



# VISULOX 4

VISULOX4\_InstallationGuide

23.07.2024

**amitego**



## Table of Contents

1 Preface.....	4
2 Requirements.....	7
3 Installing VISULOX.....	16
4 Updating VISULOX.....	20
5 VISULOX Hotfix.....	22
6 Uninstalling VISULOX.....	23
7 VISULOX License Agreement .....	24
8 VISULOX and Session Cookies.....	29
9 Appendix_I.....	30

**Limitation of Liability Statement (Disclaimer)**

The Visulox documentation is proprietary to amitego engineering GmbH and no ownership rights are hereby transferred. No part of the documentation shall be used, reproduced, translated, converted, adapted, stored in a retrieval system, communicated or transmitted by any means, for any commercial purpose, including without limitation, sale, resale, licence, rental or lease, without the prior express written consent of amitego engineering.

amitego engineering does not make any representations, warranties or guarantees, express or implied, as to the accuracy or completeness of the documentation. Users must be aware that updates and amendments will be made from time to time to the documentation. It is the user's responsibility to determine whether there have been any such updates or amendments. Neither amitego engineering nor any of its directors, officers, employees or agents shall be liable in contract, tort or in any other manner whatsoever to any person for any loss, damage, injury, liability, cost or expense of any nature, including without limitation incidental, special, direct or consequential damages arising out of or in connection with the use of the documentation.




# 1 Preface

The **VISULOX Installation Guide** provides information about installation, configuration, upgrading and removing of this version of VISULOX. Instructions on how to get started using VISULOX is also provided. This document is intended for consultants and system administrators.

## 1.1 How this manual is organized

<a href="#">Preface</a>
<a href="#">Requirements</a>
<a href="#">Installing VISULOX</a>
<a href="#">Updating VISULOX</a>
<a href="#">VISULOX Hotfix</a>
<a href="#">Uninstalling VISULOX</a>
<a href="#">VISULOX License Agreement</a>
<a href="#">VISULOX Session Cookies</a>
<a href="#">Reference Card</a>
<a href="#">Glossary</a>

## 1.2 Legend


 Useful information
 Recommended setting
 Warning / use with caution
 Tipps & tricks

## 1.3 Related documentation

## 1.4 VISULOX documentation

Application	Title	Format
Release Notes	<i>VISULOX Release Notes</i> <i>Platform Support and Release Notes</i>	HTML
Installation	<i>VISULOX Installation Guide</i> <i>Installation Guide</i>	HTML
Administration	<i>VISULOX Admin Guide</i> <i>Administration Guide</i>	HTML

Application	Title	Format
User	<i>VISULOX User Guide</i> <i>User Guide</i>	HTML

 The VISULOX Online Documentation is available at: <https://portal.visulox.com/wiki/>

## 1.5 Documentation feedback

Submit comments about this document by sending a mail to: [support@visulox.com](mailto:support@visulox.com)

## 2 Requirements

### 2.1 General

- The recommended platform is **Oracle Linux / Red Hat 8** (for other versions contact amitego) with at least 10Gbyte for the OS, 20Gbyte for VISULOX PORTAL Service and 30 Gbyte for the VISULOX Service free space on the hard disc (small installation)
- The **/opt** directory must NOT be mounted with **-nosuid** parameter
- VISULOX can be virtualized, the disk must NOT have "**Thin provisioning**" enabled
- **umask 022** is needed for installation and start of the VISULOX PORTAL Service
- Symbolic links are not supported
- If **autofs** is used with **transit mapping**, Selinux has to be disabled
- The users ttasys and ttaserv are placed in the **/home** directory during installation.
- The recommended VISULOX version is the latest VISULOX 4 release
- The recommended user repositories are all repositories, that are supported by VISULOX PORTAL Service
- Firewall configured properly or disabled
- NTP **or** Chrony enabled
- For ports, see: [Network communication within VISULOX](#)



Make sure that correct hostnames are used for the servers in the environment.  
Hostnames **must not** contain underscores (because of RFC 952 and domain names with underscores)!  
The **FQDN** of the host **must not** exceed 50 characters!  
Capital letters **must not** be used in hostnames!  
Changing hostnames after installation of VISULOX **is not** supported!  
Checking the hostname (must be identical):

```
nslookup $(hostname -f) --> Hostname and IP address is displayed
nslookup <IP address> --> IP address and hostname is displayed

getent ahosts $(/opt/tarantella/bin/bin/ttahostname) --> IP address and hostname is displayed
```

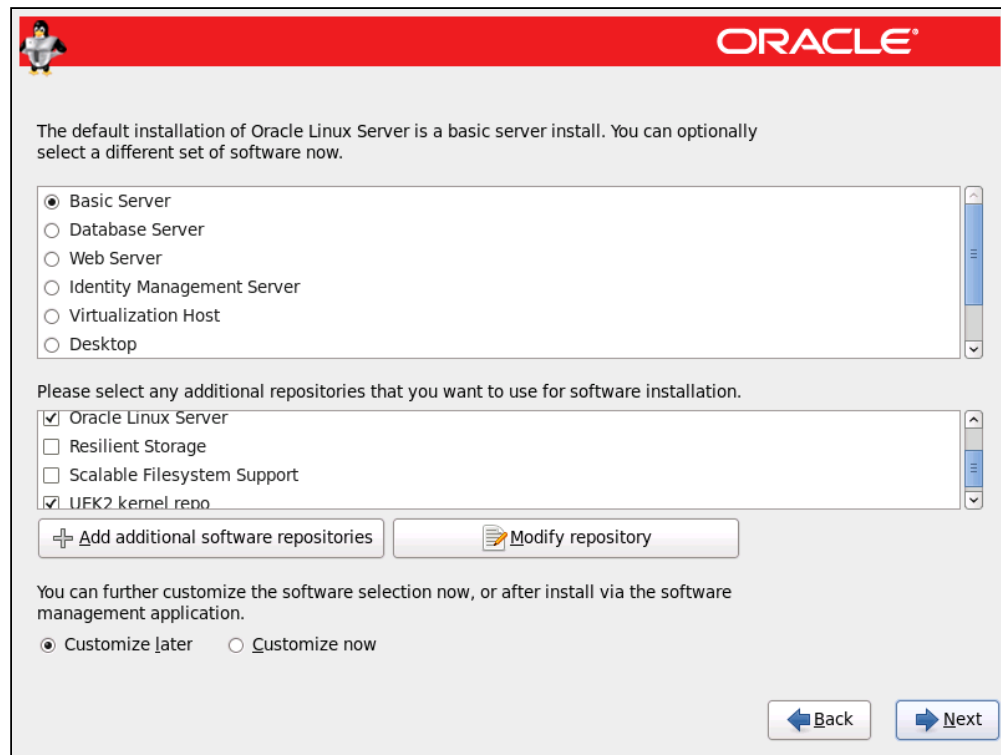
```
getent hosts <IP address> --> IP address and hostname is displayed
```

```
getent ahost localhost --> IP address is displayed (127.0.0.1)
```

```
getent hosts 127.0.0.1 --> IP address (127.0.0.1) and hostname (localhost) is displayed
```

## 2.2 Required packages

The following packages are needed for a **Oracle Linux basic server installation**, e.g. Oracle Linux:



**i** The basic server installation contains all necessary software for VISULOX. Additional software should not be installed on a VISULOX server. Runlevel 3 multi-user target is recommended.

**i** The recommended OS is **Oracle Linux 8**. As an alternative Red Hat Linux could be used, which will possibly need some other packages as listed here. For other OS versions please contact amitego.

## 2.3 Disk layout

The platform disk layout can be as usual. We recommend at least 10 Gbyte for the OS,

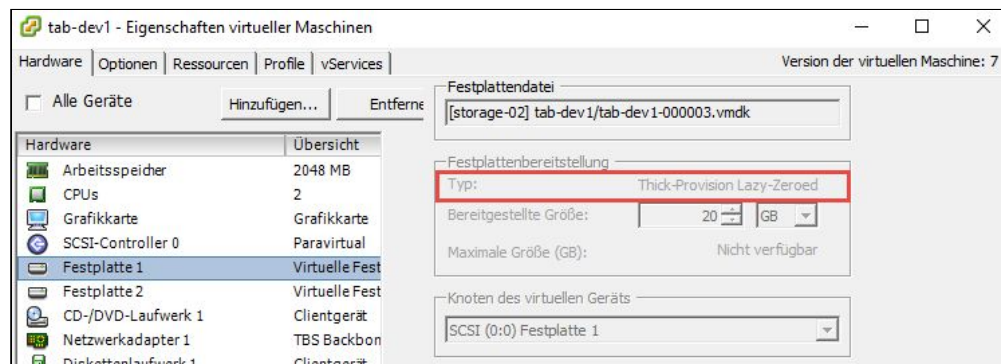
Further we recommend to have a partition of 20Gbyte under **/opt/tarantella**, 30Gbyte under **/opt/visulox** (60Gbyte with Archive) in a small environment.

For a large environment we recommend to have at least 50Gbyte under **/opt/visulox** (100Gbyte with Archive).

An additional partition for File store is also recommended, which is mounted under **/opt/visulox/data/filestore/0**.

**!** VISULOX can be virtualized, the disk must NOT have "**Thin provisioning**" enabled. (See also: [How to use VISULOX on virtualized VMWare disks](#), [VISULOX disk space protection](#))

**!** The **/opt** directory must NOT be mounted with **-nosuid** parameter.



Diskspace of VLX\_DATADIR must have at least 2.5 of size of the database available because VACUUM creates a copy of the database.

