

# **SysOrb Network Monitoring System Administrator's Guide**

**For version 4.0.0**



**SysOrb Network Monitoring System Administrator's Guide** For version 4.0.0  
Copyright © 1999 - 2014 Evalesco A/S

All trademarks used in this document are the properties of their respective owners

# Table of Contents

<b>Abstract .....</b>	<b>vii</b>
<b>1. System Overview.....</b>	<b>1</b>
1.1. SysOrb Components .....	1
1.2. How It Works .....	1
<b>2. System Requirements .....</b>	<b>3</b>
2.1. Agent Requirements.....	3
2.2. Server Requirements .....	3
<b>3. Installing SysOrb .....</b>	<b>5</b>
3.1. Installing the SysOrb Server .....	5
3.1.1. Microsoft Windows XP / Server 2003 / Server 2008 .....	5
3.1.2. Red Hat Enterprise Linux 5.....	6
3.1.3. Debian Linux 5.0 and other Debian based systems.....	7
3.1.4. SuSE Linux Enterprise 11 .....	8
3.1.5. Solaris 11 .....	9
3.2. Installing a license file.....	9
3.3. Upgrading the SysOrb Server .....	10
3.3.1. Importing the default NodeClasses .....	10
3.3.2. Upgrading from earlier than 3.0.3 .....	10
3.4. Installing the SysOrb Agent.....	10
3.4.1. Microsoft Windows XP / Server 2003 / Server 2008 .....	11
3.4.2. Microsoft Windows NT / 2000.....	12
3.4.3. Microsoft Windows Server 2003 on Itanium .....	12
3.4.4. Red Hat Enterprise Linux 5.....	12
3.4.5. Red Hat Linux 7.2, 7.3, 8 and 9.....	13
3.4.6. Debian GNU/Linux 5.0 and other Debian based systems .....	13
3.4.7. Debian GNU/Linux 2.2, 3.0 and 4.0 .....	14
3.4.8. Mandrake Linux 9.0 .....	14
3.4.9. SuSE Enterprise Linux 11 .....	14
3.4.10. SuSE Linux 8.2 and SuSE Linux 9.0 .....	15
3.4.11. FreeBSD 6.0 .....	15
3.4.12. Solaris 10.....	15
3.4.13. Solaris 11 .....	16
3.4.14. IBM AIX 5.3 .....	16
3.4.15. Novell NetWare 5.1 and 6.0 .....	17
3.5. Upgrading LogChecks from SysOrb 2.4.0.....	18
3.6. Unattended installation on Windows .....	19
<b>4. Auto-upgrading the SysOrb Agent .....</b>	<b>20</b>
4.1. Auto-upgrade with SysOrb Satellites.....	20
<b>5. SysOrb Server Configuration .....</b>	<b>21</b>
5.1. Microsoft Windows NT / 2000 .....	21
5.2. Unix-like systems (FreeBSD, Linux and Solaris).....	21
5.3. Configuration Options Reference.....	21
5.3.1. Logging Options .....	22
5.3.2. Database Options .....	24
5.3.3. Network Connection Manager Options.....	26
5.3.4. NetCheck Manager Options .....	27
5.3.5. General SysOrb Server Options .....	28
5.3.6. Alert Dispatcher Options .....	30
5.3.7. SNMP Options.....	32
5.3.8. Grid Options .....	33

5.4. Troubleshooting HTTPS/IMAPS/POP3S problems .....	34
5.5. On the fly debug logging.....	35
<b>6. SysOrb Web Interface Configuration .....</b>	<b>37</b>
6.1. General Web Interface Options.....	37
<b>7. SysOrb Web Server Configuration .....</b>	<b>38</b>
7.1. Web Server Configuration Reference.....	38
7.1.1. File Options .....	38
7.1.2. Logging.....	38
7.1.3. Server/network options.....	39
<b>8. SysOrb Agent Configuration .....</b>	<b>40</b>
8.1. Agent Configuration Reference .....	40
8.2. Releasing keys to force registering at SysOrb server.....	42
8.2.1. Releasing on agent.....	42
8.2.2. Releasing on server.....	42
8.3. Configuration of custom checks.....	43
8.4. Configuration of AgentActions.....	45
8.5. Configuration of Automated Actions - Remedy .....	46
8.6. Configuration of LogChecks.....	47
8.7. Enabling IPMI hardware monitoring .....	48
<b>9. Grid configuration .....</b>	<b>49</b>
9.1. Grid overview .....	49
9.1.1. Grid IDs - the GID.....	49
9.1.2. Links .....	49
9.1.3. Endpoint security.....	50
9.2. Configuring the Master .....	50
9.2.1. Installation and licensing .....	50
9.2.2. Configuring the master station.....	50
9.2.3. Adding a satellite to the master's configuration .....	51
9.2.4. Configuring the link between the master and the satellite.....	51
9.2.5. Exporting domains to the satellite .....	51
9.3. Configuring the Satellite .....	52
9.3.1. Installation and licensing .....	52
9.3.2. Configuring the satellite station.....	52
9.3.3. Adding the master to the satellite's configuration .....	52
9.3.4. Configuring the link between the satellite and the master.....	52
9.3.5. Mounting domains from the master .....	52
9.4. Getting started with remote monitoring .....	53
<b>10. SysOrb Server maintenance .....</b>	<b>54</b>
10.1. Adding MIB files .....	54
10.2. Custom NetChecks.....	54
10.2.1. Configuring Custom NetChecks.....	55
10.3. Custom AlertPaths .....	55
10.3.1. Script environment .....	56
10.4. Creating a new database.....	57
<b>11. SysOrb Import and Export tools.....</b>	<b>59</b>
11.1. sysorb-exporter .....	59
11.2. sysorb-importer .....	60
11.3. Examples of how to use .....	60

<b>12. SysOrb Tool</b> .....	<b>63</b>
12.1. The select command.....	64
12.1.1. How to specify the <i>timeformat</i> .....	64
12.2. The insert command.....	66
12.3. The listdomains command .....	66
12.4. The listnodes command .....	67
12.5. The listchecks command.....	67
12.6. The listproperties command.....	68
12.7. The update command .....	68
12.8. Understanding the CSV file-format .....	69
12.8.1. Continuous checks.....	69
12.8.2. State checks .....	69
12.8.3. String checks .....	70
12.9. Example scripts .....	70
<b>13. Acknowledgments</b> .....	<b>73</b>
13.1. GD Graphics Library .....	73
13.2. OpenSSL Library .....	73
13.2.1. OpenSSL License .....	73
13.2.2. Original SSLeay license .....	74

# List of Examples

8-1. Good/bad check.....	43
8-2. Numeric integer check.....	44
8-3. Numeric real check.....	44
8-4. Differential numeric integer check.....	44
8-5. Differential numeric real check.....	44
8-6. Script outputting <code>Response time: 1234 ms</code> .....	45
8-7. Count the number of files in <code>/tmp</code> .....	45
8-8. IIS restart AgentAction.....	46
8-9. LogCheck declaration file.....	47
10-1. Custom NetCheck.....	55
11-1. Exporting contents of the Test domain.....	61
11-2. Contents of the exported file.....	61
11-3. Modified XML file, ready for import.....	61
11-4. Creating a node using <code>sysorb-importer</code> .....	62
12-1. Example extracting all data using bash.....	71
12-2. Example extracting all data on Windows.....	71

# Abstract

This document describes the installation and initial configuration of the SysOrb Network Monitoring System. Please refer to the *User's guide for the SysOrb Network Monitoring System* for information about using the system after it is installed correctly. In particular the use of the Web interface is described in detail there.

This document is intended for use by the personnel responsible for *installing, configuring and maintaining* the SysOrb Network Monitoring System Server and Agents on a daily basis. It does not cover actual configuration of monitoring parameters etc.

# Chapter 1. System Overview

The purpose of the SysOrb Monitoring System is to monitor servers in a network by talking to the servers and retrieving information about running services, current load and other metrics. This information can be used by the administrators of the network to track down problems with monitored servers, to solve problems before they arise, or as documentation or a forensics tool once problems has occurred.

## 1.1. SysOrb Components

The SysOrb Network Monitoring System consists of several major software components, the responsibilities of which are outlined below:

- **The SysOrb Server:** This is the center of the SysOrb System. The Server can remotely check networked services (such as web servers and mail servers) via NetChecks, but it is also the central component to which the Agents will report device information and statistics. The SysOrb Server is the central repository in which all statistical and operational data are stored, and it is the entity in the SysOrb System that will actively alert administrators when problems arise in any of the monitored systems.

In the following text a **node** is any machine or device that can be monitored by SysOrb. A **host** is a node where the SysOrb Agent can be installed.

- **The SysOrb Agent:** In order to actively monitor local devices (such as harddrives, memory, processor statistics etc.) on networked systems, those systems must run the SysOrb Agent. This program will gather operational information from the system on which it is running, and report these data to the SysOrb Server for further processing. In case of failures (such as a harddisk running full, or a crashed service process), the SysOrb Server can actively alert the administrators of the particular machine that reported the failure.
- **The Web Interface:** In order to allow easy access to the monitoring data and then configuration of the SysOrb System from anywhere and from any platform, the Web-based Interface is provided. This User Interface ships as a part of the SysOrb Server, and is usually (but not necessarily) run on the same physical machine as the one running the SysOrb Server. In order to fully use and configure monitored services or devices in the SysOrb System, all you need is a computer with a web-browser capable of accessing the SysOrb Server computer.

## 1.2. How It Works

To illustrate how the SysOrb components work together, Figure 1 shows a setup of a SysOrb Server, some SysOrb Agents and a SysOrb Web Interface.

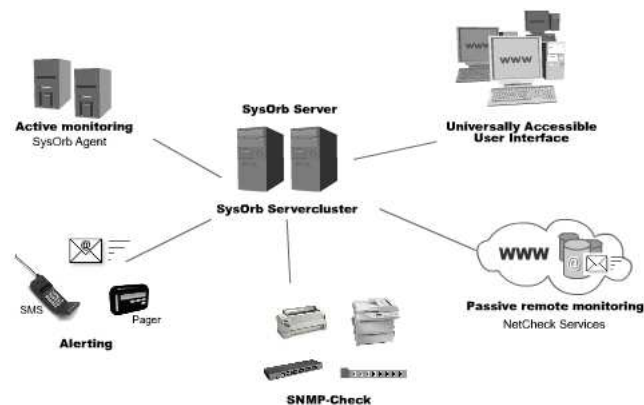


Figure 1: SysOrb Overview



## *Chapter 1. System Overview*

The setup consists of a SysOrb Server, a SysOrb Agent and a SysOrb Web Interface. When a SysOrb Agent checks in on the SysOrb Server information about the SysOrb Agent's current status is stored in the SysOrb Server's database.

The SysOrb Web Interface connects to the SysOrb Server and through this interface the SysOrb user can monitor the network, add new SysOrb Agents and similar operations.

# Chapter 2. System Requirements

The two sections below describe the minimum requirements for the SysOrb Agent and the SysOrb Server.

## 2.1. Agent Requirements

The SysOrb Agent software will run on most hardware used in servers today, and it currently supports 21 major server operating systems. Because of this the SysOrb Agent software can be run on your servers without interfering with the servers' normal operations.

In general, the SysOrb Agent has very low system requirements. If your server hardware can run the installed operating system, chances are it can run the SysOrb Agent without problems. The actual requirements for the agents will vary depending on the amount of checks configured on the given agent, and the check-in interval configured.

## 2.2. Server Requirements

The requirements for the SysOrb Server depend on the number of NetChecks, AgentChecks and snmpChecks monitored. If only a small number of these need to be monitored the SysOrb Server can be run on very modest hardware. The more checks monitored, the higher the requirements for the SysOrb Server.

**Please note:** You would usually want to dedicate a machine to running the SysOrb Server, in order to minimize the risk of failures caused by other software, on your main monitoring Server. The SysOrb Server can, however, easily run on a system which is handling other tasks as well (such as a mail-server or name-server). It is not recommended to install the SysOrb Server on a system that is already **very** busy, as the SysOrb Server will consume resources, and some measurements (such as network response time measurements) will be disturbed and inaccurate if the system is too busy handling other tasks.

**Tip:** In general, the database space requirements will grow with approximately one megabyte, per monitored check, and one megabyte per monitored node. So monitoring 20 devices on each of 10 different machines, will require approximately 210 megabytes of disk space.

In addition to this, reports in particular will also add to the disk space consumption. Reports are stored efficiently and a fully detailed report over the aforementioned 200 monitored checks will require much less than the 200 megabytes required for the full scale monitoring. Yet, when setting up a system in which many users have access to generate reports, report disk space consumption should be taken into account.

One should, of course, configure a disk space check with suitable warning and alert thresholds, for the filesystem on which the database reside, when configuring the agent on the SysOrb Server.

- Microsoft Windows Server 2003, Windows XP or Windows Server 2008:
  - **CPU:** Intel Pentium II compatible or better
  - **RAM:** 1 GB free memory for smaller installations (less than a hundred nodes configured). 2-8 GB recommended for larger installations.
  - **Disk:** 100MB for installation and log files and approximately 1 MB per configured check. E.g. an installation with 100 nodes and 100 active checks for each node would require 10 GB of disk space for the database

- Red Hat Enterprise Linux 5:
  - **CPU:** Intel Pentium II compatible or better
  - **RAM:** 1 GB free memory for smaller installations (less than a hundred nodes configured). 2-8 GB recommended for larger installations.
  - **Disk:** 30MB for installation and log files and approximately 1 MB per configured check. E.g. an installation with 100 nodes and 100 active checks for each node would require 10 GB of disk space for the database
- Sun Solaris 10:
  - **CPU:** Intel Pentium II compatible or better
  - **RAM:** 1 GB free memory for smaller installations (less than a hundred nodes configured). 2-8 GB recommended for larger installations.
  - **Disk:** 30MB for installation and log files and approximately 1 MB per configured check. E.g. an installation with 100 nodes and 100 active checks for each node would require 10 GB of disk space for the database
- Solaris 11:
  - **CPU:** Sun UltraSPARC (SPARCv9 compatible or better)
  - **RAM:** 1 GB free memory for smaller installations (less than a hundred nodes configured). 2-8 GB recommended for larger installations.
  - **Disk:** 50MB for installation and log files and approximately 1 MB per configured check. E.g. an installation with 100 nodes and 100 active checks for each node would require 10 GB of disk space for the database
- Debian GNU/Linux 5.0:
  - **CPU:** Intel Pentium II compatible or AMD64 compatible CPU
  - **RAM:** 1 GB free memory for smaller installations (less than a hundred nodes configured). 2-8 GB recommended for larger installations.
  - **Disk:** 30MB for installation and log files and approximately 1 MB per configured check. E.g. an installation with 100 nodes and 100 active checks for each node would require 10 GB of disk space for the database
- Suse Enterprise Linux 11:
  - **CPU:** Intel Pentium II compatible or AMD64 compatible CPU
  - **RAM:** 1 GB free memory for smaller installations (less than a hundred nodes configured). 2-8 GB recommended for larger installations.
  - **Disk:** 30MB for installation and log files and approximately 1 MB per configured check. E.g. an installation with 100 nodes and 100 active checks for each node would require 10 GB of disk space for the database

There are many other factors that affect overall system performance. Large installations may need not just *bigger* but also *faster* storage. In general, more memory will help the disk I/O system. Using servers with more than one CPU core is also beneficial to SysOrb, especially in large installations.

# Chapter 3. Installing SysOrb

## 3.1. Installing the SysOrb Server

The SysOrb Server is a fairly complex piece of software, yet the installation itself is simple. Please refer to Chapter 5 for detailed installation instructions for your particular server platform.

The Server may be able to run with its default configuration right after the install completes, but it is *recommended* that the configuration section is consulted before actually running the Server.

The SysOrb Server installation also contains the SysOrb Web interface. This section will not describe setup of any specific web-servers. The SysOrb Web Interface consists of CGI programs, which will work with *any* web-server supporting the CGI standard.

**Notice for IIS users:** Please make sure that you do not have third-party scripting extensions installed on the web server on which you will run the SysOrb Web interface. It is a common problem that these tools will attempt to interpret the SysOrb CGI programs as *scripts* written in some interpreted language (such as Perl). This will result in a non-functional SysOrb Web interface installation!

The SysOrb Web interface CGI programs are standard Win32 executables, and unless the configuration is overwritten by third party products, a standard IIS will work out of the box with SysOrb.

It is possible to manually override the third party scripting product configuration in the web server, to work around this problem and run both the scripting product and the SysOrb Web interface on the same web server. Please refer to the IIS documentation, or send an e-mail to <support@sysorb.com> for assistance in this matter.

You can install the Web Interface wherever you please, you can even run a SysOrb Server on one platform (say, Solaris) and the Web Interface on another (for example Windows). If you do not want to install a Web-server on the SysOrb Server machine, you can install the SysOrb Server package on any other machine, and then disable the SysOrb Server there so that only the web interface remains active.

**Note:** When the SysOrb Web Interface is installed, you can use it to access and configure the SysOrb Server. The Web Interface will ask you for a username/password. For the default configuration this is:

- **Username:** admin
- **Password:** admtest
- **Domain:** . (or just leave blank)

After you have logged in for the first time, make sure to change at least the password for the admin user. For more information about how to use the Web Interface, please refer to *User's guide for the SysOrb Monitoring System*.

### 3.1.1. Microsoft Windows XP / Server 2003 / Server 2008

To install the SysOrb Server on machine running a Microsoft Windows operating system, you must have administrator access to that machine. Please make sure that you are logged on as the *Local Administrator*, or as another user with administrative privileges on the local machine.

The full Server and Web interface installation is contained in the file:

sysorb-server-4.0.0-5562.winxp-x86.msi

for the 32-bit version or:

`sysorb-server-4.0.0-5562.winxp-amd64.msi`

for the 64-bit version

Download and run this file, and follow the instructions on screen during the install process.

**Note:** On the download page for SysOrb it is also possible to download an installation guide for Windows, which contains a screen for screen walk-through of the installation process.

If, after installation, you get an error page in your browser instead of the SysOrb Login page, please check that the "SysOrb Server" service is running in the Service Control Manager.

When the installation is finished you need to install your license file, if you have purchased SysOrb. See Section 3.2 for more information about how you do this. If you just want to test SysOrb, a test license is included in the installation.

Although the server is normally run with its default configuration from the installation procedure, it is recommended that you consult Chapter 5 for a more thorough description of all available configuration options.

