



## Virtuozzo DevOps

### Installation Guide

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## CHAPTER 1

# Installation Requirements

Before installation, make sure that the requirements listed in this chapter are met.

## 1.1 Hardware Node Requirements

To install Virtuozzo DevOps, you will need a single hardware node (i.e. physical server) that meets the following requirements. You will be able to add more nodes later via the Admin Panel.

Node hardware requirements:

- CPU(s): x86-64 (Intel is preferred); 4 cores minimum (16 or more recommended).

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**Important:** Low-voltage CPUs (i.e. Intel Atom) are strongly not recommended due to poor performance.

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- RAM: 8GB minimum, 16GB or more recommended.
- Disk: 300 GB or more of usable storage for one-server installation, including:
  - 30 GB minimum for OS,
  - 35 GB for the infrastructure,
  - storage for end users' containers (/vz directory). A single container may occupy from 700 to 1700 MB of disk space. So, for example, about 100 containers will require at least 150 GB of disk space plus space for user data inside the containers.

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**Note:** To improve performance and make further system upgrades easier, place the `/vz` directory on a separate partition formatted to ext4.

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## 1.2 External Network Requirements

You will need the following:

- An IP address that will be used as a main Platform Entry Point. It must be accessible by anyone who will interact with both the platform and applications running on it.

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**Note:** Installation on top of cloud providers that do not offer support for external IPs (Azure, AWS, OnApp, etc.) requires additional steps. See [Additional Requirements for Amazon and Azure](#) (page 4).

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By default, all applications hosted on the platform will use unique domain names and will be accessible through the shared Platform Entry Point.

- Optional external IP addresses to assign to specific applications for direct access to them. See [Jelastic documentation on adding external IP address ranges](#).

## 1.3 Internal Network Requirements

A dedicated internal network is required for interaction of application components.

- The internal network must provide at least 254 usable IP addresses, e.g., 192.168.0.0/24. Larger installations may require more IP addresses, e.g., 192.168.0.0/16.
- It is strongly not recommended to use the internal network for any other purpose.
- The internal network does not need to be routable as applications hosted on your platform will be accessible through the entry point IP address and corresponding environments' domain names.

## 1.4 DNS and Zone Delegation Requirements

**Note:** If you need to install Virtuozzo DevOps on top of Amazon or Azure, skip this step and perform step 4 in *Additional Requirements for Amazon and Azure* (page 4) instead.

Virtuozzo DevOps must be able to manage domain names in the zone that is assigned to it. This functionality is used to provide access to the applications that run on the platform.

For example, if you designate the mydomain.example.com zone to your installation and then create an application called “web-01”, Virtuozzo DevOps will automatically make this application available at web-01.mydomain.example.com. To do that, Virtuozzo DevOps will deploy a DNS server at the IP address that you provide as the Platform Entry Point, expecting that the chosen domain will be delegated to the mentioned DNS server.

**Important:** DNS zone delegation must be configured prior to installing Virtuozzo DevOps.

To configure DNS zone delegation, do the following:

1. Choose a domain name for the platform (e.g mydomain.example.com).
2. Choose the IP address that will be used as a Platform Entry Point (see *External Network Requirements* (page 2)).
3. Add records to the parent zone of the chosen domain and IP address.

For example, the records for the parent zone example.com of the domain “mydomain.example.com” and the Platform Entry Point IP address 1.1.1.1 are:

```
mydomain.example.com.      IN      NS      ns1.mydomain.example.com.
ns1.mydomain.example.com.  IN      A       1.1.1.1
```

4. Make sure there is no SOA record for the mydomain.example.com zone on your DNS servers, like:

```
ns1.mydomain.example.com IN SOA ns1.mydomain.example.com admin.mydomain.example.
```

You can verify zone delegation with the dig command as follows:

```
domain='mydomain.example.com';
tmp=${domain#*}; for tmp in $(dig +short -t ns $tmp); do dig +norecurse -t soa @$tmp $domain; \
```

```
done | grep -vE '^(;|$)'
```