**For example:** a 4GB database needs 6 GB free disk space. The disk space is checked with integrity check.

## 2.4 Libraries needed for VISULOX on Oracle Linux 8

Installing VISULOX 4.0 on Linux platforms, the yum / dnf command has to be used to ensure that any package dependencies are resolved automatically. This means that yum must be configured to use a suitable Linux package repository. Make sure that **oracle\_appstream\_latest** and **ol8-epel** are in yum repolist as well.

```
dnf repolist
This system is receiving updates from Unbreakable Linux Network or Spacewalk.

repo id                                repo name
ol8-codeready                          ol8-codeready
ol8-epel                                ol8-epel
ol8_addons                              ol8_addons
ol8_appstream_latest                   ol8_appstream_latest
ol8_x86_64                              ol8_x86_64
```

**ol8-codeready** is needed for transitmapping.

**For the Epel repository on Red Hat 8 use:**

```
dnf install https://dl.fedoraproject.org/pub/epel/epel-release-latest-8.noarch.rpm
```

```
dnf install java-11-openjdk
dnf update
```

**i yum update** is recommended before installing the new packages!

## 2.5 Platform modification during installation

### 2.5.1 VISULOX PORTAL Service

Before installation of the VISULOX PORTAL Service, the following libraries should be installed: `xterm` `xclock` `xauth`

**umask 022** is recommended for installation and start of the VISULOX PORTAL Service.

VISULOX PORTAL Service must be installed **without** symlinks.

During VISULOX PORTAL Service installation two users and a group will be created:

```
uid=500(ttasys) gid=500(ttaserv) groups=500(ttaserv)
uid=501(ttaserv) gid=500(ttaserv) groups=500(ttaserv)
```

VISULOX PORTAL Service also adds a file for PAM authentication: **`/etc/pam.d/tarantella`**.

**⚠** With **`visulox portal admin -user <unixuser>`** a Unix user can be activated as VISULOX Portal Administrator. It is recommended to set a different user than root!.

### 2.5.2 VISULOX Service

The default VISULOX installation directory is **`/opt/visulox`**.

On group `vlxgroup` is generated on startup


On default 102 users are generated in for following sequence: VISULOX user ( `vlx` ), VISULOX webservice user ( `vlxwebservice` ) and 100 Jump Users ( `vlx000 .. vlx099` ).

The users can be removed and recreated with an admin command by and a new start UID can be applied. **See also:** [Custom vlxuser ID for transit users](#)

During VISULOX Service installation the following users and groups are created:

#### Primary VISULOX user and group

```
vlx:x:503:503:VISULOX user:/opt/visulox:/bin/bash
```

 The vlxgroup **must** be a local group!

On every VISULOX Access Node, the VISULOX Service is attached to the VISULOX PORTAL Service and the webservice user is created with:


```
visulox portal attach
```

#### VISULOX PORTAL connection user

```
vlxwebservice:x:610:500:VISULOX Admin User in VISULOX PORTAL:/opt/visulox/var/vlxwebservice:/sbin/nologin
```

If the webservice user should be created with a given name and UID on a VISULOX Access Node, VISULOX has to be setup with:


```
visulox portal attach -adminuser <name> -adminuid <number>
```

 This VISULOX webservice user is created with an unknown password that never expires and **cannot** be modified!

#### 100 VISULOX jump users

```
vlx000:x:<next available user id>:503:Visulox transit user:/opt/visulox/users/vlx000:/bin/bash
```


```
...
vlx099:x:<next available user id>+100:503:Visulox transit user:/opt/visulox/users/vlx099:/bin/bash
```

 The group is the same of the vlx user. The VISULOX group

A VISULOX PID is generated on each VISULOX Node. This **vlxpid** is always **vlxgroup+1**.

During VISULOX Service installation, the set-user-id bit is set on the following binaries:

```
-r-sr-xr-x 1 root vlxgroup 18760 Sep 17 14:14 vlxchown
-r-sr-xr-x 1 root vlxgroup 38007 Sep 17 14:14 vlxsu
-r-sr-xr-x 1 root vlxgroup 16276 Sep 17 14:14 vlxsudo
```

 Code for security review is available on request.

A file with the maximum number of processes and opened files for the vlx group is added: **/etc/security/limits.d/90\_visulox.conf**

```
@vlx hard nproc 16000
@vlx soft nproc 4000
@vlx hard nofile 8000
@vlx soft nofile 2000
```

During setup, a log rotation entry for VISULOX is added: **/etc/logrotate.d/visulox**

## 2.6 Optional enhancements

## 2.7 VISULOX addons

The following VISULOX addons can be used, if the according packages are installed on the server:

### 2.7.1 VISULOX Firefox

#### **Firefox**

```
yum install firefox
```

### 2.7.2 VISULOX VNC

#### **VNC Viewer**

```
yum install tigervnc
```

### 2.7.3 Telnet

#### Telnet

```
yum install telnet
```

### 2.7.4 Checksum in File Transfer

To display the checksum of transferred files in the VISULOX Transit Area in the user's Workspace it is necessary to install **rhash**, which is available in the Epel repository.

### 3 Installing VISULOX

Installing VISULOX 4.x on Linux platforms, the yum / dnf command has to be used to ensure that any package dependencies are resolved automatically. This means that yum must be configured to use a suitable Linux package repository. Make sure that **oracle\_appstream\_latest** and **ol8-epel** are in yum repolist as well.


```
dnf repolist
This system is receiving updates from Unbreakable Linux Network or Spacewalk.

repo id                                repo name
ol8-codeready                          ol8-codeready
ol8-epel                                ol8-epel
ol8_addons                              ol8_addons
ol8_appstream_latest                   ol8_appstream_latest
ol8_x86_64                              ol8_x86_64
```

**ol8-codeready** is needed for transitmapping.

#### For the Epel repository on Red Hat 8 use:

```
dnf install https://dl.fedoraproject.org/pub/epel/epel-release-latest-8.noarch.rpm
```

 RPM package signatures can be used for the VISULOX RPM packages.  
For more information see also: [VISULOX4\\_QuickInstallGuide\\_OL8](#) and/or contact the VISULOX Support Team.

#### On VISULOX Access Nodes:

##### Installation packages

```
dnf install java-11-openjdk
dnf update
```

```
dnf install visulox-rte-1.2.0-1.el8.x86_64.rpm
dnf install visulox-4.0.1-1.el8.x86_64.rpm visulox-portal-4.0.1-1.el8.x86_64.rpm
```

With local VISULOX Gateway add:  
visulox-gateway-4.0.1-1.el8.x86\_64.rpm

**i** On external VISULOX Gateways, use the following command to add the VISULOX Portal Array:

```
visulox-gateway server add-array --name osgd --serverurl <https://fqdn of the primary portal server>
```

The server URL has to be used only, without ".../sgd/" at the end.

**i** After setup of the VISULOX Gateway, the load balancer probing template file is available.  
(See also: [How to create a feedback page for Load Balancers in the VISULOX GATEWAY configuration](#))

#### On VISULOX Nodes:

##### Installation packages

```
dnf install java-11-openjdk
dnf update

dnf install visulox-rte-1.2.0-1.el88.x86_64.rpm
dnf install visulox-4.0.1-1.el8.x86_64.rpm
```

During the VISULOX installation, the acceptance of all license agreements is requested.

VISULOX generates a key during installation. The key is always unique per node.

The key file needs to be copied from one server to all other VISULOX servers, so that the VISULOX Nodes can communicate among themselves.

### Copy key from the first server to the other servers

```
scp $VLXDIR/etc/key root@<server2>:$VLXDIR/etc/  
scp $VLXDIR/etc/key root@<server3>:$VLXDIR/etc/
```

The file must have the correct permissions:

```
-rw-r--r-- 1 vlx vlxgroup 16 Dec 17 11:29 key
```

## 3.1 Attaching VISULOX Service to VISULOX PORTAL

On VISULOX Access Nodes, the VISULOX Service is attached to the VISULOX PORTAL with:


```
visulox portal attach
```

## 3.2 Attaching the VISULOX Nodes

On the first VISULOX Node, the other VISULOX Nodes are attached with:

```
visulox attach vlx-server2.domain  
visulox attach vlx-server3.domain
```

 Depending on the current database, the replication service needs time to insert all data into the new node`s database.

 After installation of VISULOX it is a good idea to restart the VISULOX PORTAL Service once!


### 3.3 Manual installation of the VISULOX PORTAL examples

```
visulox portal attach -examples
```

Normally the VISULOX PORTAL examples are installed during attaching the VISULOX Service.

## 4 Updating VISULOX

Each VISULOX installation can be updated with a newer version provided by amitego engineering as long as the underlying database structure has not been changed. Please have a look at the release notes of the new version before update.


 The update has to be done with root permissions.

 After update of VISULOX the VISULOX PORTAL Service and the VISULOX Service must be restarted once!

### Updating VISULOX

```
dnf install visulox-rte-1.2.0-1.el8.x86_64.rpm
dnf install visulox-4.0.1-1.el8.x86_64.rpm visulox-portal-4.0.1-1.el8.x86_64.rpm
```

On pure VISULOX Service Nodes only the RTE and the VISULOX package is needed.  
On environments with a local Gateway, the Gateway package is needed.

 In case of a new installation of the Gateways with imported certificates, the old entries of the Gateways have to be removed on the VISULOX Portal Servers before the add-array command.

On each VISULOX PORTAL, the VISULOX Service has to be re-registered.

```
visulox portal attach
```

 After the update it has to be checked, if there are policies without a timeprofile or missing links to scripts. The following commands can be used:

### Example checks

```
visulox policy login list -fields basicname,pin_script,login_script  
visulox policy access list -fields basicname,timeprofile,region,acc_script  
visulox policy application list -fields basicname,kbi_general_script,app_script  
visulox policy transit list -fields basicname,ft_script,scan_script
```

If errors are displayed, the according settings have to be adjusted manually (via VISULOX Cockpit or command line).

See also: [How to control regions from the command line](#), [How to control timeprofiles from the command line](#), [How to control access from the command line](#), etc

⚠ If it is necessary to adjust changed fields in policies, this must be done, when all nodes are active.

⚠ After installation of VISULOX, the VISULOX PORTAL Service and the VISULOX Service must be restarted once!