The web-server should *allow execution* of CGI programs, and should be able to use the file `index.cgi` as the default for a directory. Apart from that, there are no special requirements for the server to work with the SysOrb web interface.

You should be able to see either an error page (showing a white background and an information-icon) from the SysOrb Web Interface if your SysOrb Server is not running, or you should see the login page.

If you cannot get to the SysOrb Login page, please refer to the "IIS Notice" at the very beginning of Section 3.1 for further information.

### 3.1.2. Red Hat Enterprise Linux 5

The full Server and Web interface installation for Red Hat Enterprise Linux is contained in the file:

`sysorb-server-4.0.0-5562.rhel5-x86_ia32.rpm`

for the 32-bit version and in:

`sysorb-agent-4.0.0-5562.rhel5-amd64.amd64.rpm`

for the 64-bit.

**Note:** The Red Hat Enterprise Linux 5 package should also work on all newer releases of Red Hat Enterprise Linux as well as CentOS and Fedora. If that is not the case, please contact Evaluesco support.

These files contain the entire SysOrb Server software package, and are available for download from <http://www.evaluesco.com>.

In order to install the SysOrb Server, you must have root access to the system.

Install the SysOrb Server using your favorite RPM utility (for support on the RPM utility, see <http://www.redhat.com>), or using the plain **rpm** command, e.g.:

**rpm -Uvh sysorb-server-4.0.0-5562.rhel5-x86\_ia32.rpm**

You now have a SysOrb Server configured on your system. If you have purchased SysOrb, you will need to install your license file (See Section 3.2 for information about how you do this). See Chapter 5 for information on how to configure your newly installed SysOrb Server.

Type `/etc/rc.d/init.d/sysorbd start` to start the server for the first time. Per default SysOrb is set up to automatically start in runlevel 3 and 5.

The installation script will automatically configure an alias in your apache configuration for the SysOrb Web interface.

**Note:** The installation script tries to add the Alias to the Apache configuration files in `/etc/httpd/conf/`. If your system does not have the configuration files in this directory edit them manually to export the directory `www` in the SysOrb Web Interface installation directory as `/sysorb/`. Make sure you allow execution of CGI scripts. If you installed the SysOrb Web Interface from the above mentioned RPMs, the SysOrb Web interface installation directory is `/var/sysorb/www`.

Remember to restart the Apache web server after having installed the SysOrb Web Interface. The web server must re-read its configuration in order to recognize the new `/sysorb/` alias.

When this is done, you should be able to see the login page (or an error page if your server is not yet running), by going to the URL `http://localhost/sysorb/`.

**Note:** If you are using a SELinux enabled Red Hat distribution, and are using SELinux policies on your web server, you have to perform the following steps for the webinterface to work:

```
cd /var/sysorb/www
chcon -t httpd_sys_content_t *.{png,gif,css,js}
chcon -t httpd_sys_script_exec_t *.cgi
```

Once these commands have been run, the webinterface will work. However, an audit will be generated each time one of the cgi-files are executed. In order to disable this audit, the `selinux-policy-targeted-sources` package must be installed. Once this is installed, perform the following steps:

```
cd /etc/selinux/targeted/src/policy/
echo "dontaudit httpd_sys_script_t ld_so_cache_t:file execute;" >> domains/misc/local.te
make reload
```

After this the audit message will be disabled.

If you have trouble getting this to work, please take a look in the error and access logs from your web-server. These logs often help by pointing out errors in the configuration files.

### 3.1.3. Debian Linux 5.0 and other Debian based systems

Debian users should download the entire SysOrb Server software package named:

```
sysorb-server-4.0.0-5562.debian50.ia32.deb
```

for the 32-bit version and:

```
sysorb-server-4.0.0-5562.debian50-amd64.x64.deb
```

for the 64-bit version

These files can be downloaded from `http://www.evaesco.com`. This should also install on most Debian based distributions, e.g. Ubuntu. Also, you should make sure that you have root access to the system on which you are installing the server software.

Install the packages with command:

```
dpkg -i sysorb-server-4.0.0-5562.debian50.ia32.deb
```

You now have a SysOrb Server configured on your system. If you have purchased SysOrb, you will need to install you license file (See Section 3.2 for information about how you do this), before starting SysOrb. Please consult Chapter 5 for detailed information about all possible configuration parameters.

Type `/etc/init.d/sysorbd start` to start the server for the first time. Per default SysOrb is set up to automatically start in runlevel 2.

The installation script will automatically configure an alias in your apache configuration for the SysOrb Web interface.

**Note:** The installation script tries to add the Alias to the Apache configuration files in `/etc/apache/`. If your system does not have the configuration files in this directory edit them manually to export the directory `www` in the SysOrb Web Interface installation directory as `/sysorb/`. Make sure you allow execution of CGI scripts. If you installed the SysOrb Web Interface from the above mentioned debian package, the Web-interface is located in `/var/sysorb/www`.

Please remember to restart the Apache web server after having installed the SysOrb Web Interface. The web server must re-read its configuration in order to recognize the new `/sysorb/` alias.

Once this is done, you should be able to see the login page (or an error page if your server is not yet running) by going to the URL `http://localhost/sysorb/`.

If you have trouble making this work, please take a look in the error and access logs from your web-server. These logs often help by pointing out errors in the configuration files.

### 3.1.4. SuSE Linux Enterprise 11

SuSE Linux 11 users should acquire the file:

```
sysorb-agent-4.0.0-5562.sles11-x86_ia32.rpm
```

for the 32-bit version and:

```
sysorb-agent-4.0.0-5562.sles11-amd64.amd64.rpm
```

for the 64-bit version.

These files contain the entire SysOrb Server software package, and are available for download from <http://www.evalesco.com>.

In order to install the SysOrb Server, you must have root access to the system.

Install the SysOrb Server using your favorite RPM utility (for support on the RPM utility, see <http://www.redhat.com>), or using the plain `rpm` command e.g.:

```
rpm -Uvh sysorb-agent-4.0.0-5562.sles11-x86_ia32.rpm
```

You now have a SysOrb Server configured on your system. If you have purchased SysOrb, you will need to install your license file (See Section 3.2 for information about how you do this). See Chapter 5 for information on how to configure your newly installed SysOrb Server.

Type `/etc/init.d/sysorbd start` to start the server for the first time. Per default SysOrb is set up to automatically start in runlevel 3 and 5.

The installation script will automatically configure an alias in your apache configuration for the SysOrb Web interface.

**Note:** The installation script tries to add the Alias to the Apache configuration files in `/etc/httpd/`. If your system does not have the configuration files in this directory edit them manually to export the directory `www` in the SysOrb Web Interface installation directory as `/sysorb/`. Make sure you allow execution of CGI scripts. If you installed the SysOrb Web Interface from the above mentioned RPMs, the SysOrb Web interface installation directory is `/var/sysorb/www`.

Remember to restart the Apache web server after having installed the SysOrb Web Interface. The web server must re-read its configuration in order to recognize the new `/sysorb/` alias.

When this is done, you should be able to see the login page (or an error page if your server is not yet running), by going to the URL `http://localhost/sysorb/`.

If you have trouble getting this to work, please take a look in the error and access logs from your web-server. These logs often help by pointing out errors in the configuration files.

### 3.1.5. Solaris 11

SysOrb server is available for Solaris 11 on UltraSparc (sun4v and sun4u) platforms.

Users of Solaris on UltraSparc should download:

```
sysorb-server-4.0.0-5562.solaris11-sun4v.p5p
```

In order to install the SysOrb Server, you must have root access to the system. The SysOrb Server is distributed as an Oracle Solaris package repository, '.p5p' file.

A normal installation in the global zone is straight forward:

```
pkg install -g sysorb-server-4.0.0-5562.solaris11-sun4v.p5p sysorb-server
```

You now have a SysOrb Server configured on your system. If you have purchased SysOrb, you will need to install you license file (See Section 3.2 for information about how you do this), before starting SysOrb. Please consult Chapter 5 for detailed information about all possible configuration parameters.

Type `svcs sysorbd` to see the status of the SysOrb service. It should have started up automatically after installation.

The SysOrb installation will include a configuration of the Apache 2.2 server that is supplied with Solaris 11. In order to access the SysOrb web interface, the Apache server must be running. The web server status can be inquired with the command `svcs http:apache22`. If this server is not running, it can be enabled with the command `svcadm enable http:apache22`.

Once this is done, you should be able to see the login page by accessing `http://localhost/sysorb/`.

## 3.2. Installing a license file

If you have purchased a license for SysOrb, you need to install it after you finished the installation of SysOrb.

The installation is simple. Just overwrite the old `sysorb.lic` file with the one that you downloaded from the license manager. The default license location on Microsoft Windows is:

```
install-dir\Config\sysorb.lic
```

On Debian, SuSE and Red Hat Linux systems it is:

```
/etc/sysorb/sysorb.lic
```

On Mandrake systems it is:

```
/etc/opt/sysorb-server/sysorb.lic
```

And on Solaris it is:

```
/etc/sysorb/sysorb.lic
```

Once the license file is in place, you will need to restart the SysOrb Server in order for it to notice the change of the license. If you are not certain that the installation of the new license worked, you can look in the `server.log` for a line that says:

```
[dbms]: License is valid for xx servers and xx agents.
```



## 3.3. Upgrading the SysOrb Server

This chapter describes the steps necessary to upgrade your SysOrb server to version 4.0.0.

If you are running SysOrb 2.6.x or 2.4.x you simply upgrade by stopping the SysOrb server, installing the new package, and starting the new SysOrb server afterwards. No database conversion is needed. However to get the most use of the new NodeClass features, we recommend that you import the default NodeClasses shipped with SysOrb 3.0.

### 3.3.1. Importing the default NodeClasses

SysOrb 3.0 ships with some default NodeClasses. These classes provides an example of how one can use the NodeClasses to create a hierarchy that can identify many different kinds of machines. Many of the default NodeClasses also contain information about how SysOrb can automatically discover whether a given node belongs to the NodeClass.

**Note:** You can only import the default NodeClasses when you have upgraded your SysOrb Server to at least version 3.0. Also note, that if you started with SysOrb 3.0, the NodeClasses are included in the default database.

To import the default NodeClasses you must use the command:

**sysorb-importer -l username -f nodeclasses.xml**

In most Unix systems the sysorb-importer program is located in the path. On Mandrake systems the program is located in `/opt/sysorb-server/bin`, and on Windows systems they are located in `C:\Program Files\SysOrb Server\`. The `nodeclasses.xml` is located in the same directory as the SysOrb database files. On most unix systems this is in `/var/sysorb` (Mandrake is `/var/opt/sysorb-server`). On Windows it is `C:\Program Files\SysOrb Server\Config`.

Upon execution, the sysorb-importer will ask you about the password for the username specified on the command line. Once entered the program will import all the NodeClasses and when it is finished, you can access the NodeClasses from the SysOrb Web Interface.

### 3.3.2. Upgrading from earlier than 3.0.3

If you are upgrading from a release earlier than 3.0.3, you must upgrade to SysOrb 3.0.3 or SysOrb 3.2 before you can proceed with the upgrade to the current version.

**Upgrades from version 2.2.x:** If you are running SysOrb version 2.2.x, please see the administrators guide for SysOrb 3.0.3 or SysOrb 3.2 for specific notes regarding the upgrade.

Because of various updates to the structure of the SysOrb database, the current version of SysOrb requires that the database has been upgraded to at least version 3.0.3 before the automatic upgrade procedure can continue. Once you have SysOrb 3.0.3 or SysOrb 3.2 running with your database, you can upgrade SysOrb to the current version. SysOrb will then automatically update your database.

## 3.4. Installing the SysOrb Agent

The SysOrb Agent is a very light piece of software, with very few configuration options. It retrieves its configuration from the SysOrb Server during normal operation, so the only configuration actually needed on the agent side (for the basic agent functionality) is the list of SysOrb servers to which the Agent should check in, and a name and a SysOrb domain used by the agent to identify itself to the SysOrb server.

You can use the DNS name of the host as the Agent name, or you can use the host's IP address. Both options will allow the SysOrb server to perform NetChecks and snmpChecks on the host too, provided that the given DNS name or IP address is actually reachable from the SysOrb Server. If you do not need to perform NetChecks or snmpChecks on the host, the Agent name can be chosen freely.

On the SysOrb server you are supposed to create a node with the exact same name as specified in the configuration, in the specified domain.

**Tip: Node Labels:** It is usually undesirable to have a list of IP addresses displayed in the web interface, as the sole means of identifying one's monitored systems. Yet, it is sometimes a requirement that IP addresses be used for the agent names (for example, if the agent hosts do not *have* DNS names).

Node Labels are a solution to this problem. When configuring the agent, in the web interface, the user is provided with both an agent host name entry field (which is mandatory), and an *optional* "node label" entry field. Any descriptive name can be inserted into the node label field - it will then be displayed in the usual web interface host listings afterwards. The node label does not affect interaction with either NetChecks, SNMPChecks, or the agent - it is purely a displayed name.

Notice: When upgrading from version 2.4.0 you must take special care of any log checks activated on a SysOrb Agent. See Section 3.5 for details.

To actually tell the SysOrb Server to monitor a specific SysOrb Agent you need to use the SysOrb Web Interface. See *User's Guide to the SysOrb Monitoring System* for more information on how to use the SysOrb Web Interface.

### 3.4.1. Microsoft Windows XP / Server 2003 / Server 2008

The SysOrb Agent installation package is named:

```
sysorb-agent-4.0.0-5562.winxp-x86.msi
```

for 32-bit based installation or:

```
sysorb-agent-4.0.0-5562.winxp-amd64.msi
```

for a 64-bit based installation.

This file can be downloaded from <http://www.evaesco.com>. To start the installation procedure, either double click on the downloaded file, or execute the following command in the Command Prompt:

```
msiexec -i sysorb-agent-4.0.0-5562.winxp-x86.msi
```

When following the instructions in the installation program, **please notice the dialog asking for SysOrb Server Name, SysOrb Domain and SysOrb Agent Name**. If the SysOrb Server Name is incorrectly entered the SysOrb Agent will not be able to send monitoring information to the SysOrb Server. If the names cannot be entered during installation they can later be changed as described in Chapter 8 of this document.

**Upgrade note:** If you need to manually upgrade the SysOrb Agent package, you can proceed in two ways. The simplest way is to start by uninstalling the SysOrb Agent, through Add/Remove Programs, and then install the new package. However that will remove the configuration and requires that the key is released on the SysOrb Server. The other solution is to run the following command in the Command Prompt:

```
msiexec -i sysorb-agent-4.0.0-5562.winxp-x86.msi REINSTALL=ALL REINSTALLMODE=vomus
```

Performing the upgrade this way, will retain all your configuration, and will not require a release of the Agent's key. Please note that the upgrade command above is case sensitive and must be written exactly as shown.

### 3.4.2. Microsoft Windows NT / 2000

The SysOrb Agent installation package is named:

```
sysorb-agent-4.0.0-5562.win32.ia32.exe
```

This file can be downloaded from <http://www.evalesco.com>. Simply run the file to start the installation procedure.

When following the instructions in the installation program, **please notice the dialog asking for SysOrb Server Name, SysOrb Domain and SysOrb Agent Name**. If the SysOrb Server Name is incorrectly entered the SysOrb Agent will not be able to send monitoring information to the SysOrb Server. If the names cannot be entered during installation they can later be changed as described in Chapter 8 of this document.

**Note:** On the SysOrb download page an installation HOWTO is available, which provides a screen by screen walk-through of the Agent installation.

### 3.4.3. Microsoft Windows Server 2003 on Itanium

The SysOrb Agent installation package is named:

```
sysorb-agent-4.0.0-5562.win64.ia64.msi
```

This file can be downloaded from <http://www.evalesco.com>. To start the installation procedure, either double click on the downloaded file, or execute the following command in the Command Prompt:

```
msiexec -i sysorb-agent-4.0.0-5562.win64.ia64.msi
```

When following the instructions in the installation program, **please notice the dialog asking for SysOrb Server Name, SysOrb Domain and SysOrb Agent Name**. If the SysOrb Server Name is incorrectly entered the SysOrb Agent will not be able to send monitoring information to the SysOrb Server. If the names cannot be entered during installation they can later be changed as described in Chapter 8 of this document.

**Upgrade note:** If you need to manually upgrade the SysOrb Agent package, you can proceed in two ways. The simplest way is to start by uninstalling the SysOrb Agent, through Add/Remove Programs, and then install the new package. However that will remove the configuration and requires that the key is released on the SysOrb Server. The other solution is to run the following command in the Command Prompt:

```
msiexec -i sysorb-agent-4.0.0-5562.win64.ia64.msi REINSTALL=ALL REINSTALLMODE=vomus
```

Performing the upgrade this way, will retain all your configuration, and will not require a release of the Agent's key

### 3.4.4. Red Hat Enterprise Linux 5

Users of Red Hat Enterprise Linux should download either:

```
sysorb-agent-4.0.0-5562.rhel5-x86.ia32.rpm
```

for 32-bit based installation or:

`sysorb-agent-4.0.0-5562.rhel5-amd64.amd64.rpm`

for a 64-bit based installation.

You can download these files from <http://www.evalesco.com>. Also, you should make sure that you have root access to the system on which you are installing the Agent Software.

**Note:** These packages are for the newer enterprise Red Hat editions. If you are using an older version of Red Hat Linux, please download and install the package for Red Hat Linux 7.2 instead.

Use the RPM utility to install the package. Example:

**rpm -Uvh sysorb-agent-4.0.0-5562.rhel5-x86\_ia32.rpm**

This should successfully install the SysOrb Agent on your system.

Please read Chapter 8 before you start the agent. The agent must know where to find its server before it will be able to do anything useful.

In order to start the SysOrb Agent after the installation, type in the command: `/etc/rc.d/init.d/soagent start`. Per default the Agent is configured to start in the runlevels 3 and 5.

### 3.4.5. Red Hat Linux 7.2, 7.3, 8 and 9

First you should download the appropriate package. For Red Hat 7.2 and newer, it is the file named:

`sysorb-agent-4.0.0-5562.rh72_ia32.rpm`

You can download these files from <http://www.evalesco.com>. Also, you should make sure that you have root access to the system on which you are installing the Agent Software.

**Note:** The package for Red Hat 7.2, also works on newer versions of Red Hat, i.e. 7.3, 8 and 9. For RedHat Enterprise Linux, please follow instructions in the previous section.