- If the zone is delegated correctly, the output should contain only NS-type records with optional A-type glue records, for example:

```
mydomain.example.com. 60 IN NS ns.mydomain.example.com.
ns.mydomain.example.com. 60 IN A 1.1.1.1
```

- If the zone is delegated incorrectly, the output may be empty or contain SOA-type records, for example:

```
example.com. 3600 IN SOA sns.dns.icann.org. noc.dns.icann.org. 2015082630 7200 3600 ...
example.com. 0 IN SOA sns.dns.icann.org. noc.dns.icann.org. 2015082630 7200 3600 ...
```

**Note:** For the general DNS domain zone delegation guidelines and troubleshooting tips, see <https://tools.ietf.org/html/rfc1912>.

## 1.5 Operating System Requirements

The server you plan to install Virtuozzo DevOps on must be running Centos 6.x with 2.6.x kernel and have SSH access enabled for the root user.

## 1.6 Additional Requirements for Amazon and Azure

Installing Virtuozzo DevOps installation on top of Azure or Amazon hardware has certain peculiarities, as these cloud providers do not offer external IP addresses and do not support attaching external IP addresses to containers. For these reasons, you will need to perform additional steps before installing Virtuozzo DevOps on AWS or Azure.

1. On the hardware node that Virtuozzo DevOps will be installed on, add endpoints for the following ports:
  - TCP 80, 443, 3022, 4848, 4949, 7979, 8081,
  - TCP and UDP 11000-11999, these ports will be used by default for [Jelastic endpoints](#) in user containers (11999 is an example endpoint limit that can be changed according to your needs).

Depending on the cloud provider, you may also need to meet the requirements listed in [Azure](#)

endpoints setup or AWS security group creation, respectively.

2. On the same hardware node, add additional iptables rules for the ports set in the previous step to configure DNAT from the hardware node IP address to the Platform Entry Point IP address, e.g.:

```
# iptables -t nat -A PREROUTING -i {UPLINK_NODE_INTERFACE} -d {UPLINK_NODE_IP} -p tcp \
-m multiport --dports 80,443,3022,4848,4949,7979,8081,11000:11999 -j DNAT \
--to {ENTRY_POINT_IP}
# iptables -t nat -A PREROUTING -i {UPLINK_NODE_INTERFACE} -d {UPLINK_NODE_IP} -p udp \
-dport 11000:11999 -j DNAT --to {ENTRY_POINT_IP}
```

To obtain the UPLINK\_NODE\_IP and UPLINK\_NODE\_INTERFACE parameters, run

```
# ip r get 1 | head -n1 | awk '{print "UPLINK_NODE_INTERFACE: " $5 "\n" \
"UPLINK_NODE_IP: " $7}'
```

3. Set up NAT for the external platform network in order to forward outgoing external traffic properly.

```
# iptables -t nat -A POSTROUTING -i venet0 -s {ENTRY_POINT_IP} -o {UPLINK_NODE_INTERFACE} \
-j MASQUERADE
```

4. Instead of setting zone delegation (described in *DNS and Zone Delegation Requirements* (page 3)), add the "\*" A-Record for your hardware node's external IP address (used as the Platform Entry Point) to the DNS server zone file or in your domain registrar's admin panel.

## CHAPTER 2

# Installing Virtuozzo DevOps

Having prepared the hardware node(s), make sure you have an email with the download URL and your unique serial number (if you do not have it, request one at <https://virtuozzo.com/products/devops>).

To install Virtuozzo DevOps, do the following:

1. Run the following command on the hardware node:

```
# curl --insecure -S \  
"https://license.jelastic.com/installer?email={your_email}&serial={your_serial_number}" > \  
vz_for_devops_install.sh; bash ./vz_for_devops_install.sh
```

The hardware node will be validated.