In case of log entries affecting the etcd instances, the node has to be reconfigured:

```
visulox etcd node reconfigure -verbose
```

⚠ During an update in larger environments it is possible, that some of the VISULOX etcd nodes are offline. If there are not enough nodes for the quorum, needed configuration parameters can not be set. There is a possibility to force the start of etcd on offline nodes to reach the number of nodes needed for the quorum. Please contact the system integrator in this case.

### See also:

- [Attaching VISULOX Service to VISULOX PORTAL Service](#)
- [Migrating VISULOX 3.1 to 3.3](#)

## 5 VISULOX Hotfix

It can be reasonable to install an available hotfix for VISULOX instead of using the VISULOX update mechanism.

**/opt/visulox/setup/hotfix.sh** checks the status of all files on all VISULOX Nodes, applies the hotfix files and creates a backup of the original files.

### Requirement for VISULOX Hotfix

Hotfix has to be applied on each node.

**Depending on the hotfix**, the following scenarios are possible:

- Total restart is needed
- Service kill is needed
- No restart is needed

See attached Release Notes for the hotfix.


(See also: [Manual restart of a missing VISULOX service](#))

### Usage:

```
sh /opt/visulox/setup/hotfix.sh <hotfix-file>
```

The backup files are copied to **/opt/visulox/setup/hotfix/hotfix-backup-*<date of installation>*.tgz** and can be re-established with VISULOX Hotfix.

The backup history can be found in **/opt/visulox/setup/hotfix/history**.

 After a VISULOX update to a new version, **/opt/visulox/setup/hotfix** will be deleted.

## 6 Uninstalling VISULOX

With the following yum command, the VISULOX components can be removed:

```
yum remove visulox-rte
```

With this command VISULOX RTE, VISULOX PORTAL, VISULOX Service will be removed.

On **VISULOX Access Nodes** with local VISULOX GATEWAY installed:

```
yum remove visulox-gateway
```

**i** The folder **/opt/visulox** still contains some VISULOX files, e.g. VLX keys, database, etc - with these files the VISULOX environment can be setup again. The folders **/opt/tarantella** and **/opt/SUNWsgd** contain VISULOX Portal and VISULOX Gateway files. If a complete uninstallation of VISULOX is wanted, then these folders should be removed as well.

## 7 VISULOX License Agreement

### 7.1 1 Object of the Agreement

The object of this licence shall be the standard data processing programme VISULOX of AMITEGO (SOFTWARE). Should a portion of the object of the Agreement also be the supply of standard software of a third party manufacturer, their terms of use shall apply exclusively in this respect. AMITEGO shall in this respect solely arrange the licence agreement, which is then concluded between the manufacturer and customer. These terms of use shall be provided to the customer on request.  
AMITEGO amitego Engineering GmbH, Balinger Straße 37A, 70567 Stuttgart, Germany  
VISULOX is a trade mark of amitego Engineering GmbH

### 7.2 2 Rights of use

The licensee shall receive the non-transferable and non-exclusive right to use of the SOFTWARE. The contractual grant of the licence shall occur according to the particular offer selected as a perpetual licence or as a time-limited licence. All use after expiry of the period shall be excluded. In the event of continued use in breach of the agreement, payment of the then-valid list price of the licence in addition to a service fee according to section 6 shall be due retrospectively to the beginning of use.

This shall not affect the right of each contracting party to extraordinary termination of the agreement without a period of notice for cause.

In the event of the termination of the licence agreement the licensee shall be obliged to delete the software and all copies of it completely.

The licensee may use the software on the hardware available to it; if the licensee changes the hardware, however, the licensee must delete the software from the hardware used previously.

The licensee shall be obliged to take suitable measures to prevent any unauthorised use by third parties; in this regard branch offices, companies associated with the customer as licensee, partners or spatially or organisationally separate institutions of the same organisation shall be regarded as “third parties.”

### 7.3 3 Object-, source code and backup copies

AMITEGO shall not be obliged to transfer the object code on a data-carrier. There shall not be any claim to surrender or disclosure of the source code either. The licensee shall be entitled to make backup copies of the SOFTWARE if this is necessary for its proper use.

### 7.4 4 Copyright

The licensee shall acknowledge that the SOFTWARE is protected by copyright and international agreements. The licensee shall not be entitled to change or process, copy or duplicate the SOFTWARE or text materials transferred to it (codes, documentation) beyond the scope required for the use of the SOFTWARE within the framework of the rights and obligations arising from the particular agreement itself or through third parties. Copyright marks or registration features, such as any registration numbers in the software in particular, may not be removed or changed.

Any temporary transfer for use for direct or indirect economic or commercial benefit to third parties shall be prohibited without the approval of AMITEGO. Any resale for independent use of the SOFTWARE to third parties shall only be permissible if the licence acquired is not as a result split up, i.e. the right to use of the SOFTWARE is not just resold for a number of users determined by the licensee, the licensee provides the data of the purchaser to AMITEGO in order to maintain the services pursuant to section 7 and the licensee ensures by all technical means at its disposal that the copy still available to it is rendered useless and that no possibility whatsoever of use of the SOFTWARE or its components remains to the licensee.

### 7.5 5 Decompilation and programme changes

Disassembling the programme code of the SOFTWARE transferred into other code forms (decompilation) and other kinds of reverse engineering of the various production stages of the software, including programme change, shall only be permissible without express approval of AMITEGO if the legal conditions of § 69e German Copyright Act (UrhG) exist.

Copyright marks, serial numbers and other features serving programme identification may not be removed or changed under any circumstances.

## 7.6 6 Support and maintenance

Support and maintenance of the SOFTWARE ("service") can be acquired in addition to the software license.

The service period shall be renewed in each case for the same contractual period as the license agreement if the service agreement is not cancelled by one contracting party in writing at the end of the initial or each succeeding contractual period. The period of notice shall in this respect be three months. If the service is terminated without cancellation of the license agreement and the licensee would reconsider to start service again, the service period from the end of the last paid service period to the actual date shall be paid with an amount of 50% of the regular service fee. This shall not affect the right of each contracting party to extraordinary termination of the agreement without a period of notice for cause.

The support and maintenance agreement shall include the supply of cost-free updates of the SOFTWARE, email support at [support@visolux.com](mailto:support@visolux.com) and telephone support pursuant to the particular support agreement separately concluded in this regard.

## 7.7 7 Guarantee

The parties are in agreement that according to the current state of technology it is not possible to develop standard software free of defects for all application conditions. AMITEGO shall in the meantime be liable for ensuring that the software substantially corresponds with the functions described in the manual and that it is free of defects that cancel or reduce its value or its suitability for the purpose contractually stipulated purpose or the usual purpose. AMITEGO shall not be liable for insignificant deviations or reductions.

In the event of considerable defects, AMITEGO shall be entitled and obliged to eliminate the defects at its expense or provide an equivalent replacement. (Subsequent specific performance). AMITEGO shall be entitled to make the choice. If the subsequent specific performance or replacement delivery fails a second time, the licensee may at its discretion either rescind the agreement or reduce the agreed payment.

The guarantee period shall be one year, calculated from the day of delivery / download of the software.

## 7.8 8 Liability restriction and contributory negligence

AMITEGO shall only be liable for losses arising other than through injury to life, limb and health if these losses are based on intent or gross negligence or culpable infringement of an essential contractual obligation by AMITEGO or its agents. An obligation shall be contractually essential if its fulfilment is what makes proper implementation of the agreement possible in the first place and on whose fulfilment the customer may normally rely.

AMITEGO shall only be liable for the loss of data according to the above sentence if such a loss could not have been avoided by appropriate data backup measures on the part of the licensee. Inadequate data backup shall in particular exist if the licensee neglected to take precautions through backup measures corresponding with the current state of technology against external influences, especially against computer viruses and other phenomena that could endanger individual data sets or the entire database.

Additional liability to damages shall be excluded; this shall not affect claims from a guarantee provided by AMITEGO for the quality of the purchase object and the German Product Liability Act.

AMITEGO shall only be liable for those losses that are foreseeable or typical in the event of ordinary negligence.

## 7.9 9 Price adjustments

AMITEGO shall reserve the right in the event of changes in the salary- or prime costs or other general cost changes in the IT industry that occur after conclusion of the agreement to increase or reduce the agreed prices in accordance with the actual cost changes. The corresponding changes shall be communicated before they take effect. The change shall take effect at the beginning of the month succeeding the notification of change. Should these changes lead to an increase in prices of more than 5%, the licensee shall be entitled to terminate the agreement without notice in writing within a month of receiving the notification of change.

## 7.10 10 Miscellaneous

Activation of the software licence shall only occur after complete payment of the usage fee for the licensed software and – if agreed – the additional fees. Swiss law shall apply to the exclusion of UN commercial law (CISG). The legal venue shall be Zurich.

The contractual language shall be English; versions in other languages shall merely serve as additional information.



## 8 VISULOX and Session Cookies

VISULOX requires altogether four cookies, which are needed for **technical session controlling**. They are only used for functional purpose.

These cookies are used to assign a server side session to the user. This is a **basic** and **essential functionality** of the VISULOX software.

Client or personal data is **not** collected/stored and **no** tracking to our company or to other services is done.

**i** Session cookies fall under the categorization of strictly necessary cookies under the General Data Protection Regulation (GDPR), applicable in the European Union and the UK. Strictly necessary cookies like session cookies are **exempt** from the consent requirements underlined in the GDPR. Therefore, session cookies are **GDPR compliant**.  
Strictly necessary cookies are essential to navigate a website and use its features and functionalities. Without them, a user wouldn't be able to use basic services like logging in on a website or adding items to a shopping cart etc. GDPR **exempts** these cookies from consent requirements as they do **not** gather any personal information about users.

If a customer nevertheless wants to have a cookie consent, this can be done with a **VISULOX extended login consent**.