Use the RPM utility to install the package. Example:

**rpm -Uvh sysorb-agent-4.0.0-5562.rh72\_ia32.rpm**

This should successfully install the SysOrb Agent on your system.

Please read Chapter 8 before you start the agent. The agent must know where to find its server before it will be able to do anything useful.

In order to start the SysOrb Agent after the installation, type in the command: `/etc/rc.d/init.d/soagent start`. Per default the Agent is configured to start in the runlevels 3 and 5.

### 3.4.6. Debian GNU/Linux 5.0 and other Debian based systems

Debian 5.0 users can download the installation package named:

`sysorb-agent-4.0.0-5562.debian50_ia32.deb`

for the 32-bit version and:

`sysorb-agent-4.0.0-5562.debian50-amd64.x64.deb`

for the 64-bit version.

The file can be downloaded from <http://www.evalesco.com>. This should also install on most Debian based distributions, e.g. Ubuntu. Also, you should make sure that you have root access to the system on which you are installing the agent software.

Use the dpkg utility to install the package, e.g.:

```
dpkg -i sysorb-agent-4.0.0-5562.debian50.ia32.deb
```

This should successfully install the SysOrb Agent on your system.

Please read Chapter 8 before you start the agent. The agent must know the name of its server, to be able to checkin.

Then type **/etc/init.d/soagent start** to start the agent for the first time. Per default the Agent is set up to automatically start in runlevel 2.

### 3.4.7. Debian GNU/Linux 2.2, 3.0 and 4.0

Users of older Debian based installations (pre 5.0) can download the installation package named:

```
sysorb-agent-4.0.0-5562.debian22.ia32.deb
```

The file can be downloaded from <http://www.evalesco.com>. Also, you should make sure that you have root access to the system on which you are installing the agent software.

Use the dpkg utility to install the package:

```
dpkg -i sysorb-agent-4.0.0-5562.debian22.ia32.deb
```

This should successfully install the SysOrb Agent on your system.

Please read Chapter 8 before you start the agent. The agent must know the name of its server, to be able to checkin.

Then type **/etc/init.d/soagent start** to start the agent for the first time. Per default the Agent is set up to automatically start in runlevel 2.

### 3.4.8. Mandrake Linux 9.0

Mandrake users can download the installation package named:

```
sysorb-agent-4.0.0-5562.mdk90.ia32.rpm
```

This file can be downloaded from <http://www.evalesco.com>. Also, you should make sure that you have root access to the system on which you are installing the Agent Software.

Use the RPM utility to install the package. Example:

```
rpm -Uvh sysorb-agent-4.0.0-5562.mdk90.ia32.rpm
```

This should successfully install the SysOrb Agent on your system.

Please read Chapter 8 before you start the agent. The agent must know where to find its server before it will be able to do anything useful. You can also run the following command to have the agent detect a suitable configuration if you have a running SysOrb server on the local subnet.

```
/etc/rc.d/init.d/sysorb-agent configure
```

In order to start the SysOrb Agent after the installation, type in the command: **/etc/rc.d/init.d/sysorb-agent start**. Per default the Agent is configured to start in the runlevels 3 and 5.

### 3.4.9. SuSE Enterprise Linux 11

If you use SuSE Enterprise Linux 11 or any newer version, you should download

```
sysorb-agent-4.0.0-5562.sles11-x86.ia32.rpm
```

for the 32-bit version and:

```
sysorb-agent-4.0.0-5562.sles11-amd64.amd64.rpm
```

for the 64-bit version.

from <http://www.evaesco.com>. Also, you should obtain root access to the system where you wish to install the SysOrb Agent.

Use the RPM utility to install the package, eg.:

```
rpm -Uvh sysorb-agent-4.0.0-5562.sles11-x86_ia32.rpm
```

This should install the SysOrb Agent on your system.

Please read Chapter 8 before you start the agent. The agent must know where to find its server before it will be able to do anything useful.

### 3.4.10. SuSE Linux 8.2 and SuSE Linux 9.0

If you use SuSE Linux 8.2 or 9.0, you should download

```
sysorb-agent-4.0.0-5562.suse82_ia32.rpm
```

from <http://www.evaesco.com>. Also, you should obtain root access to the system where you wish to install the SysOrb Agent.

Use the RPM utility to install the package. Example:

```
rpm -Uvh sysorb-agent-4.0.0-5562.suse82_ia32.rpm
```

This should install the SysOrb Agent on your system.

Please read Chapter 8 before you start the agent. The agent must know where to find its server before it will be able to do anything useful.

### 3.4.11. FreeBSD 6.0

To install the SysOrb Agent on a machine running FreeBSD 6.0 or newer, download the file named:

```
sysorb-agent-4.0.0-5562.freebsd6_ia32.tgz
```

From <http://www.evaesco.com>. This package contains everything needed in order to make a computer check in status information regularly to the SysOrb Server.

**Note:** The FreeBSD 6.0 agent also work with newer releases of FreeBSD, such as FreeBSD 7.0 and 8.0

Please note, you must have root access to the system on which you are installing this software.

You can now type:

```
pkg_add sysorb-agent-4.0.0-5562.freebsd6_ia32.tgz
```

This will install the SysOrb Agent for FreeBSD 3.5.

Your SysOrb Agent should now be installed. Please read Chapter 8 to see how the `/usr/local/etc/sysorb/agent.conf` agent configuration file should be set up.

In order to start the SysOrb Agent after the installation, type `/usr/local/etc/rc.d/soagent.sh start`.

### 3.4.12. Solaris 10

SysOrb agent is available for Solaris 10 on 32-bit and 64-bit x86 platforms.

Solaris users on x86 should download the entire SysOrb Server software package named:

```
sysorb-agent-4.0.0-5562.solaris10-x86.ia32.Z
```

In order to install the SysOrb Server, you must have root access to the system.

First unpack the file using:

```
uncompress sysorb-agent-4.0.0-5562.solaris10-x86.ia32.Z
```

You can now type:

```
pkgadd -d sysorb-agent-4.0.0-5562.solaris10-x86.ia32
```

You now have a SysOrb Server configured on your system. If you have purchased SysOrb, you will need to install your license file (See Section 3.2 for information about how you do this), before starting SysOrb. Please consult Chapter 5 for detailed information about all possible configuration parameters.

Type `/etc/init.d/sysorbd start` to start the server for the first time. Per default SysOrb is set up to automatically start in runlevel 3.

The SysOrb server must be accessed through a Web-interface, the `.cgi` and other files are placed in `/opt/SYSOsoser/var/sysorb/www/`. You must manually configure your web-server to be able to access this directory, and execute `.cgi` programs. Please remember to set up `index.cgi` as the default file to show, as the directory contains no `index.html` file.

Once this is done, you should be able to see the login page (or an error page if your server is not yet running) by accessing your web server.

If you have trouble making this work, please take a look in the error and access logs from your web-server. These logs often help by pointing out errors in the configuration files.

### 3.4.13. Solaris 11

To install the SysOrb Agent on a machine running Solaris 11 on an UltraSPARC processor, you should download the file named:

```
sysorb-agent-4.0.0-5562.solaris11-sun4v.p5p
```

Please note, you must have root access to the system on which you are installing this software.

In order to install the agent on the global zone of a Solaris 11 system, issue the command:

```
pkg install -g sysorb-agent-4.0.0-5562.solaris11-sun4v.p5p sysorb-agent
```

Your SysOrb Agent should now be installed. Please read Chapter 8 to see how the `/etc/sysorb/agent.conf` agent configuration file should be set up.

The status of the agent service can be inquired using the command `svcs soagent`. The agent service can be enabled using the command `svcadm enable soagent`.

### 3.4.14. IBM AIX 5.3

To install the SysOrb Agent on a machine running AIX 5.3, download the file named:

```
sysorb-agent-4.0.0-5562.aix53.pwr2.bff
```

The file can be downloaded from <http://www.evaluesco.com>. This package contains everything needed in order to install the SysOrb Agent.

Please note, you must have root access to the system on which you are installing this software.



You type:

```
installp -a -d sysorb-agent-4.0.0-5562.aix53.pwr2.bff all
```

Your SysOrb Agent should now be installed. Please read Chapter 8 to see how the `/etc/sysorb/agent.conf` agent configuration file should be set up, or you can run the following command to have the agent detect a suitable configuration if you have a running SysOrb server on the local subnet.

```
sysorb-testconf /etc/sysorb/agent.conf configure
```

After configuring the Agent, you can start it by executing `/usr/sbin/soagent`

### 3.4.15. Novell NetWare 5.1 and 6.0

To install the SysOrb Agent on Netware 5.1, you need to download the ZIP archive named:

```
sysorb-agent-4.0.0-5562.nw51.zip
```

To install the SysOrb Agent on Netware 6.0, you need to download the ZIP archive named:

```
sysorb-agent-4.0.0-5562.nw60.zip
```

The file can be downloaded from <http://www.evaesco.com>. This package contains everything needed in order to install the SysOrb Agent.

On your workstation, follow these steps in order to create a NetWare installation floppy for the agent:

- First, unzip the archive
- Format a floppy disk - please make sure to use a fresh floppy disk to avoid errors when installing. Old floppy disks are unreliable, and floppy disk errors are common on old media.
- Label the floppy disk - the disk should be named `SOAGENT1`.
- Now copy the extracted files from the ZIP archive, onto the floppy disk.

**Labeling the floppy disk:** When labeling the floppy disk under Windows, users have reported various problems using the graphical user interface to label the disks. A floppy disk can safely be labeled using the command line tools though. Start up a command line (choose "run" in the Start menu, and type either `cmd` or `command`), and type the following: `label a:soagent1`

Now the install floppy disk is ready to be used on your NetWare servers. Follow the installation steps below, to install the agent on your server. The installation happens using the NetWare Console on the server where you are installing the agent

- Start the `nwconfig` utility from the NetWare Console
- Select the **Product Options** menu option.
- Select the **Install a product not listed** menu option.
- Please make sure that the installation floppy is in the drive, then press enter to allow the `nwconfig` utility to search for packages on the floppy drive.
- You should now have the option to install the SysOrb Agent and it's associated configuration file.

You must now configure your SysOrb Agent. Use the `edit` editor to edit the agent configuration file `SYS:SYSORB\AGENT.CFG`. Typically you will need to set three parameters in the file:

- `server_list`: This is the name of the SysOrb Server - the name or IP address set here, must be the name or the IP address of the SysOrb Server, and the server must be reachable from the Agent machine



- name: This is the name of the Agent machine. This must match *exactly* the name given for the agent host when configuring it in the Web interface.
- domain: This is the SysOrb domain in which the agent host was placed, in the Web interface. For example, if the agent was placed in the root domain, the domain path is simply ".". If it was placed in a folder named "Sales", the domain is "Sales". Sub-folder names are separated by periods, like DNS domain names, so a folder named "Research" placed under a folder named "Head", will correspond to "Head.Research".

Finally, you can load the agent NLM. We recommend that you use the following command line to load the module:

```
load protected sys:\sysorb\soagent.nlm
```

In order to ensure that the agent starts again automatically, if the server is rebooted, this command line should be appended to the `SYS:SYSTEM\AUTOEXEC.NCF` file.

## 3.5. Upgrading LogChecks from SysOrb 2.4.0

The LogChecks configuration has changed between SysOrb version 2.4.0 and 2.4.1. This means that any LogChecks configured on a version 2.4.0 system must be manually reconfigured on the new version in order to work after upgrading.

In version 2.4.0 all configuration data including paths to logfiles and matching rules was defined on the agent in the log configuration file (default: `log.conf`), specified in the agent configuration (default: `agent.conf`). This would make the log files available for monitoring on the SysOrb Server.

In version 2.4.1 and up only the paths for the logfiles to monitor is defined in the log configuration file. The matching rules configuration has been moved to the SysOrb server. Furthermore, the LogCheck logic has been much improved. This means you have a few more configuration options.

In order to move version 2.4.0 LogChecks to version 2.4.1 you need to do the following after upgrading your SysOrb server (See the *User's Guide* and Section 8.6 for more information on LogChecks):

- Rename the log configuration file (default: `log.conf`) on the SysOrb Agent host to `log.conf.old`.

As an example, we take that the above file contained a LogCheck definition like this:

```
[Syslog]
logfile='/var/log/messages' ;
incremental;
rules
  '^RPC: garbage': warn;
  '^nfs:.*server OK': ok;
  '^nfs:': warn;
```

- Make a new log configuration file in place of the original and add the path of each log file you want to monitor, one path per line.

With the above example, you would insert this one line:

```
/var/log/messages
```

- Auto-upgrade the agent, or manually upgrade the Agent.
- If doing manual upgrade, make sure to restart the SysOrb Agent.
- Using the Web interface go to the AgentCheck configuration dialog. In order to do this, click configure, find the host and click edit. Click AgentChecks. Click 'Rescan'. Wait for next Agent Checkin (default: 30 seconds) and Click 'Show all'. Click the 'log checks' folder and click down through the tree to reach the desired log file. Click '[Add]' on the log file to be monitored.

- Copy the rule lines (not including the rules keyword itself) from the 'log.conf.old' file, to the Rules text box in the web interface.

With the above example, you would enter the following in the rules field:

```
'^RPC: garbage': warn;
'^nfs:.*server OK': ok;
'^nfs:': warn;
```

- Click OK.

Be sure to read the *User's Guide* and Section 8.6 for more information the LogChecks and the enhanced configuration options.

## 3.6. Unattended installation on Windows

In order to do an unattended on Windows, one must use the `msiexec` program from the command line. The basic syntax of an unattended installation is:

```
msiexec /passive /i sysorb-agent-4.0.0-5562.winxp-x86.msi
```

This will install the SysOrb agent using the default configuration options, meaning the SysOrb agent will most likely have to be configured after installation.

To avoid having to configure the SysOrg agent after installation, arguments can be given to the installer changing the default settings. The `msiexec` can be given properties as `Property=PropertyValue` on the command line.

The SysOrb agent installer uses a number of properties:

- AGENTNAME - The name of this SysOrb Agent.
- SERVERLIST - Comma separated list of SysOrb servers the agent should check in to.
- AGENTDOMAIN - The domain for this SysOrb agent.
- AUTOUPGRADE - Set to 'true' to
- LOGFILE - The full path to the agent log file.
- LOGCHKCONF - The full path to the log check configuration file.
- SERVERPORT - The port the SysOrb server is listening on.
- LOGDAYS - The number of days between log file rotation.
- LOGLEVEL - The amount of logging.
- AUTOUPGRADE - Set to 'true' to allow autoupgrade of the agent, 'false' otherwise.

So, in order to do an unattended installation of the SysOrb agent with the name *MySysOrbAgent* checking in to the server *MySysOrbServer* disallowing automatic upgrades, one could execute:

```
msiexec -passive -i sysorb-agent-4.0.0-5562.winxp-x86.msi AGENTNAME=MySysOrbAgent  
SERVERLIST=MySysOrbServer AUTOUPGRADE=false
```

# Chapter 4. Auto-upgrading the SysOrb Agent

Once the SysOrb Agent is installed on every monitored machine, you will not have to upgrade the Agent manually for each new release of SysOrb. Instead a special package containing the Agent for every platform will be distributed with the SysOrb Server.

Notice: When upgrading from version 2.4.0 you must take special care of any log checks activated on a SysOrb agent. See Section 3.5 for details.

Every time the Agent checks in to the Server, it will check whether a new version of itself is available. If that is the case, it will download the new version and upgrade itself without human intervention.

In order to enable this, all you have to do is copy the .spm file containing the new Agent into `/var/sysorb/upgrade` on non-Windows systems (except Mandrake, where the directory is located at `/var/opt/sysorb-server/upgrade`), or `C:\Program Files\SysOrb Server\Upgrade` on Windows. The the Agents will start downloading the next time they check in.

**Troubleshooting tip:** If the agents do not upgrade, you can try enabling the `log_upgrade_debug` switch on the SysOrb Server and restart it. (See Chapter 5 for details on configuring the Agent) Within the first about 50 lines written in `server.log` after the restart should be a line like

```
Scanning for autoupgrade packages in...
```

and immediately after the server will list the package files it finds.

The agent/server protocol is designed with the utmost care for security. The server has to authenticate itself using a 128 bit key, which is also used for encryption of subsequent communication. The chances of a hacker intercepting the transfer of an upgraded Agent executable are minimal. However, if the machine running the SysOrb Server is otherwise compromised, a clever hacker would be able to trick the SysOrb Server into sending any file as an Agent upgrade, thereby gaining access to all the machines running Agents.

If you will not risk this on your mission critical machines, you can instruct individual Agents not to download executables from the SysOrb Server, no matter what the server says. (See Chapter 8 for details on configuring the Agent)

## 4.1. Auto-upgrade with SysOrb Satellites

The installed auto-upgrade packages are local to the SysOrb Server or Satellite they are installed on. This means that the auto-upgrade packages needs to be installed on all SysOrb Servers or Satellites where agents check-in, in order to upgrade all the agents.

# Chapter 5. SysOrb Server Configuration

The SysOrb Server offers a wide range of configuration options for both debugging and troubleshooting, as well as for performance tuning and administrative convenience.

The different ports of the server have similar configuration options, but the actual way in which the configuration options are accessed differ, depending on which platform you are running. On Unix-like systems the configuration is stored in files and on Microsoft Windows NT / 2000 the configuration is stored in the system registry.

After a configuration change, you will have to restart the SysOrb Server service (a complete server reboot is not necessary).

## 5.1. Microsoft Windows NT / 2000

Server configuration is done in a program called **SysOrb Config** which can be found in the start menu. This program includes detailed descriptions of each option.

The program is located in the `Programs` folder specified during the installation.

## 5.2. Unix-like systems (FreeBSD, Linux and Solaris)

The configuration file is located in:

```
/etc/sysorb/server.conf
```

on all Unix-like platforms, except FreeBSD where it is located in:

```
/usr/local/etc/sysorb/server.conf
```

and Mandrake where it is located in:

```
/etc/opt/sysorb-server/server.conf
```

This file contains the configuration for the server. If you change this file you must restart the server for the changes to take effect.

You can however make the server reopen its log file by sending a hangup signal (**SIGHUP**) to the `sysorbd` process. This is used in the `logrotate` script that accompanies the server on Linux.

The options of primary interest are likely to be the location of the database files, and the logging options. See the reference for details.