If the installation requirements are not met, a warning will be displayed. For example:

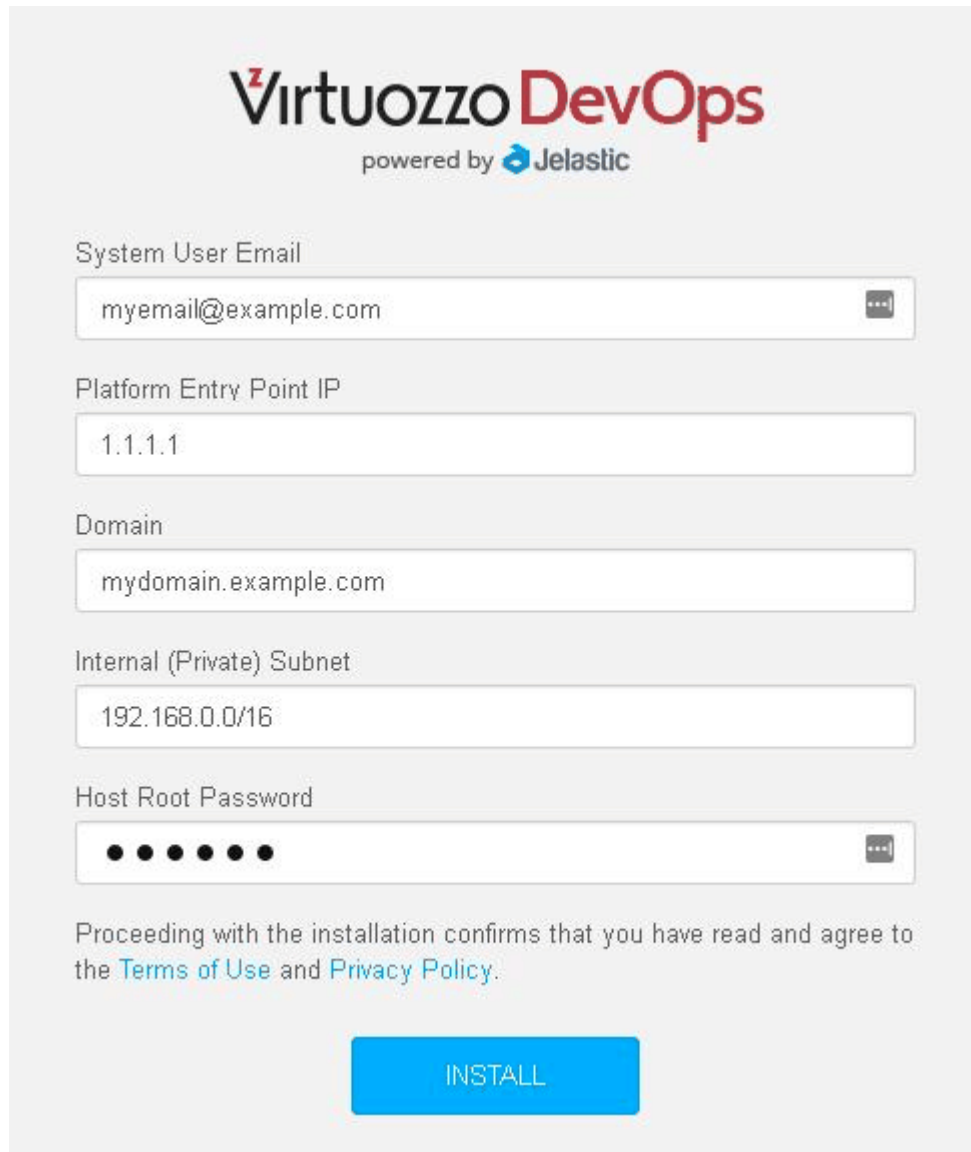
```
Detected kernel (3.18.26) does not meet installation requirements (2.6.x)  
Detected OS does not meet installation requirements (Centos 6.x)  
The /vz partition size (42G) does not meet installation requirements (250G).  
The amount of allocated RAM (8GB) does not meet installation requirements (12GB).  
You still can proceed with the installation using current parameters,  
but we can't guarantee stable platform work in this case.  
Continue the installation?  
'yes' or 'no'
```

If the validation is successful, a link will be displayed. For example:

```
Open https://installer:k6blgel6u6srran@172.31.236.84:8081/?install and continue installation
```

To continue the installation, visit the link in a web browser.