**See:** [How to setup a standard form contract to commit on login](#)

## 9 Appendix\_I

### 9.1 Appendix

#### Reference Card and Glossary

- [Appendix](#)
  - [Events](#)
    - [VISULOX Service Events](#)
    - [VISULOX PORTAL Service Events](#)
  - [Script Interface & Variables](#)
    - [Available script categories](#)
  - [Exit Codes](#)
  - [Command Line Parameter](#)
    - [VISULOX Command](#)
      - [Available parameters](#)
      - [General commands](#)
      - [Usage](#)
    - [VISULOX PORTAL ATTACH Command](#)
      - [Available parameters](#)
      - [General commands](#)
      - [Usage](#)
    - [VISULOX-PORTAL Command](#)
      - [Available parameters](#)
      - [Usage](#)
    - [VISULOX-GATEWAY Command](#)
      - [Available parameters](#)
      - [Usage](#)
    - [Integrity-Check](#)
      - [Available Integrity-Check commands](#)



- [General commands](#)
- [Usage](#)
- [Troubleshooting](#)
- [Glossary](#)

## 9.1.1 Events

### VISULOX Service Events

Type	Event	Description	Event variable
Login	Multiple login failures detected	Default warning setting for failed login attempts: 5 per minute, 20 per hour and 50 per day	multipleloginfailures
Login	Access PIN accepted	Login with Access PIN accepted	2faPinAccepted
Login	Access PIN requested	Access PIN for login requested	2faPinRequested
Login	Access PIN rejected	Access PIN was rejected	2faPinRejected
Login	OTP requested	One Time Passcode for login requested	otpRequested
Login (Webtop)	Logged out by supervisor	Application session ended by supervisor via VISULOX Cockpit	webtopSessionEndedByAdmin

Type	Event	Description	Event variable
Application	Application started	Application session has been started with session controller	sessionControllerStarted
Application	Application started (uncontrolled)	Application session has been started without session controller	sessionUncontrolledStarted
Application	Application ended	Application session ended	sessionControllerEnded
Application	Session locked	Application session locked	lock
Application	Session unlocked	Application session unlocked	unlock
Application	Session locked by supervisor	Application session locked by supervisor via VISULOX Cockpit	lockedbyadmin
Application	Session unlocked by supervisor	Application session unlocked by supervisor via VISULOX Cockpit	unlockedbyadmin
Application	Ended by supervisor	Application session ended by supervisor via VISULOX Cockpit	sessionEndedByAdmin
Application	Message sent	Message from supervisor is sent via Cockpit to the user	message
Application	Accepted by user	Message, recording, etc. acknowledged by the user	accept

Type	Event	Description	Event variable
Application	Rejected	Recording rejected by user	reject
Notification	Notification sent	A notification was sent based on the selected script	scriptsend
Access	Access will expire	Warning, that access to applications will expire soon	
Access	User request	Access requested by the user	accessRequestedByUser
Application	Remark by user	Session annotation created by the user	annotationByUser
Application	Remark by supervisor	Annotation created by the supervisor in the VISULOX Cockpit for the session	annotationBySupervisor
Cooperation	Assistance request	Request for a cooperation	assistrequested
Cooperation	Assist observe	Assist mode switched to observe	assistobserve
Cooperation	Assist interact	Assist mode switched to interact	assistinteract
Cooperation	Assist Standby	Assist mode switched to standby	assiststandby
Cooperation	Dual Control	Dual Control cooperation started	dualcontrol

Type	Event	Description	Event variable
Cooperation	Assistance closed	Cooperation closed	assistclosed
Recording	Manual recording	Manual recording of the session started by the supervisor via VISULOX Cockpit	sessionManuallyRecordingStarted
Recording	Recording stopped	Manual recording stopped by the supervisor via VISULOX Cockpit	sessionManuallyRecordingStopped
Recording	Recording started by Policy	Predefined recording started by Application Policy	sessionRecordingStarted
Keyboard control	In use	Input changed to this user	inputFocusChanged
Keyboard control	Inputline	The user entered a line of characters	keyboardControlInputline
Keyboard control	Responsible	Input changed to this user	inputResponsibility
Keyboard control	Idle	Keyboard idle	InputFocusIdle
Keyboard control	Keyboard control started	Keyboard input detection started	keyboardControlStarted
Keyboard control	Keyword detected	Keyword detected by keystroke detection control	keywordDetected
Checkout	Checkout	Session checkout via Cockpit	checkout

Type	Event	Description	Event variable
Checkout	Checkout with keystrokes	Checkout of the session information in a ZIP file with displayed keystrokes	checkoutwithkeystrokes
Checkout	Report in browser	Report created via Cockpit and displayed in browser	reportGeneratedByGuiBrowser
Checkout	Report via eMail	Report created via Cockpit and sent via eMail	reportGeneratedByGuiEmail
Checkout	Player started	Browser-based player started via Cockpit	player
Checkout	Player with keystrokes started	Browser based player with displayed keystrokes started	playerwithkeystrokes
System	Auto accepted	Accepted automatically by the system	autoaccept
System	Auto rejected	Rejected automatically by the system	autoreject
System	Object created	A VISULOX object has been created	objectNew
System	Object copied	A VISULOX object has been copied	objectCopied
System	Object changed	A VISULOX object has been changed	objectChanged
System	Object deleted	A VISULOX object has been deleted	objectDeleted

Type	Event	Description	Event variable
System	Object attached	A VISULOX object has been attached	objectAttached
System	Object detached	A VISULOX object has been detached	objectDetached
File Transfer	Synced to folder	Files synchronized with the folder	syncput
File Transfer	Synced to Transit Zone	Files synchronized with the Transit Zone	syncget
File Transfer	Transfer to server	File transferred from Transit Zone to the application server via SFTP/FTP	ftput
File Transfer	Transfer to Transit Zone	File transferred from application server to the Transit Zone via SFTP/FTP	ftget
File Transfer	Upload (internal web page)	File uploaded via internal web page	webput
File Transfer	Download (internal web page)	File downloaded via internal web page	webget
File Transfer	Upload	File uploaded from client into Transit Zone	userput
File Transfer	Download	File transferred from Transit Zone to the client	userget
File Transfer	File checked	Transferred file has been checked	checked

Type	Event	Description	Event variable
File Transfer	Approved	Transferred file has been approved	approved
File Transfer	File rejected	File rejected after check	rejected
File Transfer	Pending	File not approved yet	pending
File Transfer	Conditionally accepted	File accepted depending on endpoint rules	tmpaccepted

#### VISULOX PORTAL Service Events

Type	Event	Description	Event variable
Server	Server started	Server has been started / details	serverStart
Server	Server stopped	Server was stopped / details	serverStop
Server	SSL started	VISULOX PORTAL Security SSL has been started	securitySSLStart
Server	SSL stopped	VISULOX PORTAL Security SSL has been stopped	securitySSLStop
Login	Login rejected	VISULOX PORTAL login was rejected for the user / details	loginResultRejected


Type	Event	Description	Event variable
Login	Login ambiguous	Login information ambiguous, common name needed	loginResultAmbiguous
Login	Anonymous login not supported	Login failed, Anonymous login not supported	loginResultAnonymous
Login	Unresolveable user	Login failed, unresolveable user	loginResultUnresolveable
Workspace	Workspace opened	Workspace session has been started / details	webtopSessionStartedDetails
Workspace	Workspace closed	Workspace session has been stopped / details	webtopSessionEndedDetails
Application	Application session started	Application session has been started / details	sessionStartedDetails
Application	Application session stopped	Application session was stopped / details	sessionEndedDetails
VISULOX PORTAL Object	Object modified	VISULOX PORTAL object has been changed	modifySuccess
VISULOX PORTAL Object	Object created	A new VISULOX PORTAL object was created	createSuccess
VISULOX PORTAL Object	Object create failed	Creating an VISULOX PORTALobject failed	createFailure
VISULOX PORTAL Object	Rename successful	VISULOX PORTAL object renamed successfully	renameSuccess
VISULOX PORTAL Object	Object deleted	An VISULOX PORTAL object was deleted	deleteSuccess

## 9.1.2 Script Interface & Variables

### Available script categories

Category	Used as
Notification	These action scripts can be chosen, where application notifications are used (Application Policy).
Pin	These action scripts deliver information for the Multi Factor Authentication (Login Policy).
Report	These are report actions scripts.
Validate	These action scripts can be chosen for validation.
*	These action scripts are available everywhere scripts can be used. The setup provides one script in this category, which allows to dump all variables provided to an action script. This is helpful for testing.

### Notification script variables (examples)

 The following list contains some useful examples for script variables.  
To get the complete list of available variables for a certain action script, the dump script should be used.

Variable	Description
VLXFULLNAME	Full name of the user
VLXSURNAME	Surname of the user
VLXEMAIL	eMail address of the user
VLXSMS	SMS address of the user
VLXOWNER	Owner of the application
VLXGROUPLIST	Group list
VLXUSERPROFILE	Profile of the user
VLXPIN	PIN for Multi Factor Authentication
VLXPIN_FMT	Formatted PIN for Multi Factor Authentication
VLXPIN_SEQUENCE	Sequence number for PIN
VLXPIN_EXPIRATIONTIME	Expiration time with date for the PIN
VLXPIN_LIFETIME	Lifetime for the PIN

Variable	Description
VLXPIN_TEXT	PIN text
VLXACCESSPOIN	Access Point
VLXCREATETIME	Creation time
VLXLOG	Path to logs
VLXLOGINUSER	Logged in user
VLXMANAGER	Manager of the user
VLXOBJECT	Name of the object
VLXOWNERID	Owner ID
VLXOWNERSHORT	Short name of the owner
VLXPOLICY	VISULOX policy
VLXREMOTEIP	Remote IP
VLXSMS	SMS of the user

Variable	Description
VLXLISTHASH	Hash
VLXCLIENTIP	Client IP address
VLXLANG	Language
VLXSESSIONHOST	Host, where the session was started
VLXCREATETIME_FMT	Time of creation (readable)
VLXSESSIONSTARTTIME	Start time of the session
VLXSESSIONDURATION	Duration of the session
VLXSESSIONDURATION_FMT	Duration of the session (readable)
VLXSESSIONENDTIME	Endtime of the session
VLXSESSIONENDTIME_FMT	Endtime of the session (readable)
VLXAPPLICATION	Application name
VLXRECIPIENT	Recipient

Variable	Description
VLXTICKETID	Ticket ID of the user
VLXLOGINSCRIPT	Login script
VLXAPPLICATIONUSER	User of the application
VLXBADWORD	Detected keyword in Keyboard recording
VLXEVENTINFO	Event info
VLXCREATEDBY	Created by
VLXCREATEDBYSHORT	Short name of creator

**See also:**

- [Variables in notifications](#)
- [Transit script variables](#)
- [How to control action scripts from the command line](#)

### 9.1.3 Exit Codes

In the following table all VISULOX Exit Codes are listed with a short description and the meaning of the code.