## 5.3. Configuration Options Reference

The configuration directives for the SysOrb Server fall into nine categories:

- **Logging Options** defines where the SysOrb Server should keep its logfiles and what information should be logged.
- **Database Options** defines where the data files for the SysOrb Server's database should be stored.
- **Network Connection Manager Options** defines what TCP port the SysOrb Server should use and how many concurrent connections it will accept.
- **NetCheck Manager Options** defines maximum number of NetChecks (e.g. mail server check).
- **General SysOrb Server Options** defines other options for the SysOrb Server.

- **Alert Dispatcher Options** defines how and to whom alerts will be given.
- **SNMP options Options** defines various aspects on how SysOrb should perform SnmpChecks.
- **Grid Options** defines options for a grid of SysOrb servers and satellites.

### 5.3.1. Logging Options

logdir (path)

This is the location of the logfile. It is not the filename, but the directory in which the file should be. The file will be named `server.log` within the specified directory.

*Default value (Unix): /var/log/sysorb*

*Default value (NT/2000): install-dir\Config*

log\_assert (boolean)

Whether the server should log critical internal errors.

*Default value: true*

log\_audit (boolean)

Enable/disable audit logging - logging of all user interactions with the system.

*Default value: false*

log\_dbms\_cpu (boolean)

Whether the database subsystem should log information about how it spends its time.

*Default value: false*

log\_dbms\_debug (boolean)

Whether the database subsystem should log informational messages.

*Default value: false*

log\_dbms\_anomaly (boolean)

Whether the database subsystem should log information about certain situations, e.g. another part of sysorb requesting information about an object which does not exist in the database. Please note that there can be perfectly valid reasons for such queries, for instance the NetCheck engine requesting information about a NetCheck which has just been deleted by a user.

*Default value: false*

log\_uplink\_debug (boolean)

Whether the uplink (rental license and problem reporting) subsystem should log informational messages.

*Default value: false*

log\_tsdb\_debug (boolean)

Whether the time series database subsystem should log informational messages.

*Default value: false*

log\_socketio\_debug (boolean)

Whether the network connection manager should log informational messages.

*Default value: false*

log\_keygen\_debug (boolean)

This option enables informational messages regarding Diffie-Hellman prime/generator pair generation.

*Default value:* false

log\_snmp\_debug (boolean)

Whether the SNMP subsystem should log informational messages.

*Default value:* false

log\_esxi\_debug (boolean)

Whether the ESXi subsystem should log informational messages.

*default value:* false

log\_snmpval\_debug (boolean)

Whether the SNMP subsystem should log informational messages about the values it receive.

*Default value:* false

log\_general\_debug (boolean)

Whether general debugging information should be logged.

*Default value:* false

log\_sched\_debug (boolean)

Whether the event-scheduler should log informational messages. These messages are usually not very interesting.

*Default value:* false

log\_alarm\_debug (boolean)

Whether the central decision-making process (the alarm logic) should log informational messages.

*Default value:* false

log\_alert\_debug (boolean)

Whether the alert dispatcher should log informational messages, which can be used for troubleshooting mail-server or modem dialing problems. Set this to "true" if you have problems getting alerts via e-mail or numerical pager.

*Default value:* false

log\_netcheck\_debug (boolean)

This option enables informational messages from the NetCheck module.

*Default value:* false

log\_icmpcheck\_debug (boolean)

This option enables informational messages from the ICMP (ping) module.

*Default value:* false

log\_ssl\_debug (boolean)

This option enables informational regarding the loading of the SSL library used for SSL based NetChecks..

*Default value:* false

log\_report\_debug (boolean)

This option enables informational messages from the Report module.

*Default value:* false

log\_forecast\_debug (boolean)

This option enables informational messages from the Forecast module.

*Default value:* false

log\_upgrade\_debug (boolean)

This option enables informational messages regarding auto upgrade of the agents.

*Default value:* false

log\_scan\_debug (boolean)

This option enables logging when the SysOrb Server receives scan requests from agent machines.

*Default value:* false

log\_nodeclass\_debug (boolean)

This option enables logging about the NodeClass check configuration engine.

*Default value:* false

log\_router\_debug (boolean)

This option enables informational messages regarding grid routing.

*Default value:* false

log\_link\_debug (boolean)

This option enables informational messages regarding grid link establishment.

*Default value:* false

log\_station\_debug (boolean)

This option enables informational messages regarding grid station to station communication.

*Default value:* false

log\_gridrpc\_debug (boolean)

This option enables informational messages regarding the grid RPC communication.

*Default value:* false

log\_gridsync\_debug (boolean)

This option enables informational messages regarding grid synchronisation.

*Default value:* false

### 5.3.2. Database Options

layout\_conf (filename)

This is the file from which the database back-end reads the layout information which the Web-interface needs.

*Default value (Unix):* /var/sysorb/layout.conf

*Default value (NT/2000):* `install-dir\Config\layout.conf`

`dbms_tsdb` (filename)

This is the file in which the database back-end will store the time-series database data. This file can become rather large if many devices are monitored. The file grows with approximately 1 megabyte per monitored check.

**Linux-based systems note:** You can specify either a file on your filesystem, or a device-file for a block-device (such as a disk partition or a RAID device) here.

*Default value (Unix):* `/var/sysorb/main.tsdb`

*Default value (NT/2000):* `install-dir\Config\main.tsdb`

`dbms_odb` (filename)

This is the file that keeps all configuration information about hosts, services, devices, users, groups, etc. It is the entire hierarchical configuration of your monitored systems and their users. This file also keeps passwords for user accounts, so you should make sure that its permissions are set correctly if you run the SysOrb Server on a multiuser system with other interactive users.

*Default value (Unix):* `/var/sysorb/main.odb`

*Default value (NT/2000):* `install-dir\Config\main.odb`

`dbms_odbj` (filename)

This is the journal file for the aforementioned `main.odb` meta-data database file. The journal provides an efficient method for the SysOrb Server to guarantee data consistency in the meta database. The default size of this file is 8 megabytes, and the size will never change during the lifetime of the database.

*Default value (Unix):* `/var/sysorb/main.odbj`

*Default value (NT/2000):* `install-dir\Config\main.odbj`

**Performance tip:** The journal can be placed on a small but fast storage device, in order to improve overall meta database performance. With the modest size of the journal, it is even possible to place it on a battery backed SDRAM device.

`dbms_buffer_blocks` (number of blocks)

This option specifies how many ODB blocks (default block size is 8 KiB) the `sysorb-dbms` process will keep in memory, to speed up normal database queries and other common operations. The larger the value, the more memory the database process will consume. The memory overhead can be estimated by multiplying the number of blocks with the block size - for example, 4096 blocks will consume approximately  $4096 * 8 \text{ KiB} = 32$  megabytes of memory.

*Default value:* 4096

`tsdb_buffer_entries` (number of entries)

This option specifies how many data records (per check) there can be in the write buffer allocated for each check. Enlarging this buffer will give the time series more freedom in choosing when to flush data to disk, possibly increasing performance. The cost of an increase is a larger memory footprint of the `sysorb-tsdb` process.

*Default value:* 64



`tsdb_buffer_write_min` (number of entries)

This option controls how many entries we want in the entry write buffer before we start flushing entries to disk. The larger this number, the fewer writes to disk will be needed. It is, however, advised that this number stays well below the `tsdb_buffer_entries` parameter, so that the write buffers do not fill up. If a write buffer is filled, flushing of the buffer will be forced, thereby limiting the freedom the database has to choose a convenient time to flush the data.

*Default value:* one quarter of `tsdb_buffer_entries`

`tsdb_buffer_age_max` (seconds)

This is the maximum allowed age (measured in seconds) of an entry in the write buffer. If an entry older than this is found in a write buffer, entries from that buffer will be flushed (no matter if `tsdb_buffer_write_min` is exceeded or not). The larger this option is, the more freedom the database will have in choosing when to flush data. However, if the SysOrb Server machine loses power or is in some other way shut down without giving **sysorb-tldb** a chance to flush the write buffers from memory to disk, all records in the write buffers will be lost. This option is used to limit the maximum amount of data loss.

*Default value:* 600

`tsdb_buffer_flush_batch` (number of buffers)

The time series database will go through its live write-buffers in a round-robin fashion. Each second, it will consider `tsdb_buffer_flush_batch` buffers, and inspect whether each inspected buffer should be flushed (either because of `tsdb_buffer_age_max` or `tsdb_buffer_write_min`). This option controls how many buffers are inspected each second. The higher the number, the greater the potential peak workload on the database. If this number is low, compared to the number of checks in the system, it can however take a long time for the database to actually discover that a buffer holds entries that are too old and should be flushed.

*Default value:* 8

### 5.3.3. Network Connection Manager Options

`socketio_bind_port` (integer)

This is the TCP port on which the Connection Manager will listen for incoming connections. The standard SysOrb port is 3241, and there should be no reason to change this. If you must use another port, make sure that you change the port number both in the server, the agents and the web interface configuration files.

*Default value:* 3241

`socketio_max_connections` (integer)

This is the maximum number of concurrent connections the connection manager will accept. The number should be sufficiently low not to overload the server, and sufficiently high to allow service of both agents and user interface. Both agent and user interface connections are only active when needed, so this number can be less than the number of agents and active users on the SysOrb Monitoring System. If you are seeing many messages in the SysOrb Server log about connections being expired because high or low-water pressure, and your SysOrb Server can handle the higher load, you should raise this number.

*Default value:* 300

`socketio_max_inflight` (integer)

This is the maximum number (in thousands) of check-in results the connection manager will accept holding in memory, before it starts refusing agent connections. The purpose of this limit, is to prevent "check-in storms" - a situation in which a large number of agents simultaneously check in a very large number of results, causing the server to slow down, in turn causing even more data to queue up. By limiting the number of results held in memory and asking the agents to "check back later", the server can limit the load and prevent the overload.

If this number is set too low, you may see the server refusing agent checkins even though it is not too heavily loaded.

*Default value:* 10 (thousands)

`socketio_agentconf_rate` (integer)

This option defines how often a single SysOrb agent may request configuration from the SysOrb server. It is given as a number of seconds. Under normal operation, an Agent will only request this information when re-started. If this limit is reached it usually points towards a problem with an agent restarting over and over. There should be no reason to increase this limit.

*Default value:* 600

`socketio_agentconf_burst` (integer)

This option defines how often a single SysOrb agent may request configuration from the SysOrb server. When an agent has requested information this many times in a row, the above rate limit will be enforced.

*Default value:* 5

`agent_package_path` (directory)

This option specifies the directory where the Network Connection Manager should look for packages for the agent autoupgrade. The directory is automatically scanned once in a while.

*Default value (Unix):* `/var/sysorb/upgrade`

*Default value (NT/2000):* `install-dir\Upgrade`

### 5.3.4. NetCheck Manager Options

`netcheck_limit_children` (integer)

This is the number of simultaneous TCP-based NetChecks that can run at any given time. Checking mail-server or web-server response times, or the response time of any other TCP based service, will cause a check program to run. This number limits how many check programs can run at any given time. The default value should be sufficient for a very large number of NetCheck services, as most checks only run for a few milliseconds each. Setting this value too low will cause checks to be queued but not lost. Setting it too high will consume more system memory and possibly slow down the entire system thereby reducing the accuracy of the NetChecks. It is better to leave this value low than set it too high.

**Note:** Windows NT / 2000 has a hard limit of 30 children, and it is not recommended setting the value above 25.

*Default value (Unix):* 32

*Default value (NT/2000):* 20

`netcheck_process_pool_size` (integer)

This option controls the size of the netcheck process pool that SysOrb will spawn. Network checks to be performed are scheduled amongst the processes in the pool in a round-robin fashion. The default value of 0 means that SysOrb will attempt to autodetect a sane value and most users should not need to overrule this.

*Default value :* 0 (autodetect)

`custom_netcheck_conf` (filename)

This option points to the configuration file for the custom NetChecks. An example of how such a file should be written can be seen in the `custom_netcheck.conf.sample` in the same directory as the main configuration file.

`netcheck_ping_spacing` (integer)

This option defines the minimal spacing between ICMP ECHO REQUEST packets in microseconds, increase this if your network equipment drops ICMP packets because of buffer overruns.

*Default value:* 10000  $\mu$ s

`dns_cache_secs` (integer)

The maximal time SysOrb will cache the result of DNS lookups in seconds.

*Default value:* 86400 s

`libssl` (filename)

In the event that the NetCheck engine cannot locate the SSL-library, the exact path to the library can be specified using the `libssl` option. If the `libssl` option is set, the NetCheck engine will only try to load the exact specified library. Otherwise it will try a list of possible names for the library, and use the first one that loads.

*Default value:* not set

**Note:** This option is not available on Windows, as the SSL library is distributed with the SysOrb Server package.

### 5.3.5. General SysOrb Server Options

`working_directory` (pathname)

This is the directory that will be used as working directory by the server once it is running. It does not matter much what this is set to, if all other filenames use absolute paths (which they should). On UN\*X systems and Linux this option lets you set the working directory to somewhere outside of e.g. `/home` thereby allowing you to unmount `/home` without shutting down the SysOrb Server. On Microsoft Windows NT / 2000 this option has no other effect than providing a base path for relative filenames.

*Default value (Unix):* `/var/sysorb`

*Default value (NT/2000):* `install-dir`

`license_path` (pathname)

The SysOrb server will search this directory for the `sysorb.lic` license file.

*Default value (most Unix'es):* `/etc/sysorb`

*Default value (NT/2000):* `install-dir\Config`

`variable_file` (filename, Unix only)

This file is used for storing various non-critical values. The `sysorb` user must have write access to this file.

**NT note:** This option does not exist on NT, because the information is stored in the sub-key `Variables` in the registry under `SOserver`.

*Default value (most Unix'es): /var/sysorb/variables.server*

smem\_prefix (path and filename prefix)

This location prefix is used when building up the absolute filenames of files used internally by SysOrb to set up communications between the various processes that make up the SysOrb server.

*Default value (most Unix'es): /var/sysorb/smem*

*Default value (NT/2000): SMem*

smem\_size (size in megabytes)

Total size of the shared memory region used by the SysOrb processes for intercommunication.

A too small value will cause excessive communication overhead on a busy server, while a too large value will waste too much memory and may exceed operating system or architecture limitations on memory mapping sizes.

*Default value: 128*

resource\_directory (pathname)

The resource directory is the directory where pictures and css-files used for email-alerts and -reports are kept.

*Default value (most Unix'es): /var/sysorb/resources*

*Default value (NT/2000): install-dir\Resources*

upload\_serverinfo (boolean)

This option controls whether this SysOrb server should send important information about its health to Evalesco A/S. If enabled the SysOrb server will try uploading the information using the HTTP protocol.

*Default value: false*

allow\_import\_export (boolean)

In order to export or import sensitive data like passwords and agent keys you need to enable this option. This option should *only* be set to true during import or export. When enabled the system is vulnerable to password and agent key sniffing among other things..

*Default value: false*

max\_scan\_processes (integer)

The maximum number of parallel jobs to run during AutoDiscovery.

*Default value: 8*

allowed\_candidate\_nodes (integer)

When a sysorb agent checks in to the server, but is not already configured on the server, a candidate node is created. This candidate node can be viewed in the web interface and used to create a real node. This option allows you to limit the number of candidate nodes that can be on the server at one time. Further agents will be rejected without notice.

*Default value: 10*

spare\_keypool\_size (integer)

The SysOrb server will try to have this number of Diffie-Hellman prime/generator pairs precalculated for future agents checking in.

Only if you have many agents registering with the SysOrb server in quick succession will it make sense to increase this value.

*Default value:* 5

keypool\_reuse (integer)

The SysOrb server will use a Diffie-Hellman prime/generator pair for negotiating secret keys with this many agents before discarding it.

Only if you have many agents registering with the SysOrb server in quick succession will it make sense to increase this value.

*Default value:* 1

passive (boolean)

If this option is enabled, the SysOrb server will perform no NetChecks, generate no reports, not do AutoDiscovery, or take any other action. It will still accept incoming connection from the web interface and from SysOrb agents. This option is mostly useful for recovery, if one has accidentally started an AutoDiscovery, SNMP scan or the like, that turns out to slow down or crash the SysOrb server.

*Default value:* false

## 5.3.6. Alert Dispatcher Options

mail\_server (hostname)

This is the name of the mail-server (a server accepting SMTP connections, and willing to relay for the SysOrb Server). It should be set to the name of a local mail relay on your site.

*Default value:* localhost

mail\_from (string)

This is the domain name that will be used in the **HELO mail\_from** SMTP negotiation with the mail server, when an alert is sent via e-mail.

*Default value:* localdomain

reply\_mail\_to (string)

This is the e-mail address that will be put in the **From:** field of all e-mails sent by the SysOrb Server. It should be a valid e-mail address of the SysOrb Server administrator in the form of: user or user@host.

*Default value:* root@localhost.localdomain

alert\_sms\_subject (string)

Setting this option to a value, will make all SMS's sent via email to SMS gateways have the same subject. This can be useful, if the email to SMS gateway requires that the email has identification in the subject.

**Note:** Even with this option set, it is still possible to override the subject individually by "Forcing" the subject on a specific path, through the web-interface.

`alert_defer_at_boot` (minutes)

If the SysOrb Server has a lot of agents configured, it sometimes sends out premature alerts, for agent checkin etc. In order to prevent this, the `alert_defer_at_boot` can specify for how long in minutes the SysOrb Server will defer sending out alerts, when it is started.

*Default value:* 2

`alert_retry_delay` (seconds)

If an alert transmission fails, this is the delay in seconds that the SysOrb Alert module will wait until it re-tries the transmission.

*Default value:* 30

`alert_attempts` (integer)

This option specifies the maximum number of times the SysOrb Alert module will attempt the transmission of a single alert message.

*Default value:* 5

`alert_to_incident_log` (boolean)

This option controls whether SysOrb will log alert path usage to the nodes incident log.

*Default value:* false

`agent_checkin_delay` (integer)

This option controls when agent checkin reached ALERT level.

*Default value:* 30

`webinterface_url` (string)

This is the URL for the Web-interface that will be put in the alert messages, for the user to click on. It should point on the preferred Web-interface for the server.

*Default value:* `http://localhost/sysorb`

`modem_port` (filename)

This is the name of the modem device on your system. On Unix-like platforms, please make sure that the `sysorb` user has both read and write access to the device pointed to by this option, as the server will otherwise be unable to use the modem.