2. On the web page, fill out all the fields. For example:



The image shows a web form for installing Virtuozzo DevOps, powered by Jelastec. The form has a light gray background and contains several input fields with labels to their left. The labels are: 'System User Email', 'Platform Entry Point IP', 'Domain', 'Internal (Private) Subnet', and 'Host Root Password'. The input fields contain the following values: 'myemail@example.com', '1.1.1.1', 'mydomain.example.com', '192.168.0.0/16', and a masked password represented by seven dots. Each input field has a small '...' icon on the right side. Below the input fields, there is a line of text: 'Proceeding with the installation confirms that you have read and agree to the [Terms of Use](#) and [Privacy Policy](#).' At the bottom of the form is a large blue button with the text 'INSTALL' in white capital letters.

Virtuozzo DevOps  
powered by Jelastec

System User Email  
myemail@example.com

Platform Entry Point IP  
1.1.1.1

Domain  
mydomain.example.com

Internal (Private) Subnet  
192.168.0.0/16

Host Root Password  
● ● ● ● ● ● ●

Proceeding with the installation confirms that you have read and agree to the [Terms of Use](#) and [Privacy Policy](#).

INSTALL

You will need to provide:

1. **System User Email**, the email address for the administrator account. All installation-related emails and access credentials will be sent to this address.
2. **Platform Entry Point IP**, the IP address at which your applications will be accessible by default. Make sure this IP address is routable and not already in use.


The Platform Entry Point IP address can be external or internal:

- Use an external IPv4 address to make applications accessible from the Internet.
- Use an internal IPv4 address outside the range Internal (Private) Subnet (see further) to make

applications only accessible from the internal network.

3. **Domain**, the domain, e.g., mydomain.example.com, delegated to the IP address specified in the Platform Entry Point IP field.
  4. **Internal (Private) Subnet**, an unused subnetwork with mask, e.g. 192.168.0.0/24, IP addresses from which will be used by application components for intercommunication. All incoming external connections will pass through the Platform Entry Point IP address. For larger installations, a 192.168.0.0/16 or larger subnetwork may be required, depending on the number of applications you plan to run. Each application component and instance (such as database, web, etc.) will use an IP from this subnetwork.
  5. **Host Root Password**, root password to the server where Virtuozzo DevOps will be installed. The password is required to automatically join this server as the first compute node to the Virtuozzo DevOps cluster that will be created during the installation.
3. Next, zone delegation will be verified and you will be notified of results. If the zone was not delegated correctly, you will see a warning (see further) and will still be able to proceed with installation and fix zone delegation later.

# Virtuozzo DevOps

powered by 

## Warning

Domain name `mydomain.example.com` is not delegated to `1.1.1.1` or zone delegation is incorrect:

- Please recheck your domain registrator service to ensure following records were added to your domain zone while performing this operation:

<code>mydomain.example.com.</code>	<code>IN NS</code>	<code>ns1.mydomain.example.com.</code>
<code>ns1.mydomain.example.com.</code>	<code>IN A</code>	<code>1.1.1.1</code>
- Make sure you DON'T have the SOA record for `mydomain.example.com` zone on your DNS servers

Until `mydomain.example.com` delegation is fixed you can add the following line to your `/etc/hosts` file in order to access the cluster.

<code>1.1.1.1</code>	<code>app.mydomain.example.com</code>	<code>jca.mydomain.example.com</code>
----------------------	---------------------------------------	---------------------------------------