Exit code	Short description	Comment
-----------	-------------------	---------

<b>0</b>	SUCCESS	Success
<b>1</b>	FAILURE	Failure
<b>2</b>	WARNING	Warning
<b>3</b>	REJECT	Policy
<b>4</b>	ACCEPT	Policy
<b>5</b>	PASSON	Policy
<b>6</b>	APPLY	Policy
<b>7</b>	EXCLUDE	Policy
<b>8</b>	APPROVAL	Rule
<b>9</b>	ALLOW	Rule
<b>10</b>	ALLOWSPONTAN	Rule
<b>11</b>	ALLOWENDPOINT	Transit rule matches, but endpoint has to be taken into account
<b>12</b>	DENY	Deny action

<b>13</b>	DENYTOOLARGE	Transit: file is too large
<b>14</b>	DENYDIRECTION	Transit: file can not be transferred in this direction
<b>15</b>	DENYFORENDPOINT	Transit: file cannot be handled with this endpoint
<b>16</b>	DENYVIRUS	Transit: file has a virus
<b>17</b>	DENYEMPTY	Transit: file is empty
<b>18</b>	DENYPASSON	Transit: script denies Passon
<b>19</b>	NOMATCHPOLICY	Policy
<b>20</b>	USAGE	Command line usage error
<b>21</b>	DATAERR	Data format error
<b>22</b>	NOINPUT	Cannot open input
<b>23</b>	UNKNOWNUSER	User unknown
<b>24</b>	UNKNOWNHOST	Host name unknown
<b>25</b>	UNAVAILABLE	Service unavailable

<b>26</b>	SOFTWARE	Internal software error
<b>27</b>	LICENSE	License error
<b>28</b>	OSERR	System error (e.g. can't fork)
<b>29</b>	OSFILE	Critical OS file missing
<b>30</b>	CANTCREAT	Can't create (user) output file
<b>31</b>	IOERR	Input/output error
<b>32</b>	TEMPFAIL	Temp failure; user is invited to retry
<b>33</b>	PROTOCOL	Remote error in protocol
<b>34</b>	NOPERM	Permission denied
<b>35</b>	CONFIG	Configuration error
<b>36</b>	INIT	Initialization error
<b>37</b>	SCRIPTERROR	Script execution with error
<b>38</b>	DATABASE	Error during database interaction


<b>39</b>	TIMEOUT	Timeout
<b>40</b>	REGISTRATION	Error on registration
<b>41</b>	XAUTH	Error on setting x11 cookie
<b>42</b>	ZMQERROR	ZeroMQ error
<b>43</b>	CRYPTOERROR	Crypto error
<b>44</b>	STARTREJECTED	Start rejected
<b>45</b>	ALREADYRUNNING	Program already running
<b>46</b>	NOTIMPLEMENTED	Not implemented
<b>47</b>	UNDEFINED	Operation has no defined state yet
<b>48</b>	EXHAUSTED	No resource available anymore
<b>49</b>	LOOKUP	Item not found
<b>50</b>	EMPTY	Unexpected empty result
<b>51</b>	RESTART	Restarting...

<b>52</b>	RETRY	Try again
<b>53</b>	OLDREQUEST	Received reply to a previous request
<b>54</b>	TRANSPORT	Error in transport layer
<b>55</b>	QUORUM	No etcd leader
<b>56</b>	ACCESSPOINTCHECK	Access validation
<b>57</b>	BUSY	Resource temporarily unavailable
<b>100</b>	ACCESSREQUEST	Access Policy Request
<b>200</b>	DISABLED	LDAP cannot get data, because the datasource is disabled
<b>210</b>	APPROVALPASSON	Rule
<b>1000</b>	INFO	Info line in integrity test

## 9.1.4 Command Line Parameter

### VISULOX Command

```
visulox <command> [<command-specific args>]
```


 During installation `/usr/sbin/visulox` is created, which makes it possible to execute the VISULOX Service Command without using the whole path.


### Available parameters

Command	Description	Additional commands / args
addon	Command Line Interface to VISULOX Addons	cmdconnect, cmdguard, ftclient, host, script, template
admin	Manage the VISULOX Administration	cockpit, action, message, region, timeprofile
archive	Manage VISULOX Archive Node	-node <>, -set
assignments	Check assignments in policies and applications	app, datastore, policy
attach	Attach a node to the VISULOX Cluster	<hostname>, -location, -zone
cluster	Builds a VISULOX Cluster	data, layout, build -f <>   -template
cockpit	Start of the VISULOX Cockpit	title <>, lang <>, roles <>, grant <>, groupaccess <>,owner <>, ksr, cdm, kiosk, personal
config	Manage the VISULOX configuration	datasources, dump, edit, env, list, locations,logo, mynodename, rebuild, reset, vap
database	Query the VISULOX Database	list, backup, restore, fields, query, integrity, rename <>, node <>, table <>, timeout <>

Command	Description	Additional commands / args
datasource	Manage the VISULOX Datasources	add, check, copy, delete, edit, list
detach	Detach a node from the VISULOX Cluster	server <>, timeout <>
end2end	VISULOX end2end check	off, on, status
etcd	Manage ETCD instances	benchmark, client, del, get, instance, member, node, put, test
export	Export from VISULOX	events, files, sessions
integrity	VISULOX Integrity-Check	sys, lib, cmd, users, portal, ulimit, store, recorder, datasources, license
license	Manage the VISULOX License	list, replace, test, usage (-component <users sessions recorders hostcontrols> -unit <week month year>)
log	Query VISULOX log database	since <>, until <>, logleve <l>, follow
online	VISULOX online status	getpin, fields (list available fields), -i (ignore case), -object <> (owner or group mask), -application <>, -fields <>, sortby <> (sort by field)
otp	Manage the VISULOX OTP configuration	check <>, key, reset <>, set <>

Command	Description	Additional commands / args
passcache	Manage the VISULOX Passcache	list, fields, edit, delete
ping	Ping local master or designated worker	id <> (outdated)
policy	Command line interface to the VISULOX Policies	external, login, internal, access, application, transit
portal	Attach / detach VISULOX Service from VISULOX PORTAL Service  (See also: <a href="#">VISULOX PORTAL ATTACH Command</a> )	array, config, discover, drop, admin, etc (see: <a href="#">VISULOX-PORTAL Command</a> )  visulox portal --help shows all available VISULOX PORTAL and VISULOX commands.  With visulox portal admin -user <unixuser> a Unix user can be activated as VISULOX Portal Admin (⚠ It is recommended to set a different user than root!)
pwdmgmt	Manage / list account passwords	expired, mustchange, notify <>, warn
report	Command line interface to VISULOX Report	title <>, mctitle <>, name <>, type <>, xslt <>, metadata <>, query <>, tframe <>, -from<>.  -to <>, sql <>, lang <>, filename <>, mailto <>, mailsubject <>, maildescription <>,  maildescriptionfile <>, archive <>
reset	Reset local cluster state	

Command	Description	Additional commands / args
restart	Restart VISULOX Service (locally) <div style="border: 1px solid red; padding: 2px; display: inline-block;">  Use with caution, all sg, sc and scx will be stopped. </div>	-service <>, -timeout <>
start	Start VISULOX Service (locally)	debug
status	Query VISULOX status	diskfree, features, load, monitor, next, servers, services, sessions, uptime, usage, users, workers, server <>, serverfilter <>, print, fields <>
stop	Stop VISULOX Service (locally)	id <>
store	Manage the VISULOX store	attach, changed, detach, disable, enable, extras, get, migrate, missing, next, put, status, slot <>
support	Gather information for support (-info: short report)	directory <>, sys, dump, etc, rt, logs, net, integrity, config, tta
transit	Command line interface to VISULOX Transit Zone (list, import)	list, import, owner, path, rtime
version	Display versions of installed VISULOX packages	

 With **-help** or **-?** the detailed options for a basic command can be displayed. If more parameters are needed for a command, the available options are always displayed by entering the basic command.

## General commands

Parameter	Description
-format <value>	Format of output (text,xml,csv,json,tcl) / Default: <text>
-log <value>	Set loglevel to error, verbose, info or debug / Default: <>
-verbose	More messages on stdout
-run	Run an operation (use only on application request)
-stdin	Get arguments from stdin
--	Forcibly stop option processing
-help / -?	Display commands

## Usage

The following examples show the usage of the VISULOX Service Command:

Show VISULOX status
<pre>visulox status</pre>

### Show license information

```
visulox license
```

### Replace license

```
visulox license replace -file <path to license file>
```

### List sessions

```
visulox status sessions  
visulox online
```

### List unassigned applications

```
visulox database query -sql "select vlxapplication from external_applications WHERE vlxapplicationgroups = '' AND  
vlxapplicationusers = ''" -format csv -raw
```

### Transit import & list

```
visulox transit import -path /tmp/file.txt -owner "o=Tarantella System Objects/cn=TestUser"  
visulox transit list -owner "o=Tarantella System Objects/cn=TestUser"
```

### Detach VISULOX Node

```
visulox detach <vlx-node.domain>
```

### VISULOX PORTAL ATTACH Command

```
visulox portal attach [<command-specific args>]
```

 During installation **/usr/sbin/visulox** is created, which makes it possible to execute the VISULOX Service Command without using the whole path.