*Default value (Unix):* `/dev/modem`

*Default value (NT/2000):* `COM1`

`modem_options` (string)

This comma separated list specifies the capabilities of the attached modem. The possible elements are

`page`

The modem is able to dial a numerical pager. (Any modem should have this capability).

`sms`

Indicates that the modem supports the GSM 07.07 and GSM 07.05 standards.

*Default value:* `page`

`modem_init` (string)

This string is sent to the modem before a number is dialed.

*Default value:* ATE0 S7=20 S8=2

`modem_sim_pin` (string)

If you use the Siemens M20 GSM box for sending SMS messages directly to your cellular phone, you must supply the PIN code for the SIM card here, if one is needed for the SIM card to work.

`modem_baud_rate` (integer)

Use this option to set the baud-rate of the serial port SysOrb uses to communicate with the modem. The allowed values are 200, 300, 600, 1200, 2400, 3800, 9600, 19200, 38400.

*Default value:* 19200

`modem_pager_timeout` (seconds)

Use this option to set the maximal time to elapse between the ATD and ATH commands, when SysOrb is dialing a numerical pager (or an analog phone.)

*Default value:* 30

### 5.3.7. SNMP Options

`max_snmp_table_entries` (integer)

If SysOrb sees more than this number of entries in one SNMP table during a scan, the rest will be ignored.

You may increase this value if any of your SNMP devices has huge tables. Please note that the SysOrb web interface may navigate slowly in such cases.

*Default value:* 500

`snmp_max_retrans` (integer)

The number of retransmits that will be done if no response is received for SNMP probes during normal operation.

Normally you should never need to change this value, but if your network or the probed device is frequently dropping UDP packets it may be necessary to increase this value slightly.

*Default value:* 3

`snmp_max_retrans_walk` (integer)

The number of retransmits that will be done if no response is received for SNMP probes during a SNMP walk of a device.

Normally you should never need to change this value, but if your network or the probed device is frequently dropping UDP packets it may be necessary to increase this value slightly.

*Default value:* 5

`snmp_timeout_initial` (integer)

SNMP probe packets are timed out and retransmitted if they do not receive a timely reply (number of retransmits are controlled by 'snmp\_max\_retrans' and 'snmp\_max\_retrans\_walk'). For each retransmit the timeout is doubled, up to a maximum ceiling specified by 'snmp\_timeout\_max'. This value specifies the initial timeout for the first packet, before retransmit, in milliseconds.

You should only ever raise this value if you experience that SNMP probes often fail and you suspect this to be due to dropped UDP packets on the network rather than a problem with the probed device.

*Default value:* 500

`snmp_timeout_max` (integer)

SNMP probe packets are timed out and retransmitted if they do not receive a timely reply. For each retransmit the timeout is doubled, up to a maximum ceiling specified by this parameter. This value is in milliseconds.

You should only ever raise this value if you experience that SNMP probes often fail and you suspect this to be due to dropped UDP packets on the network rather than a problem with the probed device.

*Default value:*

`snmp_packet_spacing` (integer)

This option defines the minimal spacing between SNMP packets in microseconds, increase this if your network equipment drops SNMP packets because of buffer overruns.

*Default value:* 10000  $\mu$ s

### 5.3.8. Grid Options

`ssec_keylength` (bits)

This SysOrb station (server) will generate RSA station keys with this many bits.

*Default value:* 1024

`ssec_min_keylength` (bits)

This SysOrb station will require RSA keys from other stations to be at least this many bits.

*Default value:* 1024

`ssec_secret_keylength` (bits)

This SysOrb station will generate AES session keys with this many bits

*Default value:* 256

`ssec_secret_min_keylength` (bits)

This SysOrb station will require AES session keys from other stations to be at least this many bits.

*Default value:* 128

`ssec_secret_lifetime` (seconds)

Determines how often session keys should be replaced

*Default value:* 600

`grid_default_ttl` (integer)

Default TTL for grid messages

*Default value:* 8

`master_notify_queue` (integer)

The maximum number of pending updates that a SysOrb master will keep track of. If the satellite fails to acknowledge them, the master will kick the satellite.

*Default value:* 8192



satellite\_tsdb\_async (integer)

The maximum number of timeseries being propagated from the satellite at one time

*Default value: 32*

## 5.4. Troubleshooting HTTPS/IMAPS/POP3S problems

The SysOrb Servers SSL support uses the OpenSSL libraries. On all platforms except Windows, it uses the version of OpenSSL that ships with the operating system. This chapter describes how to troubleshoot SSL check problems on the Unix-like platforms.

The most common problem is that the check shows "No Connection" even though the service is accessible. It usually happens because the OpenSSL library is not installed on the host OS. If this is the case, you will be seeing "No connection" errors in the SysOrb Web Interface, and the server log will contain the following message:

```
Could not load SSL-library. Please check the administrators guide for information about how to fix this problem
```

The first thing to check is that the OpenSSL library is installed on the host OS. How to ensure this can be seen in the list below:

### Most Linux and FreeBSD

On the platforms that aren't mentioned below, the SysOrb Server package depends on the OpenSSL package being installed. So if the SysOrb Server package can be installed, the OpenSSL library is also installed.

### Mandrake/Mandriva

On Mandrake/Mandriva one of `libopenssl10`, `libopenssl10.9.7` or `libopenssl10.9.8` should be installed.

Please consult the Mandrake/Mandriva documentation for information about how to install one of these packages.

### Solaris

On solaris there are two options for providing OpenSSL. On Solaris 10, an OpenSSL library package is included in the operating system. This package is called `SUNWopenssl-libraries`. On Solaris 8 and 9 OpenSSL is not a part of the operating system. However an OpenSSL package can be downloaded from <http://www.sunfreeware.com>. On Solaris 11 OpenSSL is provided as a component of the operating system.

To check if one of these packages are installed you should execute the following commands:

```
pkginfo -l SUNWopenssl-libraries
```

```
pkginfo -l SMCssl
```

If one of these commands succeeds in printing out information about the package, the OpenSSL library is installed.

If none of these packages are installed, you should install one of them. For Solaris 10, please consult the Solaris documentation for information about how to install the `SUNWopenssl-libraries` package. For Solaris 8 and 9, follow the instructions available from <http://www.sunfreeware.com>.

It is not necessary to restart the SysOrb Server, if the OpenSSL library was installed while the SysOrb Server was running.

If the OpenSSL library is installed, and SysOrb still cannot find the OpenSSL library, you can specify the exact location of libssl.so (or similar named), by using the `libssl` server configuration option. See Section 5.3.4 for information about this option.

If you instead get a message stating

```
Error loading library
```

or

```
Error dynamically loading function
```

it means that your version of OpenSSL is incompatible with SysOrb. In this case you should either upgrade to a newer version provided by your OS provider, or download the source code from <http://openssl.org> and compile it by hand. Instructions on how to do this can be found on the OpenSSL homepage. Note that after the installation, it might be necessary to use the `libssl` to get the SysOrb Server to use the correct version of openssl.

## 5.5. On the fly debug logging

SysOrb has the ability to add debug logging on the fly without having to restart the service. The extra debug information will be added in the "server.log" file.

To add debug logging, simply create a new empty file in the log director, naming it according to the information you want to add to the serverlog. It is important that the naming of the files, does not include any extensions. Once they have been placed in the correct directory, the logging should start to add data to the server.log

Default settings for where log files are placed, and where the log check-files should be added, are:

- **Default log directory (Unix):** `/var/log/sysorb`
- **Default log directory (Windows):** `install-dir\Config`

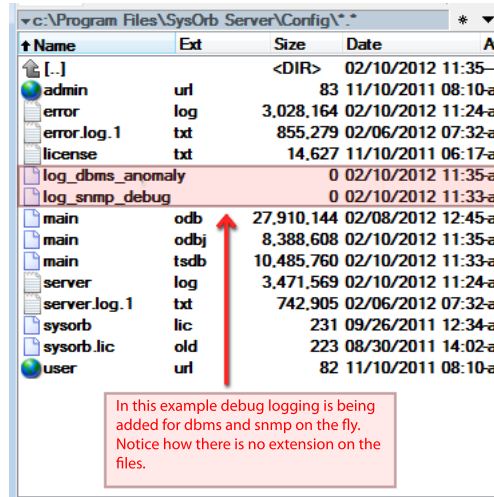
To avoid that you get huge log files, you should only add debug logging when needed. Once you do not need the debug logging, you simply delete the files again, and the logging will stop.

Below is a list of filenames that can be used to add the debug logging.

Look in Section 5.3.1 to get more detailed information about the debug logging options.

```
log_dbms_debug
log_tsd_b_debug
log_dbms_anomaly
log_socketio_debug
log_keygen_debug
log_snmp_debug
log_snmpval_debug
log_general_debug
log_sched_debug
log_alarm_debug
log_alert_debug
log_broadcast_debug
log_brdc_frag_debug
log_time_debug
log_netcheck_debug
log_icmpcheck_debug
log_ssl_debug
log_report_debug
log_forecast_debug
log_upgrade_debug
log_scan_debug
```

log\_nodeclass\_debug  
log\_router\_debug  
log\_link\_debug  
log\_station\_debug  
log\_gridrpc\_debug  
log\_gridsync\_debug  
log\_uplink\_debug



**Example:** An example on how on the fly debugging is set up.

# Chapter 6. SysOrb Web Interface Configuration

The Web Interface needs to know how it can contact the SysOrb Server. Note that the Web Interface can run on any system with network access to the SysOrb Server system and that it does not have to actually run on the same physical machine, although this is by far the most common configuration.

The configuration of the SysOrb Web Interface is stored in `/etc/sysorb/cgi.conf` on all Unix-like systems, except FreeBSD where the file is stored in `/usr/local/etc/sysorb/cgi.conf`, and Mandrake where the file is located in `/etc/opt/sysorb-server/cgi.conf`. On Microsoft Windows configuration is performed by the SysOrb Config program found in the start menu.

## 6.1. General Web Interface Options

`server_list` (list of hosts)

The list is a comma-separated list of hostnames, **without whitespace**. The web interface first tries all the hosts in the list, and then only displays those that answered. If the servers are running on different ports, this can also be specified by adding `:portno` after the hostname. If no portnumber is given the default is `server_port`.

*Default value:* localhost

`server_port` (integer)

This is the port number on which the SysOrb Server listens for incoming connections. The value should only be changed if the server has been told to use another port number as well. It should not be necessary to change these port numbers, but it is nonetheless possible if needed.

*Default value:* 3241

`default_domain` (domain-identifier)

This option specifies which domain should be presented in the domain box on the login page. If this option is unspecified it defaults to the empty string, which is also the root domain.

*Default value:* . (dot)

# Chapter 7. SysOrb Web Server Configuration

On Windows it is possible to install a Web Server with a small feature set, that is customized for use with the SysOrb Web Interface. It is provided as an alternative to installing IIS, but for the larger installations the use of IIS is still recommended, because of its larger feature set.

The SysOrb Web Server has few configuration options, and most should be set to reasonable values by the installation program.

## 7.1. Web Server Configuration Reference

The following sections list the available configuration options for the Web Server. Note that usually the Web Server is ready for use after the installation.

### 7.1.1. File Options

`html_dir` (directory)

This option specifies the directory from which the static files should be served.

*Default value:* `install-dir\www`

`cgi_dir` (directory)

This option specifies the directory from which the CGI-programs should be served.

*Default value:* `install-dir\www`

`cgi_ext` (file extension)

The file extension used to determine if a request is for a CGI-program or for a file.

*Default value:* `cgi`

`index_file` (file name)

The name of the file that should be served if no file is specified.

*Default value:* `index.cgi`

### 7.1.2. Logging

`log_file` (file name)

The name of the file that the Web Server should log to.

*Default value:* `install-dir\error.log`

`tick_time` (seconds)

How often the Web Server should write "MARK" messages to the log file. Use 0 to disable writing of MARK messages

*Default value:* 0

log\_level (integer)

The amount of logging that is written to the log file. Write 0, to disable logging, 3 to only log warning messages, 7 to log warning and informational messages, and 15 to log everything including debug messages.

*Default value:* 7

log\_rotate\_time (seconds)

How often the log-file is rotated, in seconds.

*Default value:*604800 (7 days)

### 7.1.3. Server/network options

port (integer)

Use this option to set the port number through which the Web Server should be available.

*Default value:*Determined during the installation

server\_string (string)

The server identification string. This string is sent whenever a page is requested from the Web Server. Change this option to make the SysOrb Web Server present itself differently.

*Default value:* SysOrb Httpd v.4.0.0 build 5562 on Windows NT (IA-32)

max\_connections (integer)

The maximum number of open connections to the Web Server. When this number of connections is reached, new connections will not be accepted.

*Default value:* 32

time\_out (seconds)

The number of seconds a connection is allowed to be idle, before the Web Server automatically closes it.

*Default value:* 60

# Chapter 8. SysOrb Agent Configuration

The agent has few configuration options. It only needs to know about a few simple things, such as how to contact the SysOrb Server. The real configuration of what checks to perform, when to check in and so on is configured on the SysOrb Server, and migrated to the agent on demand.

The agent configuration is stored in the file `/etc/sysorb/agent.conf` on all Unix-like systems, except FreeBSD where it is stored in `/usr/local/etc/sysorb/agent.conf`, Mandrake where the file is located at `/etc/opt/sysorb-agent/agent.conf`, and Tru64 where the file is located at `/usr/opt/AGT400/etc/agent.conf`. On Microsoft Windows systems this information is stored in the system registry, and is made accessible through the **SysOrb Config** program installed with the SysOrb Agent.

The agent must be restarted in order to reread the configuration. However, reconfiguration of the agent options is almost never needed after the agent is set up the first time.

On Unix systems a hangup signal (SIGHUP) can be sent to the agent to re-open the log file. This is used by the logrotate script on Linux, and can be employed similarly on FreeBSD and Solaris. On Windows the log-rotation is handled by the agent.

## 8.1. Agent Configuration Reference

Most of the options in the SysOrb Agent configuration are specific to the site where the SysOrb runs and, as such, no appropriate default values can be given. When installing the SysOrb Agent remember to check that the configuration options matches the environment in which the SysOrb Agent works.

The first three options need to be changed on almost all new installations.

`name (hostname)`

This is the name the agent will use to identify itself to the server. This must be the exact same name as a host created on the SysOrb Server.

`domain (domain-identifier)`

This is the domain the agent uses to identify itself to the server with. This must be the exact same domain as the agent was configured with in the server.

The following options rarely needs to be changed:

`server_port (integer)`

The port number on which the SysOrb Server will be listening for incoming connections. This number should not be changed, unless there is some special reason for using another port.

*Default value:* 3241

`logfile (filename)`

This is the name of the logfile the agent will use to write informational messages and errors in. You should keep the default setting unless you want to place the logfile somewhere else.

*Default value (Unix):* `/var/log/sysorb/agent.log`

*Default value (NT/2000):* `install-dir\Config\agent.log`

`variable_file (filename, Unix only)`

This is the name of the variable file, which the agent uses to store non-critical values. The `sysorb` user must have write access to this file.

**Windows note:** This option does not exist for Windows, because all the information is stored in the registry.

*Default value (Unix):* /var/sysorb/variables.agent

log\_level (0-3)

This is the logging level to be used by the agent. The higher the number, the less the agent will log. The default is 1, where most uncommon messages are logged, as well as all errors. For troubleshooting purposes, you may wish to set the log level to 0, where the agent will log a lot of routine events.

*Default value:* 1

log\_days (integer)

This option tells the agent how many days should pass before it changes logfile. The old logfile will be renamed to *logfile.X*, where X is increasing as the files get older, and *logfile* is the value specified in the logfile parameter. If set to 0, the logfile is never changed by the agent.

**Unix note:** Many Unixes have a build in tool, which handles the change of logfiles. If your Unix does not have such a tool, you should enable log\_days

*Default value (NT/2000/NetWare):* 7

*Default value (Unix):* 0

max\_log\_files (integer)

This option determines how many changed logfiles will be kept.

*Default value (NT/2000/NetWare):* 5

*Default value (Unix):* 0

allow\_autoupgrade (boolean)

The agent will only attempt to download and install a new version of itself if this flag is set to true. See Chapter 4 for further explanation.

*Default value:* true

use\_psapi (boolean, Windows only)

Choose which way the SysOrb Agent retrieves the list of running processes. The default *false* uses the same way as the Windows Task Manager, and should work on all machines. However if you experience trouble with the process reporting, try switching this on.

**Warning:** Changing this option will change the name of some of the running processes, since the two different way, also uses different naming. So when changing this option, the agent must be rescanned and it should be made certain that all the process presence checks still work.

*Default value (NT/2000):* false

perf\_cnt\_level (string, Windows only)

This option changes the detail level of the performance counters reported to the SysOrb Server. There are four different levels: *Novice*, *Advanced*, *Expert* and *Wizard*. Changing this from the default of *Advanced* will change the number of performance counters that can be checked. The *Novice* level will return the lowest number of performance counters, and the *Wizard*-level will return the highest.



**Note:** After this option has been changed, the agent must be rescanned from the Web-interface in order for the new performance counters to show up.

*Default value (NT/2000):* Advanced

`max_data_retention_days` (integer)

If the agent is unable to contact the server, it will still generate monitoring data and save it. If the server is unavailable for a longer time, the agent can end up using large amounts of memory. Use this option to set how many days should pass without server connection before the agent starts discarding the monitoring data. Set to 0 or negative value to disable discarding of monitoring data.

*Default value:* 7

`custom_chk_conf` (filename)

If this option is set, the agent will try to read the custom check configuration file specified by the option. For information about the custom check file format, see Section 8.3.

*Default value:* (none)

`actions_conf` (filename)

If this option is set, the agent will try to read the custom AgentAction configuration file specified by the option. For information about the custom AgentAction file format, see Section 8.4.

*Default value:* (none)

`log_chk_conf` (filename)

If this option is set, the agent will try to read the log check configuration file specified by the option. For information about the log check file format, see Section 8.6.

*Default value:* (none)

## 8.2. Releasing keys to force registering at SysOrb server

If you for some reason would like an agent to check-in to another server than the one it already does, you have to release the authentication key for the agent. Both the server and the agent has the key, which is used for security purposes.

### 8.2.1. Releasing on agent

To release the agent key on a Unix-like system, you must delete you the variables file while the SysOrb agent daemon is stopped. The location of the variables file is configured in the `agent.conf` file on the host where the agent runs (usually `/var/sysorb/variables.agent`).