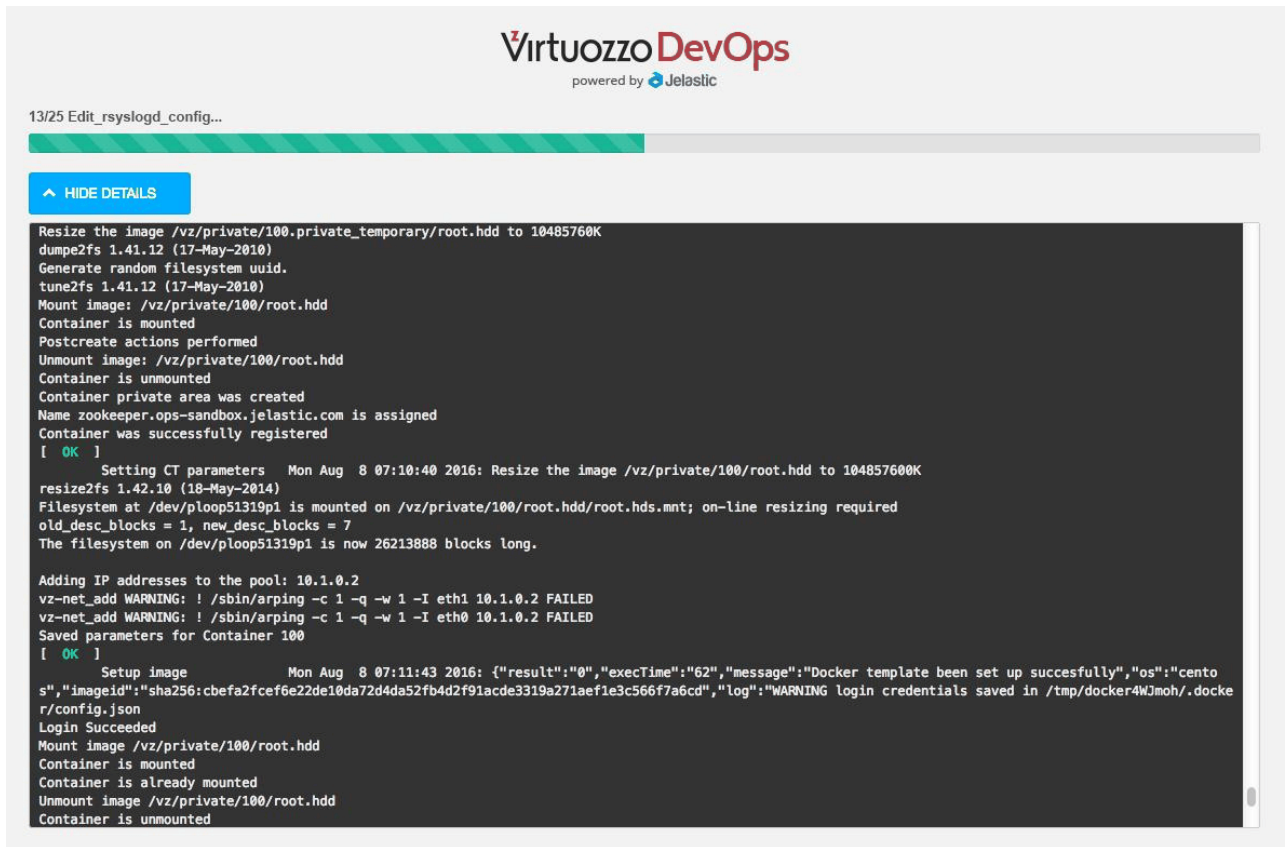
You can proceed with the installation and fix delegation issues later.

ABORT INSTALLATION

RE-CHECK

PROCEED (FIX LATER)

After you click **PROCEED**, the last installation steps will be performed. You will be able to track the progress in the installer output. For example:



The screenshot shows the Virtuozzo DevOps interface with a terminal window displaying the following output:

```

13/25 Edit_rsyslogd_config...

^ HIDE DETAILS

Resize the image /vz/private/100.private_temporary/root.hdd to 10485760K
dumpe2fs 1.41.12 (17-May-2010)
Generate random filesystem uuid.
tune2fs 1.41.12 (17-May-2010)
Mount image: /vz/private/100/root.hdd
Container is mounted
Postcreate actions performed
Unmount image: /vz/private/100/root.hdd
Container is unmounted
Container private area was created
Name zookeeper.ops-sandbox.jelastic.com is assigned
Container was successfully registered
[ OK ]

Setting CT parameters Mon Aug 8 07:10:40 2016: Resize the image /vz/private/100/root.hdd to 10485760K
resize2fs 1.42.10 (18-May-2014)
Filesystem at /dev/ploop51319p1 is mounted on /vz/private/100/root.hdd/root.hds.mnt; on-line resizing required
old_desc_blocks = 1, new_desc_blocks = 7
The filesystem on /dev/ploop51319p1 is now 26213888 blocks long.

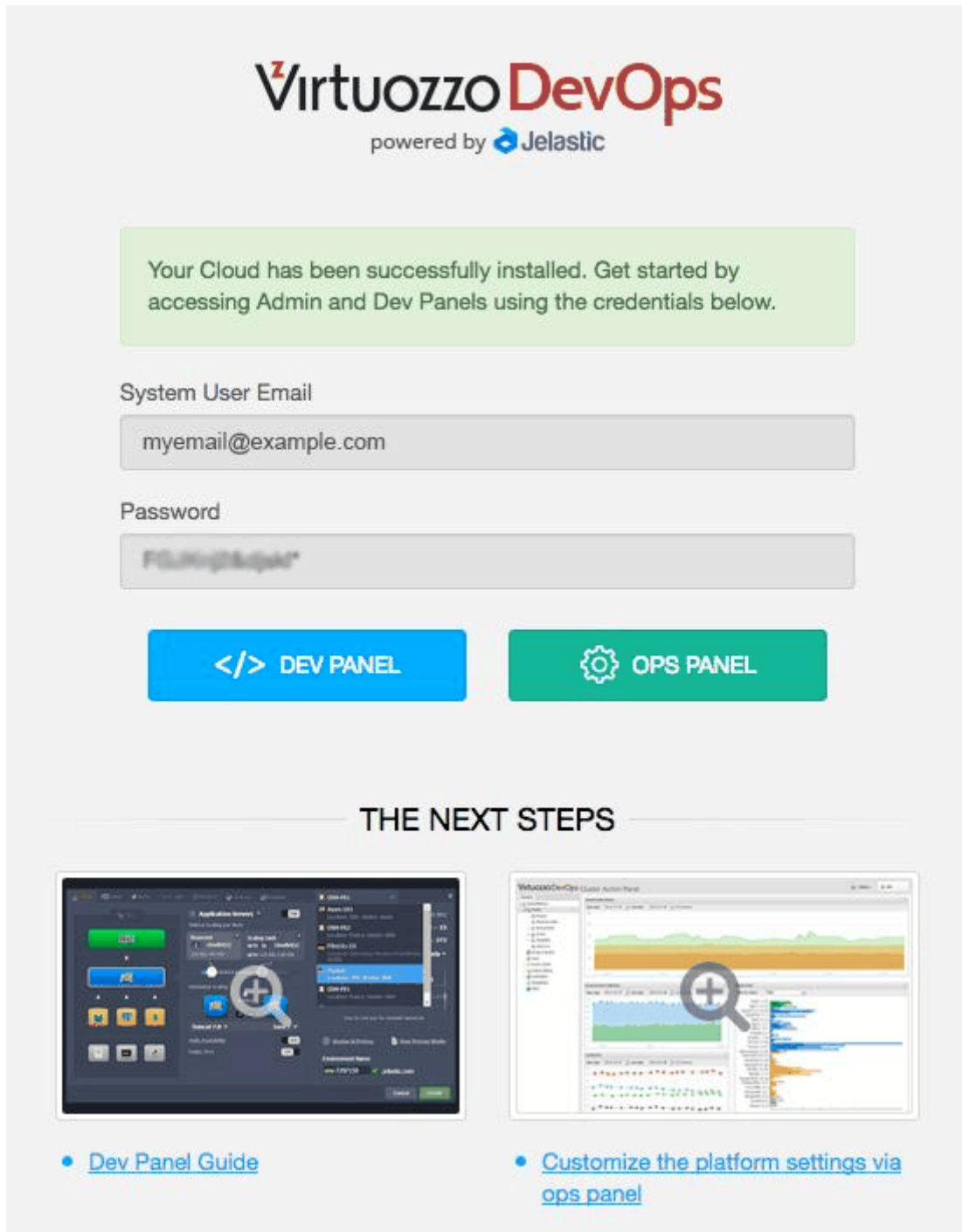
Adding IP addresses to the pool: 10.1.0.2
vz-net_add WARNING: ! /sbin/arping -c 1 -q -w 1 -I eth1 10.1.0.2 FAILED
vz-net_add WARNING: ! /sbin/arping -c 1 -q -w 1 -I eth0 10.1.0.2 FAILED
Saved parameters for Container 100
[ OK ]

Setup image Mon Aug 8 07:11:43 2016: {"result": "0", "execTime": "62", "message": "Docker template been set up succesfully", "os": "centos", "imageid": "sha256:cbefa2fcef6e22de10da72d4da52fb4d2f91acde3319a271aef1e3c566f7a6cd", "log": "WARNING login credentials saved in /tmp/docker4WJmoh/.docker/config.json"}
Login Succeeded
Mount image /vz/private/100/root.hdd
Container is mounted
Container is already mounted
Unmount image /vz/private/100/root.hdd
Container is unmounted