### Available parameters

Command	Description
-all	Install all (default)
-portal	Modify VISULOX PORTAL only, write configuration
-examples	setup examples
-attach	Attach VISULOX Service to VISULOX PORTAL Service
-expect	Install expect script only
-webtop	Install webtop script only

Command	Description
-jspconfig	Create VISULOX JSP configuration file
-apacheport <value>	Local port to address Apache. If empty, discovered by webservice configuration <>
-externalport <value>	External port to address Apache. If empty, discovered by httpd.conf <>
-serviceonline <value>	Enable/disable Webtop Enhancements <true>
-adminuser <value>	UNIX user for the VISULOX webservice user in VISULOX PORTAL<vlxwebservice>
-adminuid <value>	User ID for the VISULOX admin user in VISULOX PORTAL <610>
-adminpwd <value>	Password for the VISULOX admin user in VISULOX PORTAL <generate>
-adminou <value>	OrgUnit for Webservice user cn=<host name>/<adminou> <>
-version <value>	Force VISULOX PORTAL version <>

#### General commands

Parameter	Description
-format <value>	Format of output (text,xml,csv,json,tcl) / Default: <text>

Parameter	Description
-verbose	More messages on stdout
-run	Run an operation (use only on application request)
--	Forcibly stop option processing
-help / -?	Display commands

#### Usage

The following examples show the usage of the attach command:

##### Attaching VISULOX Service to VISULOX PORTAL Service

```
visulox portal attach
```

This command checks if login-ens is enabled. If this is the case a local user vlxwebservice (610) with group ttaserv (500) was added to the system. A password was also generated and stored secure.


##### Attaching with an already defined user

```
visulox portal attach -adminuser <name> -adminuid <uid> -adminpwd <pwd>
```

If the default generated user is not allowed, the user can be applied to the attach command. The user must exist and he must have a permanent password.

## VISULOX-PORTAL Command

```
visulox-portal <command> [<command-specific args>]
```

 During installation **/usr/sbin/visulox-portal** is created, which makes it possible to execute the VISULOX PORTAL Service Command without using the whole path.

### Available parameters

Command	Description
array	Creates and manages arrays of VISULOX PORTAL servers
config	Edits array-wide and server-specific configuration
discover	Discover available resources
drop	Drop discovered resources
emulatorsession	Lists and controls emulator sessions
gateway	Manipulates the VISULOX GATEWAY store
help	Displays this list of commands
info	Shows status information for the local server

Command	Description
object	Manipulates objects in the datastore
passcache	Manipulates the password cache
restart	Restarts VISULOX PORTAL services
role	Configures role occupants and their extra webtop links
security	Controls security services, manages certificates
serverrename	Change the server's peer or external DNS name
service	Edits service object configuration
start	Starts VISULOX PORTAL services
status	Shows the current status of VISULOX PORTAL array members
stop	Stops VISULOX PORTAL services
tokencache	Manipulates the token cache
version	Displays versions of installed VISULOX PORTAL packages

Command	Description
webserver	Controls the VISULOX PORTAL Web Server
webtopsession	Lists and controls webtop sessions

**i** With **visulox-portal <subcommand> --help** the detailed options for a command can be displayed. If more parameters are needed for a command, the available options are always displayed by entering the basic command.

### Usage

The following examples show the usage of the VISULOX-PORTAL Command:

#### Show VISULOX PORTAL status

```
visulox-portal status
```

#### Show version information

```
visulox-portal version
```

#### List webtop sessions

```
visulox-portal webtopsession list
```

### List VISULOX Array members


```
visulox-portal array list
```

### Join VISULOX Array member

```
visulox-portal array join --primary <hostname> --secondary <hostname>
```

## VISULOX-GATEWAY Command

```
visulox-gateway <command> [<command-specific args>]
```

 During installation **/usr/sbin/visulox-gateway** is created, which makes it possible to execute the VISULOX GATEWAY Command without using the whole path.

### Available parameters

Command	Description
start	Start VISULOX GATEWAY
stop	Stop VISULOX GATEWAY
restart	Restart VISULOX GATEWAY
config	Configuration options: create, list, edit, enable, disable

Command	Description
server	Server options: add, add-array, remove, list, list-array
status	Show VISULOX GATEWAY status
version	Show VISULOX GATEWAY version
sslcert	Export, print sslcert
sslkey	Import, export sslkey
cert	Export the VISULOX GATEWAY certificate
clientcert	Import, list, remove clientcert
key	Import private key and its corresponding certificate
patch	Add, remove, list VISULOX GATEWAY patches
connection	List connections
support	VISULOX Gateway Support Report

**i** With **visulox-gateway <subcommand> --help** the detailed options for a command can be displayed.  
 If more parameters are needed for a command, the available options are always displayed by entering the basic command.

## Usage

The following examples show the usage of the VISULOX-GATEWAY Command:

### Show VISULOX GATEWAY status

```
visulox-gateway status
```

### Show version information

```
visulox-gateway version
```

### List VISULOX PORTAL Servers / certificates

```
visulox-gateway server list
```

### Show VISULOX GATEWAY configuration

```
visulox-gateway config list
```

### Add the VISULOX Portal Array on external Gateway

```
visulox-gateway server add-array --name osgd --serverurl <https://fqdn of the primary portal server>
```

## Integrity-Check

The Integrity-Check is started automatically during installation of VISULOX to make sure, that all requirements are met for a properly running system. However Integrity-Check can also be used in an already running environment for diagnose purpose.

### Integrity-Check can be started via the visulox command:

```
visulox integrity
```

In the quiet mode no shell output and no log entries in **/tmp/visulox-integrity.log** are written.

Only the Integrity-Check exit code will be returned:

```
visulox integrity -quiet
```

### Available Integrity-Check commands

Command	Description
-sw	Check of online software status
-vlx	Check the VLX Services and cluster ports
-sys	Check the system environment

<b>Command</b>	<b>Description</b>
-lib	Check for missing libs
-cmd	Check command for missing libraries
-disk	Check disk
-users	Check VISULOX transit users
-portal	Check the VISULOX PORTAL Service
-cert	Check certificates within VISULOX and VISULOX PORTAL
-store	Check store
-recorder	Check recorder
-datasources	Check datasources
-assignments	Check datastore assignments and dynamic applications
-license	Check license
-policies	Check policies (VISULOX must be online)

Command	Description
-index	Check index
-scripts	Check scripts
-x11forward	Check x11forward
-gate	Check gate config
-mail	Check mail configuration

### General commands

Command	Description
-format <value>	Format of output (text,xml,csv,json,tcl) <text>
-verbose	More messages on stdout
--	Forcibly stop option processing
-help	Print this message

Command	Description
-?	Print this message

## Usage

```
visulox integrity
```

```
Please wait ....
```

```
Integrity-Check: amitego engineering - in house license / beta2-3.1.1 / 2016-07-12 12:46:32 UTC
```

```
-----
```

option	cat	info	returnCode
-license	check	Evaluation	WARNING(2)
-sys	Script /opt/visulox/tools/filecheck.sh	not configured	WARNING(2)
-sys	Script /opt/visulox/tools/event.sh	not configured	WARNING(2)
-portal	5.60 Warnings	see logfile	WARNING(2)

```
-----
```

```
ExitCode: WARNING
```

```
Check the warnings. For more information see /tmp/visulox-integrity.log
```

 Only warnings and errors are displayed by default. All Integrity checks can be shown with the **-verbose** parameter.

## visulox integrity -portal

```
-----
```

option	cat	info	returnCode
--------	-----	------	------------

```

-----
| -portal | core          | PORTAL 5.60          | SUCCESS(0) |
| -portal | connect       | yes                  | SUCCESS(0) |
| -portal | webtop        | ok                   | SUCCESS(0) |
| -portal | var           | security-xsecurity  ok | SUCCESS(0) |
| -portal | var           | xpe-maxsessions    ok | SUCCESS(0) |
| -portal | var           | xpe-maxusers       ok | SUCCESS(0) |
| -portal | role          | administrator is    root | WARNING(2) |
| -portal | array         | P: mp-vlx32-ol7.tbsol.de | SUCCESS(0) |
| -portal | security-gateway | mp-vlx32-ol7.tbsol.de is good | SUCCESS(0) |
-----

```

#### visulox integrity -cert

```

-----
| option | cat          | info                                                         | returnCode |
-----
| -cert  | SSL-CERT    | issuer = /C=de/ST=de/O=amitego/CN=test.tbsol.de           | SUCCESS(0) |
| -cert  | SSL-CERT    | subject = test.tbsol.de                                     | SUCCESS(0) |
| -cert  | SSL-CERT    | serial = EA8628EF3B3A7F44                                  | SUCCESS(0) |
| -cert  | SSL-CERT    | from = 2016-12-16 09:12                                     | SUCCESS(0) |
| -cert  | SSL-CERT    | until = 2017-12-16 09:12                                   | SUCCESS(0) |
| -cert  | SSL-CERT    | remain = 360d 21h                                          | SUCCESS(0) |
| -cert  | PEER-CERT   | issuer = /CN=mp-ol6u3-devel.tbsol.de CA Cert              | SUCCESS(0) |
| -cert  | PEER-CERT   | subject = test.tbsol.de CA Cert                            | SUCCESS(0) |
| -cert  | PEER-CERT   | serial = 9F3D8E05D8800F22                                  | SUCCESS(0) |
| -cert  | PEER-CERT   | from = 2013-07-15 12:20                                     | SUCCESS(0) |
| -cert  | PEER-CERT   | until = 2023-07-13 12:20                                   | SUCCESS(0) |
| -cert  | PEER-CERT   | remain = 2395d 23h                                         | SUCCESS(0) |
| -cert  | SSL-CA      | issuer = /C=de/ST=de/O=amitego/CN=test.tbsol.de           | SUCCESS(0) |
| -cert  | SSL-CA      | subject = test.tbsol.de                                     | SUCCESS(0) |
| -cert  | SSL-CA      | serial = EA8628EF3B3A7F44                                  | SUCCESS(0) |
| -cert  | SSL-CA      | from = 2016-12-16 09:12                                     | SUCCESS(0) |
-----

```

```

| -cert | SSL-CA | until = 2017-12-16 09:12 | SUCCESS(0) |
| -cert | SSL-CA | remain = 360d 21h | SUCCESS(0) |
-----

```

Integrity check with the parameter **-cert** shows the status of the both VISULOX PORTAL certificates. PEER-CERT and SSL-CERT.