To release the key on a windows open the SysOrb configuration utility located in *Start menu->Programs->SysOrb->SysOrb configuration*. In the configuration tree choose *SysOrb agent->General->Release Key*. In the dialog on the right side of the configuration dialog click the *Release Key* button.

To release the agent key on a NetWare system, you must delete you the variables file while the SysOrb agent NLM is unloaded. The location of the variables file is configured in the `AGENT.CFG` file on the host where the agent runs (usually `\SYSORB\AGENT.VAR`).

## 8.2.2. Releasing on server

You can also release the key on the server to force the server and agent to make a new key.

To release the key on server, do the following in the SysOrb web interface:

- Click the **Configure** button in the navigation menu.
- Find the host you want to have release the key for in the configuration tree.
- Click edit on the edit link associated with the host.
- Select **Edit Node**.
- If the server and agent has negotiated a key you will be able to find a **Agent key** label. Click on the **Release key** on the right to release the key on the server. If the label is not present, it is because the server does not have a key for the host in question.

## 8.3. Configuration of custom checks

If the built-in checks of the SysOrb Agent does not suffice for you particular setup, you may write extension scripts that can perform the check.

You can write these scripts in any language you desire. The only requirement is that the script must deliver the result of the check to the SysOrb Agent in one of two ways.

- If the check is either good or bad, the script must tell the SysOrb agent by the exit code. A non-zero exit code indicates a bad result, while an exit code of zero indicates a good result. How exit with specific exit codes depends on the script language used.
- If the check can return a numeric value within some range, it must output that value decimally to standard output on a line like: "Result: 1234". Note that the colon must be present, and that the Agent is case sensitive. The SysOrb Agent will parse the output from the script, putting any line not conforming to the above format into the agent log file.

The custom checks that an Agent is able to execute is configured using a file on the machine running the SysOrb Agent. It may have been more convenient to be able to do it from the web interface, but that would open serious security risks, as any SysOrb user, with capabilities to configure checks, would be able to have the agent execute arbitrary shell commands.

In order to use custom checks you must first tell the SysOrb Agent where to find the custom check configuration file. On non-windows systems this is done by adding a line like

```
custom_chk_conf=/etc/sysorb/custom.conf
```

to the agent configuration file (usually located in `/etc/sysorb/agent.conf`). On Windows you must open the SysOrb Configuration utility located in *Start menu->Programs->SysOrb->SysOrb Configuration*. In the configuration tree choose *SysOrb Agent->Configuration files->Custom checks* and enter the path where you are going to put the new configuration file.

After changing this path, the Agent must be restarted, but wait until you have put something into the new file.

You must edit the new file `custom.conf` in order to configure which custom checks the agent can perform. The format of the file is most easily illustrated with a few examples of custom checks:

### Example 8-1. Good/bad check

```
# Comment lines begin with #
[check name]
command=/path/to/the/execfile parameters
```

```
timeout=10
```

The value between [ and ] gives the name of the check. `command` is the command sent to the shell, so normal shell expansion works. The `timeout` parameter is optional, and the default value is 10 seconds. Please note that the SysOrb Agent stops processing other tasks (ordinary checks and communication with the server) while a custom check is carried out, so `timeout` shouldn't be more than half of the checkin frequency for that agent.

#### Example 8-2. Numeric integer check

```
[check name]
type=integer
unit=kB
command=/path/to/the/execfile parameters
timeout=10
```

The line `type=integer` tells the SysOrb Agent, that this is a numeric integer check, that will output a line on the form `Result: 1234`, the `unit` property tells the agent, that the numeric output should be interpreted as a number of kilobytes. This information is passed along to the SysOrb Server, to allow putting units on the Y-axis in graphs and elsewhere.

#### Example 8-3. Numeric real check

```
[check name]
type=real
unit=s
command=/path/to/the/execfile parameters
timeout=10
```

The line `type=real` tells the SysOrb Agent, that this is a numeric check, that will output a line on the form `Result: 12.03`, the `unit` property tells the agent, that the numeric output should be interpreted as a number of kilobytes. This information is passed along to the SysOrb Server, to allow putting units on the Y-axis in graphs and elsewhere.

#### Example 8-4. Differential numeric integer check

```
[check name]
type=diff_integer
unit=kB/s
command=/path/to/the/execfile parameters
timeout=10
```

The line `type=diff_integer` tells the SysOrb Agent, that this script outputs an integer like a numeric integer check. For each pair of successive invocations, the SysOrb agent will subtract the two results, and divide the difference with the elapsed time. This is useful if your script for instance outputs the number of bytes which have passed through an interface since some fixed point in time, but you want the check to show the number of bytes per second passing through right now.

**Example 8-5. Differential numeric real check**

```
[check_name]
type=diff_integer
unit=kB/s
command=/path/to/the/execfile parameters
timeout=10
```

The line `type=diff_real` tells the SysOrb Agent, that this script outputs an real like a numeric real check. For each pair of successive invocations, the SysOrb agent will subtract the two results, and divide the difference with the elapsed time. This is useful if your script for instance outputs the number of bytes which have passed through an interface since some fixed point in time, but you want the check to show the number of bytes per second passing through right now.

Whenever you edit this file, you must push open a web interface and push **Rescan** on the **AgentChecks** tab on the **Configure** page for the host in question. You do not need to restart the SysOrb Agent, unless you have changed the location of this file.

Sometimes you do not write the script yourself, and there is no easy way of having it output its result on a line like `Result: 1234`. In that case you can instruct the SysOrb Agent to look for the result in lines containing other text. You do that by means of a POSIX regular expression. The syntax of regular expression can be found at: <http://www.opengroup.org/onlinepubs/007908799/xbd/re.html>

**Example 8-6. Script outputting `Response time: 1234 ms`**

```
[resp_time]
type=integer
command=measure-command
result_pattern=^Response time: ([:digit:]+) ms$
timeout=10
```

The `result_pattern` must contain exactly one set of parentheses enclosing the pattern matching the numerical result of the check.

**Example 8-7. Count the number of files in /tmp**

```
[temp_count]
type=integer
command=find /tmp -maxdepth 1 | wc -l
result_pattern=([:digit:]+)
timeout=10
```

This `result_pattern` will match any line containing numerical characters. The SysOrb Agent will then pick the first line containing numbers, and if there are more than one number on that line, the leftmost of them.

## 8.4. Configuration of AgentActions

Starting with SysOrb version 2.4, you can now define AgentActions, which is actions carried out on the Agent machine, when a user orders this through the Web Interface. These actions can help ease remote administration,

as they can be defined to carry out common tasks on machines. An AgentAction could as an example restart a webserver, or reboot the target machine.

In order to use AgentActions you will first have to configure the Agent to read the actions from a configuration file. The name of this file is specified through the `actions_conf` option in the agent configuration (see Section 8.1 for information about how this is done).

The fileformat for the AgentAction configuration file resembles the fileformat of the Custom Check configuration file very much. The format consists of a block as following for each action:

```
# Comment lines begin with #  
[action name]  
command=/path/to/the/execfile parameters
```

The action name between the [ and ] is the name displayed to the user of the Web Interface. The `command` parameter is the command which is executed. On Unix-like systems this command is passed to the shell, so normal shell syntax can be used.

As an example, the following configuration file will create an action that will restart IIS on a Windows 2000 Server installation.

#### Example 8-8. IIS restart AgentAction

```
# Restart IIS.  
[Restart IIS]  
command=iisreset
```

Once the AgentAction configuration file is in place, you must rescan the agent before the actions appear in the Web Interface. When they appear, they will be accessible from the Node overview page, and from the AgentCheck configuration pages.

## 8.5. Configuration of Automated Actions - Remedy

Introduced in SysOrb 4.0, remedy is a functionality that makes it possible for SysOrb to automatically carry out an agent action. A typical situation where remedy is used, could be to automatically restart a service if it stops.

To set up a remedy, the first thing to do is to set up a Agent actions, look in Section 8.4 if you want to know more about this topic.

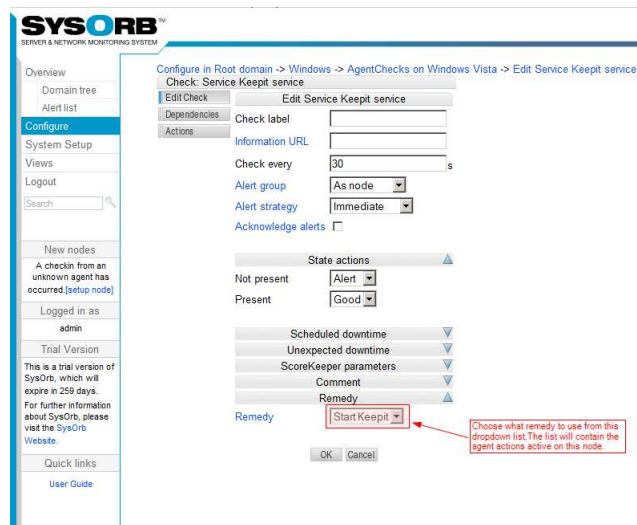
After this, configure the check, by choosing the action that you want to happen when the check goes into alert in the remedy dropdown. Once this is done, remedy should run as soon as the check goes into alert, triggering the action that have been selected.

Once an automatic action has been carried out by SysOrb, the remedy will be disabled for 30 minutes, which means, that if a second alert comes up, the check will go into alert state, and follow through as normal.

To come with an example: A server is monitoring a service, that HAS to run all the time. However, due to some issues on the server, the service will shut down every now and again, therefore a agent action that restarts the service have been set up. Remedy will make sure, that if the service only shuts down one time, it will automatically restart it with the agent action, however, if the service goes down a second time within 30 minutes (while remedy is disabled) it will go into alert. This is done to make sure that if the service goes down for good, and do not recover, SysOrb will tell you.

At the same time, when remedy is executed, there is automatically introduced a 5 minutes unexpected downtime for the whole node, this is done in order to avoid alarms from other checks which might arise because of the action being executed. A common situation could be: A web site starts running poorly. SysOrb remedy is set to re-starts IIS, if a site is responding above a certain limit. Restarting IIS causes all sites on the host to temporarily

malfunction, but we do not want to have alarms from all sites. If restarting the web server has solved the problem, everything will be back to normal when the node comes out of downtime. The incident log on the given node will tell you when SysOrb executed the remedy.



## 8.6. Configuration of LogChecks

The SysOrb Agent can scan logfiles on the host machine, and report any error messages or unexpected event to the SysOrb Server, providing a quick overview of all machines on your network.

The files that the Agent can monitor this way must be specified in a configuration file on the machine running the SysOrb Agent. This is a safety measure, guarding against a compromised SysOrb Server being able to retrieve a copy of any file on the hosts running SysOrb Agents.

The name of the file containing the definitions of the allowed LogChecks is given in the Agent configuration option `log_chk_conf` (see Chapter 8 for more information). It is usually called `log.conf`, a sample file allowing a few system log files to be scanned is included in the SysOrb Agent package.

The file contains a number of lines that each specifies a path that is to be searched for log files to monitor. This can be a specific file path, such as `C:\logs\error.log` or `/var/log/messages`. But it can also contain the following special wildcard characters. '?' can match any character. '\*' matches any character string of any length. '\*\*' matches any directory path. Thus, the path `C:\logs\log??\**\error.log` matches `C:\logs\log01\sub\dir\error.log` and `C:\logs\log02\sub\sub\dir\error.log`, but not `C:\logs\log002\sub\dir\error.log`.

You can also specify to scan for eventlogs by setting the path to `'eventlog:*'`. This will scan for all eventlogs available, but you can replace '\*' with a specific event log name.

Note that for these logs to actually be monitored, you will have to configure them on the SysOrb server, setting up how often the check should be performed, along with various other parameters. (See the *User's Guide* for information on how to activate LogChecks.)

### Example 8-9. LogCheck declaration file

```
/var/log/messages
/var/log/apache/virtual-domain-*/error.log
eventlog:*
```

This will allow the user to configure checks on the file `/var/log/message`, all virtual domain error logs in `/var/log/apache/virtual-domain-*/error.log` and all eventlogs.

## 8.7. Enabling IPMI hardware monitoring

The agent supports monitoring of hardware parameters such as *fan speeds, temperatures, voltages* etc. by means of the IPMI (Intelligent Platform Management Interface) standard on supported server and operating system combinations.

Hardware monitoring with IPMI is supported on these operating systems:

Windows Server systems prior to Windows 2003 R2

Intel provides an IPMI driver free of charge which can be used on these systems. The driver can be downloaded from the Intel driver download page. This driver is fully supported by the SysOrb Agent.

Windows Server 2003 R2 (and later)

Microsoft provides an IPMI driver as part of the operating system. It is not installed by default, but can be installed by following the instructions from the TechNet article "Enabling Hardware Management". This driver is fully supported by the SysOrb Agent.

Linux kernel 2.6 based systems

Most modern Linux distributions ship with Linux kernels from the 2.6 series, and include an OpenIPMI driver. This driver is fully supported by the SysOrb Agent.

Once the appropriate driver is installed, the SysOrb Agent can be re-scanned, and all IPMI sensors available on the given hardware provided by the operating system driver will appear in the web interface under "Agent Checks".

# Chapter 9. Grid configuration

## 9.1. Grid overview

The SysOrb Grid functionality allows for centralized secure monitoring of remote networks. A "satellite" can be installed on a remote network, and perform NetChecks, SNMPChecks and receive Agent Check-ins on that remote LAN. The satellite can securely deliver all locally gathered check results back to a "master", the single centralized SysOrb Server.

A grid will contain *one master*, and *one or more satellites*. These are collectively called "Stations" in the grid. It must be possible, network wise, for either the master to initiate a TCP connection to the satellite, or, for the satellite to initiate a TCP connection to the master. Therefore, it is actually possible to monitor multiple LANs sharing the *same IP ranges* (for example the 10.0.1.X series), as long as the satellites can connect to the master.

If the network connectivity between a satellite and the master fails, the satellite will continue to run all configured checks on its local network. It will hold all measurements gathered in its local database, until the network connectivity comes back up. The satellite does not hold measurement data locally for any longer than what is necessary - but since it does include the full featured database already used in the common SysOrb Server product, it can spool measurement data to disk efficiently for very long periods of time, if the network outage is prolonged.

The high levels of security in the grid networking layer, combined with the autonomy of the grid satellites, allows the use of satellites for running SNMPChecks and NetChecks on remote locations, securely on the LAN, and reporting back these results in a safe manner to a central SysOrb Server (a Grid Master). Even though a VPN could also be used to secure the otherwise inherently insecure SNMPChecks and NetChecks, a VPN would not allow for continued monitoring in case of network outages, and the VPN itself would incur a significant and unpredictable latency to the checks. In other words, the grid solution with satellites allow for consolidated monitoring scenarios that are not possible to achieve using other conventional technologies, as, for example, VPNs.

### 9.1.1. Grid IDs - the GID

As mentioned, the IP addresses of satellites need not be unique across your SysOrb installation, and therefore cannot be used to uniquely identify a satellite in the grid. When configuring NetChecks and SNMPChecks it is possible to specify which station should execute the check - in order to accommodate this, there must be some form of unique identification of every single station in the grid.

A "Grid ID" scheme has been developed for this purpose. Grid IDs, or GIDs, are unique numbers used to identify a station in the grid. A GID consists of four two-digit hexadecimal numbers; for example "0A:3D:42:F1".

In order to accommodate future grid interoperability between existing installations, it is highly desirable that all SysOrb installations use globally unique GIDs. This is not a requirement as such, and any installation is free to use whatever GIDs it wants to - but Evaluesco A/S *encourages* our users to use globally unique GIDs. In order to facilitate such a global numbering scheme, it is now possible for every customer to allocate a "GID Prefix" on the Evaluesco Web site. The prefix consists of the first three numbers of the four-number GID. This prefix is guaranteed to be globally unique. Once the GID prefix is acquired, the user can freely assign the last of the four numbers - this allows for a grid with 256 stations (using numbers from 00 to FF), which should be enough for most installations. If more stations are required in a grid, more prefixes can be allocated for that customer.

If a prefix of "02:FE:C7" is assigned to a customer, that customer can use, for example, "02:FE:C7:01" as the GID for the master station, "02:FE:C7:02" as the GID for the first satellite, and so forth...

### 9.1.2. Links

In order to receive configuration from the master, and in order to report results back to the master, the satellite must have some form of network connectivity to the master. In SysOrb Grid terminology, we call this connectivity a



"link". A link is a network connection between a single master and a single satellite.

Links can be initiated from the master, or from the satellite, or can be configured to be initiated from any of the two. A link will actually be constituted by a TCP connection from a random port on the initiator machine to the common port 3241 on the receiver machine. If you have configured your SysOrb Server to use a port other than the default 3241, you will of course need to adjust your link configurations accordingly.

The most common setup, is to configure the links so that it is the satellites (which are often on closed networks, often using the same 10.X.X.X IP address ranges) initiate the connection to the master (which is usually located on a public IP address). The connections initiated from the satellites can be NAT'ed out thru a firewall, for example.

### 9.1.3. Endpoint security

A grid will commonly consist of machines located far away from each other, with links going over common insecure Internet lines. The grid networking layer will ensure *authenticity*, *integrity* and *secrecy* of all communication within the grid. It is therefore not necessary to employ VPN solutions or private protected lines connecting the stations within the grid.

Every station in the grid will have its own RSA public and private key pair. This key pair is automatically generated when a station is first set up, and it can be viewed in the web interface (under "System Setup" and "This Station"). The RSA key pair will by default be 1024 bits, but this can be configured freely between 512 bits and 8192 bits.

The first time two stations establish a link between them, they will exchange their public keys. This communication *cannot* be authenticated, as the stations share no secrets prior to this exchange. A "man-in-the-middle" attack is thus possible during this initial exchange. It is therefore advised that one verifies that the public key received from a remote station is in fact the correct public key, by comparing the remote station key (found in the web interface under "System Setup" and "Stations", selecting the given remote station) as received on the local station, with the actual station key of the remote station (found as described above, on the remote stations web interface, under "This Station").

Once it is established that the public keys have been correctly exchanged during this very first connection of the stations, security will be maintained in all future communication.

Based on the RSA keys exchanged, the stations will negotiate a symmetric key for all following communication. This symmetric key establishment is referred to as "Endpoint Security" - it is the guarantee for authenticity, integrity and secrecy of all communication between the pair of stations. Per default, the endpoint security will consist of a shared 256 bit AES key. It is possible to configure stations to use 128 or 192 bit keys instead.