```

Typically, the installation takes about 30-40 minutes, depending on the download speed and your server performance.

After the installation is completed, you will see access credentials for the Admin and Dev panels. For example:



4. If you are installing Virtuozzo DevOps on Amazon or Azure, also perform steps in *Post-Installation Configuration for Amazon and Azure* (page 12).

After the installation, the Admin Panel will be available at [http://jca.{your\\_domain}](http://jca.{your_domain}) and the developer dashboard will be available at [http://app.{your\\_domain}](http://app.{your_domain}).

For information on how to start working with Virtuozzo DevOps after the installation, read the following documentation:

- [Managing the platform via the Admin Panel](#),
- [Adding Jelastic templates via the Admin Panel](#),
- [Granting access to team members for collaboration](#),
- [Setting up limitations and quotas](#),
- [Deploying and running your first application](#).

## 2.1 Post-Installation Configuration for Amazon and Azure

1. If you plan to add more hardware nodes to your installation, build an L2 overlay network. For example, with `gretap + ipsec` OR `openvswitch`.
2. Normally, the platform notifies users about basic events (e.g. environment creation, account password changes, etc.) by email. Check that the feature works after the installation. If it does not (due to a missing SPF record on the server), change the default SMTP server settings to the ones you are going to use (for your own SMTP server or the Google one).

To do that, in the JCA Admin Panel, switch to the **System settings** > **Common** section, expand the **common** parameter list and set the values to the set of `smtp.mail.*` strings.

## CHAPTER 3

# Troubleshooting

## 3.1 Configuring Private Networking Across Multiple Nodes

**Symptoms:** When Virtuozzo DevOps is deployed to multiple servers, application components are not able to communicate to each other when located on different physical servers (nodes). An example of such problem can be an application server unable to connect to its database.

**Cause:** By default, Virtuozzo DevOps suggests an unused private IP subnetwork. Application components (containers) using IP addresses from this subnetwork will be able to communicate with each other as long as they are located on the same node. However, outgoing traffic will go to the default gateway which may not have information about proper routing of this traffic.

**How to fix:** Configure the routing rules for the private subnetwork.

The configuration is explained on the following example:

- the deployment consists of two nodes;
- both servers have network interfaces `eth0` for external traffic and `eth1` for internal traffic;
- the interface `eth1` is configured on both servers with the IP address `192.168.1.x` and the network mask `255.255.255.0`;
- the private subnetwork assigned during the installation is `10.1.0.0/20`.

You will need to create routing rules to send traffic for the private subnetwork to the interface `eth1`. To do that, run the following command on both nodes:

```
# ip r add 10.1.0.0/20 dev eth1
```

Doing so will make routing work properly until next reboot. To make the changes permanent, run the following command on both nodes:

```
# echo "10.1.0.0/20 dev eth1" >> /etc/sysconfig/network-scripts/route-eth1
```