The serials can be displayed on the local VISULOX GATEWAY with the command **visulox-gateway server list** and have to match with the serials of the VISULOX PORTAL certificates.

Integrity check shows a warning, when the lifetime is lower than 30 days or an error when the lifetime is expired.

### visulox integrity -disk

```

Please wait ...Integrity-Check: VISULOX EVALUATION / xdevelopment / development
-----

```

option	cat	info	returnCode
-disk	Diskspace	ok in base (base threshold at 2.0GB has 39.67GB)	SUCCESS(0)
-disk	Diskspace	ok in var (var threshold at 5.0GB has 39.67GB)	SUCCESS(0)
-disk	Diskspace	ok in data (data threshold at 20.0GB has 39.67GB)	SUCCESS(0)
-disk	Diskspace	ok	SUCCESS(0)
-disk	DB Partition	ok fileserver.tbzol.de:/home/users/xxx	SUCCESS(0)
-disk	DB Partition	needs atleast 157.30MB - has 39.67GB	SUCCESS(0)

```

ExitCode: SUCCESS
-----

```

Among the checks also the diskspace for the database is checked. VLX\_DATADIR must have at least 2.5 of size of the database available because VACUUM creates a copy of the database.

For example: a 4GB database needs 6 GB free diskpace. The diskpace is checked with integriy check.

## Troubleshooting

- **VISULOX PORTAL connect failure**

On servers, where VISULOX Service is installed together with VISULOX PORTAL Service, the connection to the VISULOX PORTAL Service can be checked with a small tool:

```
/opt/visulox/lib/utils/sgd.tcl check

Check connections

-----
|                                     scottasessionid |                                     scottasessionowner
|
-----
| test-ol6u5.tbsol.de:1434362892796:1108252004568201775 | {.../_ens/o=Tarantella System Objects/ou=Visulox/cn=test-ol6u5}
|
-----
```

The following command reinstalls the necessary VISULOX PORTAL Service components on the server and mostly fixes connection errors:

```
visulox portal attach
```

- **VISULOX PORTAL Service warnings**

More details can be found in visulox-integrity.log. The Java tuning values should be adjusted for the environment.

Mostly, the following settings will be adequate:

- tuning-jvm-initial: 1024


- tuning-jvm-max: 2048
- tuning-jvm-scale: 150

Adjust the values, with:

```
visulox-portal config edit --tuning-jvm-initial 2048  
visulox-portal config edit --tuning-jvm-max 2048  
visulox-portal config edit --tuning-jvm-scale 150
```

The following VISULOX PORTAL Service default values should also be checked:

- sessions-timeout-always
- sessions-timeout-session
- webtop-session-idle-timeout

 Changes of VISULOX PORTAL Service configurations is known to VISULOX after "**visulox portal attach -portal**".

- **"Administrator is root" warning**

The warning can be disabled by adding a new administrator to VISULOX PORTAL:

**Add a user**

```
useradd <name of the new portal administrator>  
passwd <name of the new portal administrator>
```

#### Add the new administrator to the VISULOX PORTAL administrators

```
visulox-portal object edit --name "/o=tarantella system objects/cn=administrator" --user admin
```

#### After changes to the VISULOX PORTAL, VISULOX needs to be reregistered

```
visulox portal attach
```

Doing a VISULOX Integrity-Check again, the warning has disappeared. root can be removed from the administrators list.

- **event.sh and filecheck.sh missing**

The files event.sh.template and filecheck.sh.template in **/opt/visulox/tools/** must be copied to event.sh and filecheck.sh, if needed. The correct permission (**0550 / vlx:vlxgroup**) has to be set as well for these files.

```
cd /opt/visulox/tools
cp events.sh.template events.sh
cp filecheck.sh.template filecheck.sh
chown vlx: events.sh filecheck.sh
chmod 0550 events.sh filecheck.sh
```

## 9.1.5 Glossary

<b>Expression</b>	<b>Description</b>
<b>3PA</b>	Third Party Authentication
<b>Access Branding</b>	With Access Branding it is possible to display different login page designs for different users according to their access point.
<b>Access Management</b>	Enhanced VISULOX Concept for administrating the access of users
<b>AD</b>	<b>A</b> ctive <b>D</b> irectory
<b>AIP</b>	<b>A</b> daptive <b>I</b> nternet <b>P</b> rotocol: Client communication protocol from the VISULOX PORTAL Service
<b>Ambiguous login</b>	The situation where an authentication mechanism has found more than one match for a user and cannot distinguish between them without further information from the user
<b>Annotation</b>	A short text, that can be entered before a recorded session is confirmed, during a recorded session or in VISULOX Cockpit / Archive for closed sessions
<b>API</b>	<b>A</b> pplication <b>P</b> rogramming <b>I</b> nterface
<b>Application server</b>	A server which provides applications, that can be accessed via the VISULOX PORTAL
<b>Application session</b>	See: <b>emulator session</b>

Expression	Description
<b>Args</b>	The arguments an application is started with
<b>Assist / Assistance</b>	See: <b>Assisting Cooperation</b>
<b>Assisting cooperation</b>	Within the VISULOX Cockpit, the user can select an application and press assist to join the application. The owner of the application selects the cooperation mode
<b>Chapter</b>	A chapter equals 20 minutes film of a recorded session
<b>CLI</b>	<b>Command Line Interface</b>
<b>CMD</b>	The command / path an application is started with
<b>Cooperation</b>	When two or more users are watching or working with the same application in realtime on their own desktop
<b>Cooperation master</b>	The user, who has started the application (owner) will be the master of this application in a Cooperation
<b>Cooperation member</b>	A user, who is not owner of an application and who is not able to switch the cooperation modes
<b>Cooperation modes</b>	<p><b>On hold:</b> Member is assigned to a Cooperation, but does not participate</p> <p><b>Observe:</b> Member is able to watch the Cooperation application, but can not interact</p> <p><b>Interact:</b> Member can interact with the application</p>
<b>CP</b>	Short form for <b>Cooperation</b>

<b>Expression</b>	<b>Description</b>
<b>Datastore</b>	Internal VISULOX PORTAL Service database, where all defined objects (users, hosts, applications) are stored. A VISULOX PORTAL Array replicates the datastore between all members simultaneously
<b>DMZ</b>	Demilitarized zone (Perimeter zone)
<b>DSI</b>	<b>Directory Service Integration</b>
<b>Dual Control</b>	Cooperation enforcing a real four-eye-principle
<b>ELU</b>	<b>Extended License Usage</b> - When ELU has expired, its not possible to start more recorders or display more users than allowed under MD / Status, max users / recorders
<b>Emulator session</b>	The running session, when an application is started with the Workspace on an application server
<b>Expect script</b>	VISULOX PORTAL connection script started during the launch of an application
<b>External DNS name</b>	The name by which an VISULOX PORTAL Server is known to a client device. A VISULOX PORTAL Server can have multiple external DNS names.
<b>File Exchange</b>	File Transfer web access for transferring files between a client and the Transit Zone for users without access to the VISULOX PORTAL
<b>File Transfer Client</b>	VISULOX Component for transferring files securely from Transit Zone to application servers and back
<b>Film</b>	Summary of the recorded chapters

Expression	Description
<b>Forced authentication</b>	When VISULOX PORTAL prompts for a user name or password, by displaying an authentication dialog box For example, if a user holds down the Shift key when clicking on an application's link on the Workspace
<b>FQDN</b>	<b>Fully Qualified Domain Name</b> - The full name of a system, containing its hostname and its domain name. For example: portal.visulox.com, where portal is the hostname of a server, and visulox.com is the domain name
<b>Group Access</b>	Group Access is used to define an Access Policy for a specific list of users. This is needed when users are working together in a project and the project is represented by a group object in the repository
<b>Host object</b>	Host objects can be assigned to File Transit, Command Guard and Command Connect groups.
<b>Host Connect</b>	See: <b>VISULOX Command Connect / VISULOX Command Guard</b>
<b>IAR</b>	<b>Intelligent Array Routing</b>
<b>ICA</b>	<b>Independent Computing Architecture</b> : Client communication protocol from Citrix
<b>Integrity-Check</b>	Tool to check the VISULOX components and services
<b>Internal / external message</b>	The VISULOX Service supplies an external message for the login page and an internal message for the user's Workspace
<b>Kiosk mode</b>	VISULOX PORTAL display mode, where an application is displayed in full-screen
<b>LDAP</b>	<b>Lightweight Directory Access Protocol</b>

Expression	Description
<b>LDAPS</b>	Lightweight <b>D</b> irectory <b>A</b> ccess <b>P</b> rotocol over <b>S</b> SL. Used for secure connections to an LDAP directory.
<b>LID</b>	Short form for <b>L</b> icense <b>I</b> D - Contains the date, the license started
<b>Management Console</b>	See: <b>VISULOX Cockpit</b>
<b>MFA</b>	<b>M</b> ulti <b>F</b> actor <b>A</b> uthentication
<b>Native Client</b>	A VISULOX PORTAL component that can be installed on client devices. The client maintains communication with the VISULOX PORTAL Server and is required to run applications The Native Client is provided by Oracle.
<b>NEP</b>	Short form for <b>N</b> etwork <b>E</b> ntry <b>P</b> oint
<b>Network Entry Point</b>	See: <b>RIP</b>
<b>NFS</b>	<b>N</b> etwork <b>F</b> ile <b>S</b> ystem
<b>Notifications</b>	Implemented notification system for access, Workspace / File Transfer and emulator sessions in the VISULOX Services
<b>Object</b>	A self-contained entity, defined by a number of attributes and values. VISULOX PORTAL Objects have different types, such as an X application. The available attributes for each type are defined by a schema