## 9.2. Configuring the Master

Your grid master will be the station on which all day-to-day operations happen. It is the station that will send out alerts, and it is the station that will store all historical data for every check running on the grid. Except for the initial satellite setup, all configuration of every monitored node in your grid will also be done via. the web interface on the grid master.

### 9.2.1. Installation and licensing

The grid master functionality is included in the standard SysOrb Server. Therefore, installing a grid master is simply the installation of a normal SysOrb Server, as described earlier in this manual.

The grid master functionality is enabled in the server with a special license file. Trial licenses are offered specially, and full licenses can be purchased just like the non-grid licenses. Please contact your sales representative or Evaluesco A/S for details.

### 9.2.2. Configuring the master station

In the web interface, under "System Setup", enter the "This Station" page. Here you can specify a descriptive name for the station (the master), and you can enter the unique GID. Please use your allocated GID prefix, and pick the last number in the GID as you wish (as long as it is unique within your installation).

Once a descriptive name and the proper GID is entered, the station as such is configured to participate in your grid. The cryptographic keys on the configuration page will be blank initially, but once you have configured the station, the system will begin to generate a proper RSA key pair. After a few minutes (depending on the speed of the system), you should be able to see the signature and encryption keys listed in the web interface.

### 9.2.3. Adding a satellite to the master's configuration

The master must now be made aware of a satellite. We have not yet configured the satellite itself, but we can still let the master know that one is going to exist in the future.

Under "System Setup", please select the "Stations" page. This is for configuring all remote stations, as seen from this local station. Select "Add station" to add a satellite.

The "name" field cannot be filled out, as the name of the remote station will be fetched automatically once the master and the satellite establish their connection. The GID field, however, must be filled out. This field must contain the GID of the station you will be adding. Again, please make sure that you select a unique GID for your station, preferably using your allocated GID prefix.

### 9.2.4. Configuring the link between the master and the satellite

In order to facilitate communication between the master and the server, we must now let the master know how it can contact, or how it can be contacted by, the satellite. This is done under "System Configuration" and the "Links" page.

Select "Add Link" to define a link between the master and the satellite. You can enter a descriptive name for this link. You must now select whether the master may accept incoming connections from the remote station over this link, and whether the master may attempt to initiate connections to the remote station over the link.

For masters, it is most common to specify that they are allowed to accept incoming connections. Masters will often not be able to connect directly to the remote satellites, as these will often be NAT'ed away behind firewalls on remote networks. If, however, your master must attempt to establish the connection to the satellite, you must specify a destination IP address (and optionally a port number if your satellite deviates from the default configuration of using port 3241).

Now, that we have configured the master, made the master aware of the satellite, and configured the master's connectivity to the satellite, all of the grid specific communication is actually complete. We can now go ahead and actually configure the satellite station that we have just made the master aware of.

### 9.2.5. Exporting domains to the satellite

Information can be exported to the master, on a domain-tree basis. For each domain, one can specify a list of GIDs that are allowed to "mount" said domain. A common scenario is to create a domain for each remote satellite location, and specify the corresponding satellite GID in the allowed export list for the given domain.

Please create a domain for your remote satellite location (under "Configure", select "Add domain", and add a new domain as usual). For the rest of this example, let us assume the domain is called "remote" and that it is located right under the root domain. Please be sure to specify the GID of the satellite in the export list for the domain.

The satellite will now be allowed to retrieve all node and check configurations from the domain and from all domains under this domain. The satellite will still have to be configured to actually "pull" this information from the

master, but specifying the GID of the satellite in the export list of the domain is a prerequisite to actually allowing the export of information to the given satellite.

## 9.3. Configuring the Satellite

Configuring the satellite is very similar to configuring the master. You must perform a number of steps here using the web interface on the satellite system. However, there will be no use for the web interface once the satellite is configured. It would therefore be wise to un-install or disable the web interface on the satellite once the configuration is done. Please also note that the satellite will have its own administrator user, with the default "admin" login name and default password. *The password on this account should be changed to prevent others from reconfiguring the satellite station!*

### 9.3.1. Installation and licensing

Grid Satellite functionality is also included in the standard SysOrb Server packages. The satellite functionality is enabled, like in the case of the master, with a special license file.

### 9.3.2. Configuring the satellite station

Like we configured the master for its participation in the grid, with a descriptive name and a unique GID, we must now configure the satellite with its parameters for grid operation.

In the web interface, under "System Setup", enter the "This Station" page. Here you can specify a descriptive name for the station (the satellite), and you can enter the unique GID. Please make sure that you use the same GID as you did when you configured this satellite previously on the master station.

### 9.3.3. Adding the master to the satellite's configuration

As we told the master about this satellite, we must also tell this satellite about the existence of the master. Under "System Setup", please select the "Stations" page. Select "Add station" to add the master.

The GID field must contain the GID of the station you are adding - this should be the GID of the master station.

### 9.3.4. Configuring the link between the satellite and the master

We have already specified on the master, how communication should commence between the satellite and the master. We must now tell the satellite how this happens as well - keeping in mind that from the satellites point of view, this will be a "reversed" configuration compared to the master. For example, if the master must only accept connections and never initiate, the satellite must be told to initiate and never accept. Like on the master, the link configuration is performed under "System Configuration" and the "Links" page.

Select "Add Link" to define a link between the satellite and the master. You can enter a descriptive name for this link. Now, enter the "reversed" configuration of what was done on the master side. Assuming the master was configured to accept and never initiate connections, you must now specify the opposite for the satellites link configuration, and you must supply an IP address for the satellite to connect to.

The satellite will expect, that when it connects to the IP address that you specify, it will find a station with the GID that you specify for this link. Please be sure that the satellite is actually allowed to initiate a TCP connection to the given port on the given IP address, and that this actually is the proper IP address of your master station.

### 9.3.5. Mounting domains from the master

Earlier, a domain called "remote" was created on the master station, and the GID of this satellite was added to the domain export list. We can now tell the satellite to actually mount this domain - to retrieve all configuration information under the domain, store it in the local database, and to perform any checks that might be configured on nodes under that domain.

Under "Configure", select "Add Mountpoint". Now select the GID of the master to import information from. Also specify a descriptive name for the mount - this name does not have to be the same as the name of the domain on the master. Finally, you must specify the actual domain, as named on the master, to mount. Using the example "remote" domain, you can specify ".remote" in this field, to state that you wish to import the domain named "remote" located directly under the root domain on the master.

Domains are separated with dots. If, for example, the satellite should mount a domain called "foo", under the domain "bar", under the root domain, the path would be ".bar.foo".

As soon as the satellite and the master establish their link and negotiate their end-point security, the satellite will attempt to retrieve all configuration information for the configured mountpoint. All of this is happening as background operations, and you will not actually have to wait for any of these operations to complete. You can follow the progress of the link establishment, the security negotiations, and the actual database synchronization happening in the mount process, by using the logs under the "Stations" and "Links" pages under "System Setup" on both the satellite and the master stations.

This concludes all "system level" configuration of your master and satellite setup. All remaining configuration will be done via. the web interface on the master system exclusively. The satellite will be notified by the master of any configuration changes, and will automatically start performing any checks that are configured to be run on the satellite.

## 9.4. Getting started with remote monitoring

You can specify, either on a check-by-check basis, per node, or per domain, from which grid GID SNMPChecks and NetChecks should be performed. In order to get started with your satellite quickly, we suggest that you enter the configuration page for the exported domain, using the web interface on your master station, and specify that all checks should be performed on the GID of the satellite. Enter "Configure" and "Edit" for the exported domain, in order to do this.

Now, you can run an "Auto discovery" under the exported domain. This will start an auto-discovery process on the remote satellite, and the satellite will then configure any nodes that it discover on the remote network. These nodes will appear as they are found, in the web interface on the master.

From here on, you can add new checks, re-configure the ones already set up, add or delete nodes, etc. etc. All reconfiguration that you perform via. the web interface on the master, will be propagated to the relevant remote satellites. The satellites will report back check results to the master, where you can access the graphs and where alerts can be generated. In fact, as soon as the grid is configured, the day to day administration is very similar to the common setup with only one SysOrb Server, except that you now have the ability to run NetChecks and SNMPChecks efficiently and securely on remote locations.

# Chapter 10. SysOrb Server maintenance

## 10.1. Adding MIB files

In order to monitor nodes using snmpChecks the SysOrb server must know about the name, measuring scale etc. of the parameters to be monitored. These informations is stored in MIB (Management Information Base) files.

SysOrb comes with a number of MIB's pre-installed. These MIB's cover standard parameters such as traffic statistics for routers and switches, and some common printer parameters. You should be able to set up basic monitoring of almost any SNMP enabled router, switch or printer without adding other MIB files.

Should you, however, wish to monitor vendor-specific parameters on your network equipment, you will need to add the relevant MIB files to the ones already in SysOrb. This is done while the SysOrb server is running and operational.

To add a MIB file named `xyz.mib` to a running SysOrb server, execute the command **sysorb-mibparser -l admin xyz.mib**, assuming a SysOrb user named admin exists in the root domain, and has appropriate privileges. The `sysorb-mibparser` utility will then extract the information from the MIB file and insert them into the running SysOrb database. Afterwards SysOrb does not need the file `xyz.mib` any more.

After adding the needed MIB files, you must perform a SNMP scan (again) of the nodes supporting any of the newly added parameters. You do that through the SysOrb web interface by clicking configure, browsing to find the node, clicking snmpChecks and finally clicking on the rescan button at the bottom of the page.

The full syntax of `sysorb-mibparser` is:

```
sysorb-mibparser [-h] [-s server] [-p port] -l login [-P password] mib-file..
```

### **-s server**

Instructs the utility which SysOrb server to connect to. Defaults to the local machine.

### **-p port**

If you SysOrb server uses a non-default port, use this switch.

### **-l login**

You must give the name of a SysOrb user from the root domain having appropriate privileges.

### **-P password**

You may specify a password on the command line to avoid having to type it afterwards, this is especially useful in scripts. However, you should mind the security implications of leaving a plaintext password in a script file.

### **-h**

Show a help message explaining the command line and switches.

## 10.2. Custom NetChecks

In some cases the NetCheck capabilities of the SysOrb Server is not good enough to satisfy a specific need. In these cases a Custom NetCheck can be created.

A Custom NetCheck functions the same way as a normal NetCheck. That is, the result from a Custom NetCheck is the amount of time it took to perform the check. They can of course be used for other purposes, but a Custom NetCheck always returns a number as its result.

This number must be an integer, and represents the number of milliseconds it took to perform the check, and must be written to output by the Custom NetCheck, in order for SysOrb to find it. The format of the line containing this number, can be specified for each check.

If SysOrb did not locate this line in the output from the Custom NetCheck before it exits, the check is marked as giving no reply. If the check does not write the line, in ten seconds, plus the upper limit for the check, the check will be marked as timed out.

The Custom NetCheck is executed as stated in the configuration, with the name of the node to perform the check on, given as the first parameter.

### 10.2.1. Configuring Custom NetChecks

In order to use Custom NetChecks, you must first tell the SysOrb Server where to find the Custom NetCheck configuration file. On non-windows systems this is done by adding a line like

```
custom_netcheck_conf = "/etc/sysorb/custom_netcheck.conf"
```

to the SysOrb Server configuration file (usually located in `/etc/sysorb/server.conf`). On Windows you must open the SysOrb Configuration utility located in *Start menu->Programs->SysOrb->SysOrb configuration*. In the configuration tree choose *SysOrb Server->NetCheck Manager->Custom NetChecks*, and enter the path where you are going to put the new configuration file.

The format of the Custom NetCheck configuration file is easily illustrated by a simple example:

#### Example 10-1. Custom NetCheck

```
# Comment lines start with a #
[NetCheck Name]
command=command to execute
result_pattern=([[:digit:]]+)
```

The value enclosed in [ and ] are the name of the Custom NetCheck, as it will be displayed in the Web-interface. The `command`, is the command to execute, in order to perform the check. The `result_pattern` is a regular expression, that tells SysOrb how to retrieve the result from the check. See Section 8.3 for more information about regular expressions.

Once the Custom NetCheck has been configured, the SysOrb Server must be restarted, in order for it to discover the new checks.

## 10.3. Custom AlertPaths

In addition to the built-in ways, that the SysOrb server can alert its users (Email, SMS, paging), you can also have SysOrb execute a script of your choice. This could be used to send SMS through a gateway of your provider, to put events into your help-desk system, to send an instant message, or whatever you can do through any command line utility.

The SysOrb server passes information about the alert to be sent exclusively through environment variables. Before instructing SysOrb to invoke the script, you probably want to debug it by running it on the command line with the environment variables manually set. You will find a list with descriptions of each of the variables at the end of this section.

In order to be able to set up the script to be invoked by SysOrb, you must have a running SysOrb server. Log into the web interface using an administrator account, and click the **System Setup** button. Then select **Custom Alerts** and click **New type of Custom AlertPath**. All you have to supply is a name of your choice for this type of custom alerts, and the command for running the script.

After registering the script with SysOrb. You can select any user, click **Edit**, and then you should see a new option called **Add custom path**. Try creating a path, and testing it by clicking **Test** next to the new path on the list.

### 10.3.1. Script environment

Here is the list of the environment variables passed to the custom alert script.

#### SO\_TYPE

This variable contains one of the following values:

`warning` The script should send a warning

`alert` The script should send an alert

`test` The script should test the alert path

`scheduled_downtime` The script should send a message, stating that the check is entering unexpected downtime.

#### SO\_USER\_NAME

The name of the user to receive this alert.

#### SO\_USER\_DOMAIN

The dot separated name of the domain to which the user belongs.

#### SO\_DESTINATION

The alert path destination, as entered in the web interface, when the user created his AlertPath, that is using this script. If your script sends SMS'es through some in-house gateway, then you probably want the destination field to contain the phone number of the phone. Other scripts may require other information in the destination field, some may not need it at all.

#### SO\_NODE\_LABEL

The full name of the Node in question, as shown on the overview pages.

#### SO\_NODE\_DNS

The text from the `dns-name/ip-address` field of the node in question.

#### SO\_CHECK\_TYPE

This variable contains one of the following values:

`checkin` This alert is due to late checkin of the Node, and the rest of the `SO_CHECK_...` variables are not set, as this m

`netchecks` This alert is due to a NetCheck.

`agentchecks` This alert is due to an AgentCheck.

`snmpchecks` This alert is due to a snmpCheck.

#### SO\_CHECK\_ACCUMULATION

Depending on whether this check is an accumulation or not, this variable will contain `yes` or `no`

#### SO\_CHECK\_LABEL

A descriptive name of the check in question.

#### SO\_CHECK\_NAME

A dot separated string, which identifies the Check relative to its Node. This is not suitable for inclusion in text presented to the user, use `SO_CHECK_LABEL` for that. Instead this is mostly useful for conditions in the



script, if you for instance want to treat all ICMP checks different than other NetChecks.

#### SO\_CHECK\_URL

A http url linking to the SysOrb web interface page for this check.

#### SO\_CHECK\_INFO\_URL

An optional http url given by the SysOrb user with additional information about this check.

#### SO\_RESULT\_STR

The last measured value from the check, printed in human readable format, e.g. 2.34 MB.

#### SO\_RESULT\_UNIT

The unit of the measurement of this check, e.g. B (bytes).

#### SO\_RESULT\_VALUE

The last measured value from the check, measured in units given by SO\_RESULT\_UNIT, e.g. 2453666.00

#### SO\_ALERT\_IF\_ABOVE, WARN\_IF\_ABOVE, WARN\_IF\_BELOW, ALERT\_IF\_BELOW

The warn/alert limits, measured in units given by SO\_RESULT\_UNIT. If any of the limits are disabled, the corresponding variable will be unset.

## 10.4. Creating a new database

One can re-create a clean SysOrb database using the **sysorb-createdb** tool. This is required if one wishes to change the database block sizes, or if one wishes to run the database on raw disk devices (or partitions) rather than on a file system (on operating systems where this functionality is available).

The database creation tool will create two or three files, depending on chosen options. The files are:

`main.odb`:

The meta database.

`main.odbj`: (optional)

External journal for `main.odb`.

`main.tsdb`:

The time series database

The tool accepts a number of command line options, described below:

`-h`:

Print a short help message summarizing usage.

`-i`:

Start the tool in "interactive" mode - this will allow for a more fine grained control over the created database. It is not usually necessary to tweak these settings, and setting them wrong can result in a non-functional database. Use this option with care.



**-d path:**

Specify a path in where the database files will be created. The default is to create the files in the current working directory.

**-c:**

Create a completely empty database. This option is not useful in end-user scenarios, as the database will not include the default administrative user, and thus it will not be possible to log into a server started with the empty database.

**-f**

Force - no questions will be asked by the tool.

A number of advanced settings can be specified in the "interactive" mode of the **createdb** tool. When using the tool in the standard non-interactive mode, good defaults are chosen. It should not usually be necessary for an administrator to specify these options manually, but there are certain situations where such flexibility is useful.

Most notably, when creating a database on "raw" devices (partitions or volumes, rather than in files on a file system), it is necessary to use the interactive mode in order to specify the individual device locations (as the database needs two or three locations, and if volumes or partitions are used, two or three distinct locations must be specified).

In interactive mode, the user will be prompted for each of the advanced settings in turn:

- *Journal type:* The meta database can use either an internal or an external journal. An external journal allows the administrator to place the journal on a smaller but faster storage device.
- *Journal size:* A too small journal will, sooner or later, cause the SysOrb Server to perform an emergency shut-down. It is absolutely vital, that the journal is not chosen too small. The default journal size is 8 Megabytes, which is sufficient. If the journal can be placed on a very fast storage device, it may be beneficial to raise the journal size somewhat. It is not possible to give hard numbers for this though - a busy metadatabase with the journal on a fast storage device, may see speed improvements from a 16 Megabyte journal. It is generally recommended to just go with the default size of 8 Megabytes though.
- *Number of chains:* The time series database relies on "phase chains" rather than a journal to guarantee consistency over unexpected system shutdowns. A number of chains is allocated - the database needs at least one chain as the "consistent" chain, and one as the "active" chain. Thus, the number of chains can not be set lower than two. Setting the number of chains higher does in theory not improve reliability - it does however give the operating system and hardware some amount of "slack" - the default is three chains.
- *Block size:* A uniform block size is used in both the time series database and the meta database. Meta data objects cannot span blocks in the database, therefore the block size must be large enough for the largest possible object. It is not recommended to set the block size lower than 4 kilobytes, although a minimum of 1 kilobyte is possible using the **createdb** tool. Both databases use 32-bit block indexing, and are therefore limited in size to approximately four billion blocks. A block size of 8 kilobytes thus results in a maximum database size (for each of the metadata and time series databases) of 32 terabytes. Increasing the block size further will raise this limit. The default block size is 8 kilobytes.
- *Estimated number of checks:* As a convenience, the **createdb** tool can - upon database creation - allocate space in the time series database for some given number of checks. This is only an initial allocation, and the database will be grown later as needed. The default of 1000 checks will result in a database of approximately one gigabyte in size. For small installations, use a smaller number. Again, the database will be grown as needed, anyone can put "10" here - which will make the **creatdb** run significantly faster.

