
update-alternatives --config java
```

At the prompt generated by the `update-alternatives` command, select the version of Java that corresponds to the version just installed (see [Requirements for RHEL and Setup](#) on page 38).

- The Turbonomic bundle

```
yum install vmt-bundle --nogpgcheck
```

4. Set up the correct file structure.

Execute the following commands to set up the required directory structure:

```
ln -s /srv/www/htdocs /srv/www/html
```

```
rm -rf /var/www/
```

```
ln -s /srv/www/cgi-bin /var/www/
```

```
ln -s /srv/www/htdocs /var/www/
```

```
rm -rf /var/lib/tomcat6/ /var/lib/tomcat/
```

```
ln -s /srv/tomcat6/ /var/lib/
```

```
ln -s /srv/tomcat/ /var/lib/
```

```
mkdir -p /var/lib/mysql/tmp
```

```
chown mysql:mysql /var/lib/mysql/tmp
```

5. Initialize the database that was installed in the Turbonomic bundle.

Execute the following commands:

```
cd /srv/rails/webapps/persistence/db/
```

```
./initialize_all.sh
```

6. Start the associated services.

You can restart the VM or you can execute the following commands to start the services:

```
service tomcat start
```

```
service httpd start
```

7. Ensure that time is synchronized between the VM and the physical machine that hosts the VM.

Confirm that the NTP service is running.

For a host that is managed by VMware vSphere, disable the **Synchronize Guest Time With Host** option for the VM.

You can find that setting in **Options > VMware Tools > Advanced**.

8. Enable Turbonomic reports.

Execute the following command with root privileges:

```
setsebool -P httpd_can_network_connect=1
```

9. Change the context of the /cgi-bin directory to enable the execution of cgi scripts.

Execute the following commands:

```
semanage fcontext -a -t httpd_sys_script_exec_t "/srv/www/cgi-bin(/.*)?"
```

```
restorecon -Rv /srv/www/cgi-bin/
```


10. Enable http(s) communication by adding http and https to firewalld.

Execute the following commands:

- a) Edit the `/etc/firewalld/zones/public.xml` file.

Modify the settings in the public zone section. For example:

```
<zone>
<short>Public </short>
<description>For use in public areas. You do not trust the other
  computers on networks to not harm your computer. Only selected incoming connections
  are accepted. </description>
<service name="dhcpv6-client"/>
<service name="ssh"/>
<service name="http"/>
<service name="https"/>
</zone>
```

- b) Reload the firewalld.

```
firewall-cmd --complete-reload
```

- c) Restart the firewalld service.

```
systemctl restart firewalld
```

11. (Optional) Allow remote MariaDB client connections.

- a) Open the `bind-addr` configuration file.

For example, use the `vi /etc/my.cnf.d/bind-addr.cnf` command.

- b) Set the `bind_address` parameter to the IP address of your Turbonomic instance.

For example: `bind_address=10.10.10.123`

- c) Save the file.

- d) Restart the MariaDB service.

Execute the `systemctl restart mariadb` command.

Updating the RHEL Deployment

After you have deployed Turbonomic on a RHEL platform, you can update that installation with new versions of Turbonomic as they become available. Choose one of the following methods to update Turbonomic:

- Offline Update
- Online Update

NOTE: You should be sure that the DejaVu fonts are installed and the JDK version is compatible with the new Turbonomic version. For information, see [Requirements for RHEL and Setup](#) on page 38.

Offline Update

Perform these steps:

1. Download a new offline deliverable and unzip it to the /tmp directory.

```
rm -rf /tmp/vmturbo
cd /tmp
unzip update64_redhat-XXXXX-X.X.X.zip
```

2. Execute YUM commands to update the installed components.

```
yum clean all
yum update vmt-bundle vmt-config vmt-persistence vmt-platform vmt-presentation vmt-
reports birt-runtime
```

3. (Optional) Allow remote MariaDB client connections.

- a) Open the `bind-addr` configuration file.
For example, use the `vi /etc/my.cnf.d/bind-addr.cnf` command.
- b) Set the `bind_address` parameter to the IP address of your Turbonomic instance.
For example: `bind_address=10.10.10.123`
- c) Save the file.
- d) Restart the MariaDB service.
Execute the `systemctl restart mariadb` command.

Online Update

Perform these steps:

1. Execute YUM commands to update the installed components.

```
yum clean all
yum update vmt-bundle vmt-config vmt-persistence vmt-platform vmt-presentation vmt-
reports birt-runtime
```

2. (Optional) Allow remote MariaDB client connections.

- a) Open the `bind-addr` configuration file.
For example, use the `vi /etc/my.cnf.d/bind-addr.cnf` command.
- b) Set the `bind_address` parameter to the IP address of your Turbonomic instance.
For example: `bind_address=10.10.10.123`
- c) Save the file.
- d) Restart the MariaDB service.
Execute the `systemctl restart mariadb` command.



FAQs

To ensure that you have the most rewarding experience with Turbonomic, we have collected the top installation issues that people experience. If you have any further questions, contact Turbonomic Technical Support.

Do I need special software to run the Turbonomic client?

If you use the Classic UI, make sure that you have installed an up-to-date Flash plug-in to your browser. If your URL takes you to a blank page, it is possible that the Flash plug-in is not installed.

How to Determine the Linux Kernel Version Running on Your Turbonomic Instance

If you need to verify which version of CentOS you are running, perform these steps:

1. **Open a secure shell to your Turbonomic machine** using the default credentials: `root/vmturbo`.
2. **Display the os-release file.**

In the shell, enter `cat /etc/os-release`.

The result includes your OS version. For example:

```
[root@turbonomic ~] cat /etc/os-release
NAME="CentOS Linux"
VERSION="7 (Core)"
ID="centos"
ID_LIKE="rhel fedora"
VERSION_ID="7"
PRETTY_NAME="CentOS Linux 7 (Core)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:centos:centos:7"
HOME_URL="https://www.centos.org/"
BUG_REPORT_URL="https://bugs.centos.org/"

CENTOS_MANTISBT_PROJECT="CentOS-7"
CENTOS_MANTISBT_PROJECT_VERSION="7"
REDHAT_SUPPORT_PRODUCT="centos"
REDHAT_SUPPORT_PRODUCT_VERSION="7"
```

3. Enter Control-c to close the file.
4. Log out of the secure shell session.

When do I need to clear my local Adobe Flash cache?

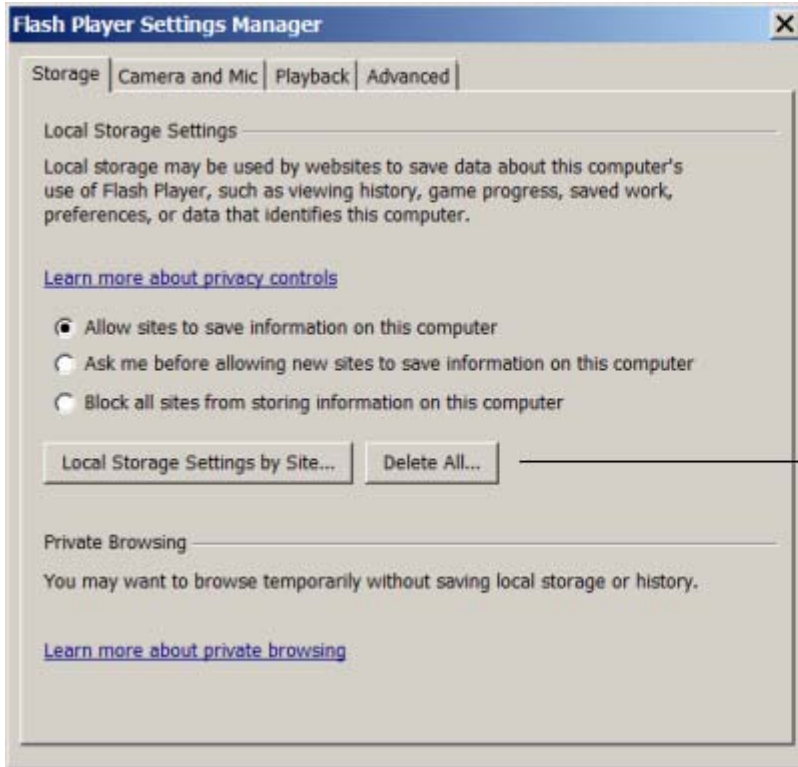
If you use the Classic UI, after you update the Turbonomic instance, you must then clear the Flash cache. Clearing the Flash cache ensures that the Turbonomic user interface will be fully refreshed in the browser.

To clear the cache, you can open the Flash Settings Manager locally on your system, or can access the Settings Manager through the following Adobe site:

http://www.macromedia.com/support/documentation/en/flashplayer/help/settings_manager07.html

To open the Settings Manager locally on the system, click:

- Windows: **Start > Settings > Control Panel > Flash Player**
- Macintosh: **System Preferences (under Other) > Flash Player**
- Linux Gnome: **System > Preferences > Adobe Flash Player**
- Linux KDE: **System Settings > Adobe Flash Player**



Click **Local Storage Settings by Site** to clear just the Operations Manager appliance, or click **Delete All** clear the cache for all sites that have run on your computer.

Why can I not execute some of the recommendations made by Turbonomic?

To automate the Turbonomic recommendations, review the *Turbonomic User Guide* for complete information about setting policies. Policies are located in **Settings > Policies**.

Turbonomic supports the following action modes:

- Disabled — Do not recommend or perform the action.
- Recommended — Recommend the action so a user can perform it using the given hypervisor or by other means.
- Manual — Recommend the action, and provide the option to perform that action through the user interface.
- Automated — Turbonomic performs the action automatically.

Some actions are set to Recommend or Disabled by default. To enable execution of these actions, you must change them to Manual or Automated.

Other actions cannot be executed by Turbonomic. These actions will only have Disabled or Recommended as an option.

How Do I Add Fonts to Enable Reporting for the RHEL Platform?

To check if the DejaVu fonts are installed, use the command:

```
rpm -qa | grep dejavu
```

If the DejaVu fonts are not installed, perform these steps:

1. Open a shell with root permissions and execute this YUM command to install the DejaVu fonts.

```
yum install -y dejavu-fonts-common dejavu-sans-fonts dejavu-sans-mono-fonts dejavu-serif-fonts
```

2. Create the new configuration file.

```
vi /etc/fonts/local.conf
```

3. Copy this code into the /etc/fonts/local.conf file.

```
<?xml version='1.0'?>
<!DOCTYPE fontconfig SYSTEM 'fonts.dtd'>
<fontconfig>
<alias>
  <family>serif</family>
  <prefer><family>Utopia</family></prefer>
</alias>
<alias>
  <family>sans-serif</family>
  <prefer><family>Utopia</family></prefer>
</alias>
<alias>
  <family>monospace</family>
  <prefer><family>Utopia</family></prefer>
</alias>
<alias>
  <family>dialog</family>
  <prefer><family>Utopia</family></prefer>
</alias>
<alias>
  <family>dialoginput</family>
  <prefer><family>Utopia</family></prefer>
</alias>
</fontconfig>
```

4. Save the file.