Expression	Description
<b>One Time Passcode</b>	The One Time Passcode is used for authentication and will become invalid after usage. A provided OTP is based on a secret key and the time via a smartphone APP
<b>Organization object</b>	A VISULOX PORTAL Object used to represent the top level of an organizational hierarchy. Organization objects can contain <b>OU=</b> or user profile objects. Organization objects have an <b>O=</b> naming attribute.
<b>Organizational hierarchy</b>	The collection of objects in the VISULOX PORTAL Datastore, descending from one or more organization or domain component objects. Represents the collection of people, application servers, and applications within an organization.
<b>Organizational unit object</b>	A VISULOX PORTAL Object used to distinguish different departments, sites, or teams in an organizational hierarchy. Organizational unit ( <b>OU</b> ) objects can be contained in an organization or domain component object. Organizational unit objects have an <b>OU=</b> naming attribute
<b>OTP</b>	Short form for <b>One Time Passcode</b>
<b>Peer DNS name</b>	The name by which an VISULOX PORTAL Server is known to other VISULOX PORTAL Servers in the same array
<b>Primary server</b>	The VISULOX PORTAL Server that acts as the authoritative source for global information, and maintains the definitive copy of the VISULOX PORTAL Datastore
<b>RDP</b>	<b>Remote Desktop Protocol</b> : Client communication protocol from Microsoft
<b>Remote IP</b>	Remote IP address, the information, from where a client request is coming

Expression	Description
<b>Report</b>	The VISULOX Service is collecting data about workspace sessions, emulator sessions, recordings and cooperations. The information can be clearly arranged in reports. In VISULOX Cockpit a variety of possible reports can be created on several pages
<b>Resume</b>	To redisplay an application session that has been suspended. See also: <b>suspend</b>
<b>RIP</b>	Short form for <b>R</b> emote <b>I</b> P address
<b>RVA</b>	<b>R</b> emote <b>V</b> endor <b>A</b> ccess
<b>S &amp; M</b>	Short form for <b>S</b> upport and <b>M</b> aintenance
<b>Secondary server</b>	An array member that is not the primary server. The primary server replicates information to secondary servers.
<b>Session</b>	The VISULOX PORTAL generates a session for any X11 or RDP application, which has an unique session ID
<b>SIEM</b>	<b>S</b> ecurity <b>I</b> nformation and <b>E</b> vent <b>M</b> anagement
<b>SOX</b>	Short form for <b>S</b> arbanes- <b>O</b> xley <b>A</b> ct
<b>SSL certificate</b>	A digital passport that establishes credentials on the web. In VISULOX PORTAL Service, allows client devices to trust the identity of a VISULOX PORTAL Server
<b>Suspend</b>	To pause an application session. A suspended application is not closed, it can be resumed. See also: <b>resume</b>

<b>Expression</b>	<b>Description</b>
<b>TAP</b>	Short form for <b>T</b> emporary <b>A</b> ccess <b>P</b> IN, part of the Multi Factor Authentication (MFA)
<b>TCC</b>	Short form for <b>T</b> arantella <b>C</b> lient <b>C</b> omponent: Component for login into the VISULOX PORTAL via <b>Native Client</b>
<b>TCL</b>	Programming Language. Most of the VISULOX products are based on TCL
<b>Temporary Access PIN</b>	VISULOX method for the Multi Factor Authentication ( <b>MFA</b> )
<b>TFN</b>	Tarantella Full Naming, X.500 format to address a VISULOX PORTAL object
<b>Transit Zone</b>	Zone, where files are transferred from/to application servers/clients
<b>VAP</b>	Short form for <b>V</b> irtual <b>A</b> ccess <b>P</b> oint
<b>Virtual Access Point</b>	VISULOX method to get an independent URL of the VISULOX Access Nodes for reliability and Workspace balancing
<b>VISULOX Access Node</b>	Node running the VISULOX PORTAL Service and the VISULOX Service
<b>VISULOX Base</b>	Single VISULOX Node
<b>VISULOX Cluster</b>	Two or more VISULOX Nodes, that are joined together because of scalability, redundancy and load balancing
<b>VISULOX Cockpit</b>	Central VISULOX application to control sessions, access, recording, cooperations and to generate reports

Expression	Description
<b>VISULOX Command Connect</b>	VISULOX component, which provides the possibility to connect to multiple hosts and to open an X-Client on these hosts. The connection method can be SSH, RDP or telnet. Former: <b>Host Connect</b>
<b>VISULOX Command Guard</b>	VISULOX component, which provides the possibility to connect to multiple hosts and to open an X-Client on these hosts Command Guard has command level controls for the application. It allows and denies the usage of certain commands by the user Additionally server side scripts can be issued either to multiple endpoints or to a single one
<b>VISULOX Common Access Platform</b>	The whole environment, that is built with the VISULOX GATEWAY, VISULOX Portal Service, VISULOX Service and databases
<b>VISULOX Data</b>	VISULOX Database and VISULOX Filestore
<b>VISULOX Filestore</b>	File system which stores the films. 5 MByte per user and per hour. Recommended for VISULOX is a local disk with 150-250 GB, for VISULOX Archive Node depending on the lifetime of films, up to x TB on a NAS/SAN storage
<b>VISULOX GATEWAY</b>	The VISULOX GATEWAY is a proxy server designed to be deployed in front of a VISULOX PORTAL Array in a demilitarized zone (DMZ). This enables the VISULOX PORTAL Array to be located on the internal network of an organization. Additionally, all connections can be authenticated in the DMZ before any connections are made to the VISULOX PORTAL servers in the array. The VISULOX GATEWAY manages load balancing of HTTP connections for the VISULOX PORTAL Servers in the array.
<b>VISULOX Host Connect</b>	See: <b>VISULOX Command Connect</b>
<b>VISULOX Hotfix</b>	Tool to check the software status in the cluster, backup and apply hotfixes

Expression	Description
<b>VISULOX keystroke recording with analyzing engine</b>	In this recording mode all user keyboard interactions are registered and can be checked for unwanted entries (analyzing engine)
<b>VISULOX Node</b>	Node running the VISULOX Service to control sessions, films and recorders
<b>VISULOX PAM</b>	<b>VISULOX Privileged Access Management</b>
<b>VISULOX PORTAL Array</b>	Two or more VISULOX Access Nodes, that are joined together because of scalability, redundancy and load balancing
<b>VISULOX PORTAL Benchmark</b>	Tool to create a defined number of demo-users, who log into the VISULOX PORTAL and start recorded applications automatically. All settings can be configured easily within a GUI
<b>VISULOX PORTAL Console</b>	Web-based management console for the VISULOX PORTAL Service (Former: Administration Console)
<b>VISULOX PORTAL Web Server</b>	A pre-built web server installed and configured along with the VISULOX PORTAL Service, contains Apache, mod_ssl for HTTPS support, and Tomcat for Java Servlet and JSP support
<b>VISULOX PORTAL Web Services</b>	An API collection that allows developers to build their own applications to work with the VISULOX PORTAL Service. The APIs can be used to authenticate users, launch applications, and interact with the VISULOX PORTAL Datastore
<b>VISULOX Revision Server</b>	VISULOX Node which replicates the production database into Revision Server database and transfers the films from the production filestore into the Revision Server filestore (also known as Archive Server)
<b>VISULOX Service Group</b>	See: <b>VISULOX Cluster</b>

Expression	Description
<b>VISULOX Short Support Report</b>	A Short Support Report to send via eMail created with <b>visulox support -info</b> . The Short Support Report should be sent to the VISULOX Support Team every time a new Support Request is opened
<b>VISULOX Support Report</b>	Package generated by the <b>visulox support</b> command, containing all information, necessary for support
<b>VISULOX Transit Area</b>	File Transfer component embedded in the Workspace to transfer files between client and Transit Zone
<b>VISULOX Transit Mapping</b>	To setup the VISULOX Transit Zone on Unix application servers, that are not a VISULOX Node, an RPM file is available for installation.
<b>VISULOX Videolog Player</b>	Player to view the recorded films inside the VISULOX Cockpit or checked out films in a browser
<b>VISULOX Webservice User</b>	Each VISULOX Service needs this user in the datastore to read the webservices on the VISULOX Access Nodes. The VISULOX webservice user has to be setup once in the datastore
<b>VISULOX_Setup.xls</b>	Excel-sheet, which has to be filled out in the planning phase by the responsible project leader, together with the amitego consultant
<b>vlxMode</b>	VISULOX variable set in the VISULOX PORTAL Console
<b>VLX Password SelfService</b>	Active Directory (AD) and Oracle Unified Directory (OUD) users are able to change their password by themselves with this application assigned.
<b>Webtop</b>	In the current version, the Webtop is called the <b>Workspace</b> . A Workspace is the term used to describe a user's applications, documents, and desktops. See: <b>Workspace</b>
<b>WM</b>	Short form for <b>Window Manager</b>

Expression	Description
<b>Workspace</b>	The Workspace is displayed after logging into the VISULOX PORTAL. It is a special web page, that lists the applications that are assigned to the user
<b>Workspace balancing</b>	VISULOX load balancing mechanism including a virtual access point
<b>Workspace session</b>	The running session, after a user has logged into the VISULOX PORTAL via browser or Native Client
<b>X11 forwarding</b>	The process of forwarding, or tunneling, the windows of a remotely started X application to a client desktop
<b>X Window System</b>	A distributed window system for UNIX platform operating systems, based on the X11 protocol. Also called X11, or X Windows
<b>X.509 certificate</b>	See: <b>SSL certificate</b>