The following will create a standard database with the default "admin" (password: "admtest") login in the directory /mnt/database/:

**sysorb-createdb -d /mnt/database -f**

The following will create a completely empty database:

**sysorb-createdb -d /mnt/database -f -c**

# Chapter 11. SysOrb Import and Export tools

The SysOrb importing and exporting tools, called `sysorb-importer` and `sysorb-exporter` is provided to allow the user to import and export parts of the database. This could be either for importing in another system, or in order to create nodes/checks in SysOrb, from the commandline.

## 11.1. `sysorb-exporter`

The `sysorb-exporter` can be used to export a part of the SysOrb database to XML. Once the data is exported to XML, it can easily be manipulated and imported into SysOrb again, or it can be imported into other programs.

The syntax of the `sysorb-exporter` tool is:

```
sysorb-exporter [-h] [-s server] [-p port] [-d domain] -l login [-P password] [-f filename] [-e domain] [-i classes] [-I classes]
```

### **-h**

Displays a text on how to use the tool

### **-s server**

Instructs the utility which SysOrb server to connect to. Defaults to the local machine.

### **-p port**

If you SysOrb server uses a non-default port, use this switch.

### **-d domain**

Specifies the domain in which the user that is used for the login is placed.

### **-l login**

The login name of the user.

### **-P password**

The password for the login.

### **-f filename**

This option specifies the output file. If not specified standard out will be used.

### **-e domain**

The domain to export. I.e. if the users login is in the root domain, and the domain that should be exported is further in the tree, this option is useful.

### **-i classes**

Ignores the listed classes in the export. This is a comma-separated list, that allows to stop the export at a specific level, e.g. at the node level.

### **-I classes**

Include only the listed classes. This is a comma-separated list, that allows you to restrict the scope of the export operation. E.g. **-I Domain,Node** will cause only domains and the nodes to be exported, not any of the checks or other sub-objects of either nodes or domains. Appending a + to a class name will cause all sub-objects to

be included, e.g. **-I Domain,Node+** will cause all nodes with checks and other settings to be exported, while still excluding users and other objects present in domains.

## 11.2. sysorb-importer

The `sysorb-importer` can import XML-data exported from the `sysorb-exporter`, or XML-data generated by scripts or programs, as long as they use the same format as the `sysorb-exporter`.

The syntax of the tool is:

```
sysorb-importer [-h] [-s server] [-p port] [-d domain] -l login [-P password] [-f filename] [-m]
```

### **-h**

Displays a text on how to use the tool

### **-s server**

Instructs the utility which SysOrb server to connect to. Defaults to the local machine.

### **-p port**

If you SysOrb server uses a non-default port, use this switch.

### **-d domain**

Specifies the domain in which the user that is used for the login is placed.

### **-l login**

The login name of the user.

### **-P password**

The password for the login.

### **-f filename**

This option specifies the output file. If not specified standard out will be used.

### **-i domain**

The domain to import into. I.e. if the users login is in the root domain, and the domain that should be imported into is further down the tree, this option is useful.

### **-m**

When this option is specified, the `sysorb-importer` does not remove the outmost domain in the XML file, which is done otherwise.

## 11.3. Examples of how to use

In the following we will demonstrate how the importer and exporter can be used to automate the creation of nodes in SysOrb. These concepts can easily be expanded to allow automatic creation of other objects in SysOrb.

In this example we will assume that there exists a domain in the root-domain called `Test`, and in that domain a node called `template` is placed.

In order to export the contents of the Test domain, the command in the first line of the following example is used. The program will respond with something like the following lines.

#### Example 11-1. Exporting contents of the Test domain

```
$ sysorb-exporter -l admin -P admtest -e Test -i CheckGroup -f template.xml
Exporting database
Exporting domain Test.
Exporting statistical data (1.3266410235). Please wait.
```

Done

The `-i CheckGroup` is included in order to keep the exporter-tool from exporting the Checks configured on the node.

The above command will export a file called `template.xml` which will contain the following (note that there will be some differences between different exports):

#### Example 11-2. Contents of the exported file

```
<?xml version="1.0"?>
<Meta version="1.0" description="SysOrb exported database" timestamp="2004-04-13-T15:52:38">
</Meta><Object id="1.3266410236" type="Domain">
  <Property type="Enumeration(14)" name="downNotify" value="1"/>
  <Property type="String" name="label" value=""/>
  <Property type="String" name="name" value="Test"/>
  <Property type="Computed String" name="siblingName" value="Test"/>
<Object id="1.3266410235" type="Node">
  <Property type="Boolean" name="acknowledgeAlerts" value="false"/>
  <Property type="Integer" name="alert" value="1000"/>
  <Property type="Integer" name="alertCeiling" value="1100"/>
  <Property type="Enumeration(12)" name="alertStrategy" value="1"/>
  <Property type="Unsigned Integer" name="checkinFrequency" value="30"/>
  <Property type="Integer" name="checkinScore" value="-5"/>
  <Property type="Enumeration(14)" name="downNotify" value="1"/>
  <Property type="String" name="label" value=""/>
  <Property type="Integer" name="missedCheckinScore" value="10"/>
  <Property type="String" name="name" value="template"/>
  <Property type="ObjectSet" name="nodeClasses" value=""/>
  <Property type="Computed String" name="siblingName" value="template"/>
  <Property type="String" name="snmpCommunity" value="public"/>
  <Property type="Enumeration(20)" name="snmpVersion" value="0"/>
  <Property type="Integer" name="warn" value="200"/>
  <Property type="Integer" name="warnCeiling" value="300"/>
</Object>
</Object>
```

Before this file can be used to create new nodes in SysOrb, the name of the node must be changed. This is the property called `name`. Just change the value to something other than `template`. The following example shows the modified file, which can be used to create a node called `New Node`.

**Example 11-3. Modified XML file, ready for import**

```

<?xml version="1.0"?>
<Meta version="1.0" description="SysOrb exported database" timestamp="2004-04-13-T15:52:38">
</Meta><Object id="1.3266410236" type="Domain">
  <Property type="Enumeration(14)" name="downNotify" value="1"/>
  <Property type="String" name="label" value=""/>
  <Property type="String" name="name" value="Test"/>
  <Property type="Computed String" name="siblingName" value="Test"/>
  <Object id="1.3266410235" type="Node">
    <Property type="Boolean" name="acknowledgeAlerts" value="false"/>
    <Property type="Integer" name="alert" value="1000"/>
    <Property type="Integer" name="alertCeiling" value="1100"/>
    <Property type="Enumeration(12)" name="alertStrategy" value="1"/>
    <Property type="Unsigned Integer" name="checkinFrequency" value="30"/>
    <Property type="Integer" name="checkinScore" value="-5"/>
    <Property type="Enumeration(14)" name="downNotify" value="1"/>
    <Property type="String" name="label" value=""/>
    <Property type="Integer" name="missedCheckinScore" value="10"/>
    <Property type="String" name="name" value="New Node"/>
    <Property type="ObjectSet" name="nodeClasses" value=""/>
    <Property type="Computed String" name="siblingName" value="template"/>
    <Property type="String" name="snmpCommunity" value="public"/>
    <Property type="Enumeration(20)" name="snmpVersion" value="0"/>
    <Property type="Integer" name="warn" value="200"/>
    <Property type="Integer" name="warnCeiling" value="300"/>
  </Object>
</Object>

```

Using the modified file it is possible to create a node called `New Node` in any domain on the SysOrb Server. To create the node in the domain called `New Domain` (must be created before the command is executed), use the following command:

**Example 11-4. Creating a node using `sysorb-importer`**

```

$ sysorb-importer -l admin -P admtest -i "New Domain" -f template.xml
Importing database into domain 1.1004032985 and replacing it.
Importing configuration.. Done

```

It is possible to expand on this to create domains, checks etc. from the command line. It is also possible to export the statistical data gathered by SysOrb if it must be processed by some other tool. However in this case `sysorb-tool` is a better solution, which is described in the next chapter.

# Chapter 12. SysOrb Tool

The SysOrb Tool is provided in order to access the SysOrb database using a command line tool.

The syntax of the tool is:

```
sysorb-tool [-h] [-s server] [-p port] [-d domain] -l login [-P password] [-f filename] command  
[command-options] path | -i id
```

## **-h**

Displays a text on how to use the tool

## **-s server**

Instructs the utility which SysOrb server to connect to. Defaults to the local machine.

## **-p port**

If you SysOrb server uses a non-default port, use this switch.

## **-d domain**

Specifies the domain in which the user that is used for the login is placed.

## **-l login**

The login name of the user.

## **-P password**

The password for the login.

## **-f file**

This option specifies the input or output file. If not specified standard in or out will be used, according to the command used.

The **command** argument determines the output of the program. Currently there are seven different commands available:

### select

The **select** command is used for extracting statistical information about a check or the incident log from a node, and output it to a CSV file. It is possible to specify the time interval that should be exported. In this case the path argument is a path to a check.

### insert

The **insert** command allows the user to insert data into a check. The data is read from an CSV file, in the same format used by the **select** command.

### listdomains

**listdomains** is used to extract a list of domains. Which domains are listed are determined by the path, which must point to a domain. The command then lists all subdomains in this domains. This can also be done recursively, so the subdomains of the subdomains also are listed.

### listnodes

**listnodes** will list the nodes located under the domain, specified by the path.

#### listchecks

**listchecks** will, if given a node as parameter, list all the checks on this node. If given a domain, all the checks on the nodes in the domain will be listed.

#### listproperties

**listproperties** will list all the properties of the object identified by the path. This can be both Domains, Nodes and Checks.

#### update

**update** will update the value of one or more properties in the object identified by the path.

The path is a string identifying either a domain, a node or a check. If the path identifies a domain, the path only consists of one item. This is a '.' separated list of the domain names, leading to the domain. So a path to the 'Routers' domain located in the 'Backbone' domain would be 'Backbone.Routers'.

If the path identifies a node, it will consist of two parts separated by a ',' . The first path will identify the domain in which the node is located, in the same way as specifying a path to a domain. The second part is the node's name (not label) in SysOrb. I.e. a path to the node 'mainrouter' in the 'Routers' subdomain would be 'Backbone.Routers,mainrouter'.

A third part is added when the path identifies a check. This part identifies the check for the SysOrb Server. However constructing this part by hand is not easy, so the listchecks command should be used in order to obtain this part of the path.

Instead of a path, the **-i** switch can be used. This switch allows you to give an ID to the domain/node/check instead of the path. The id's can be retrieved by the list commands.

## 12.1. The select command

```
select [-t timeformat | -u] [-b starttime] [-e endtime]
```

The **select** command allows you to extract statistical information about a specific check, or the incident log from a node, into a CSV (Comma Separated Value) file.

#### **-t timeformat**

Using this switch allows you to change the format of the time, when written to the CSV file. How to do this is documented in Section 12.1.1.

#### **-u**

Using this switch will format the time as seconds passed since '1970-01-01 00:00:00 GMT'. Note that only one of the **-u** and **-t** switches can be used at a time.

#### **-b starttime**

The earliest point in time, for which data should be extracted. This should be specified as either as the number of seconds passed since '1970-01-01 00:00:00 GMT', or as ISO time (YYYY-MM-DD-Thh:mm:ss). If **-b** is not given, the extraction will include the first data record, present in SysOrb.

#### **-e endtime**

The latest point in time, for which data should be extracted. The format of *endtime* is the same as for *starttime* for the **-b** switch.

### 12.1.1. How to specify the *timeformat*

If you have specific requirements as to how the time stamps should be formatted, the **-t** option allows you to customize the output.

The *timeformat* is a string, in which some special character sequences will be replaced with specific parts of the date.

The following sequences are supported (note that the specific output of some of these sequences will depend on the language and region setting of the node where sysorb-tool is executed):

%a

The abbreviated weekday name for the date.

%A

The un-abbreviated weekday name.

%b

The abbreviated month name for the date.

%B

The full month name.

%c

The preferred date and time format, according to the language and region settings of the machine.

%d

The day of the month. (01-31).

%H

The hour on a 24-hour clock, as a number (00-23).

%I

The hour on a 12-hour clock, as a number (01-12).

%j

The day of the year as a number (001-366).

%m

The month as a number (01-12).

%M

The minute as a number (00-59).

%p

AM/PM for 12-hour clocks.

%S

The seconds as a number (00-61). The number of seconds can reach 61, in order to account for leap-seconds.

%U

The week number of the year (00-53). This will start the numbering with the first sunday as the first day of week 01.



`%w`

The weekday as a number (0-6). Sunday is 0.

`%W`

The week number of the year (00-53). This will start the numbering with the first monday as the first day of week 01.

`%x`

The preferred date format, according to the language and region settings of the machine.

`%X`

The preferred time format, according to the language and region settings of the machine.

`%y`

The year without the century as a number (00-99).

`%Y`

The year with the century as a number

`%%`

A `'%'` will be output.

## 12.2. The insert command

### **insert**

The **insert** command reads a CSV file, and imports the data from that file, into a specific check in the SysOrb database.

The command takes no options, and it expects the timeformat of the CSV file to be either the default format outputted from **select**, or the format obtained when **-u** is used. The command will automatically determine which of the formats are used for the CSV file.

## 12.3. The listdomains command

**listdomains** [-o N|i|p|d ] [-r]

The **listdomains** command will list the sub-domains of the specified domain.

**-o** *N|i|p|d*

This switch controls the produced output. Each of the letters will make the command output a different property of the domains being listed. The order of the letters determines the order of the output. The letters have the following meanings:

**N**

Will display the human readable name for the domain.

- i  
Will display the ID of the domains.
- p or d  
Will display the path to the domains, usable as a parameter for the **listnodes** or **listdomains** commands.
- r**  
If this switch is given, not only direct subdomains will be listed, but also subdomains of the subdomains.

## 12.4. The listnodes command

**listnodes** [-o N|i|p|d|n ] [-r]

The **listnodes** command will list the nodes of the specified domain.

**-o N|i|p|d|n**

This switch controls the produced output. Each of the letters will make the command output a different property of the nodes being listed. The order of the letters determine the order of the output. The letters have the following meanings:

N

Will display the human readable name for the node.

i

Will display the ID of the node.

P

Will display the full path to the node, usable as a parameter for the **listchecks** command.

d

Will display the path to the domain in which the node is located.

n

Will display the path to the node, without the domain path.

**-r**

If this switch is given, not only nodes placed directly in the selected domain will be listed, but also nodes in the subdomains.

## 12.5. The listchecks command

**listchecks** [-o N|i|p|d|n|c ] [-r]

The **listchecks** command will list the checks of the specified node or domain.

**-o** *N|i/p/d/n/c*

This switch controls the produced output. Each of the letters will make the command output a different property of the checks being listed. The order of the letters determines the order of the output. The letters have the following meanings:

**N**

Will display the human readable name for the check.

**i**

Will display the ID of the check.

**p**

Will display the full path to the check, usable as a parameter for the **select** or **insert** commands.

**d**

Will display the path to the domain in which the check is located.

**n**

Will display the path to the node, on which the check is located.

**c**

Will display the path to the check, without the domain and node path.

**-r**

If this switch is given, not only checks placed on nodes which are directly in the selected domain will be listed, but also checks on nodes in the subdomains. This option has no effect if the path specifies a node instead of a domain.

## 12.6. The listproperties command

**listproperties** *{path-specification}* [-a] [-t] *{property-name}*...

The **listproperties** command will list some or all of the properties of a Domain, Node or Check together with the value of said properties..

**-a**

When this switch is given, all properties of the given Domain, Node or Check will be listed, together with their value.

**-t**

When this switch is given, the type of each property will be listed together with the property name and value

**property-name...**

If the **-a** argument is not given, the **listproperties** will only list the properties where the name is explicitly given on the command line.

## 12.7. The update command

**update** *{path-specification}* *{property-name=new-property-value}*...

The **update** command will update one or more properties of a Domain, Node or Check, if necessary.

The command's arguments is a list of properties together with the new value of the property.

If you wish to alter the name of a domain, the parameter **name="New Name"** will change the name property of the specified domain to "New Name". When you use parameters that contains spaces, make sure that you quote according to the rules of your shell.

## 12.8. Understanding the CSV file-format

`sysorb-tool` has 3 different CSV formats, depending on which kind of check is selected.

The first line of each CSV file identifies the columns of the file. After this line, comes the real data from the check. Each line corresponds to one record in the SysOrb database. A record can contain several measurements. This is because SysOrb will "compress" older data, by combining several measurements into one record.

A measurement can be either good or bad. If it is good, it means that SysOrb actually have obtained a value from the check. If it is bad, it means that SysOrb was unable to obtain a value from the check. For example this is the case when SysOrb tries to perform a HTTP check, but cannot connect to the server.

### 12.8.1. Continuous checks

Continuous checks are the checks that are plotted as a line graph in the SysOrb Web-interface, plus the uptime graphs. E.g. all NetChecks are Continuous graphs.

A CSV file of a continuous check contains 7 different columns.

**Begin**

The time at which the first measurement contained in the record is started.

**End**

The end time of the last measurement contained in the record.

**Min**

The minimum value of the good measurements.

**Avg**

The average value of the good measurements included in the record.

**Max**

The maximum value of the good measurements.

**ngood**

The number of good measurements contained in the record.

**nbad**

The number of bad measurements contained in the record.

## 12.8.2. State checks

State check are the checks that can be in different states. E.g. Process Presence check, RAID state check etc. are all State checks.

Internally in SysOrb the state of these checks are represented by a bit-mask. So when SysOrb "compresses" several state measurements into one, more bits get set in the bit-mask of the resulting record.

A state check CSV file contains 5 different fields:

Begin

The time at which the first measurement contained in the record is started.

End

The end time of the last measurement contained in the record.

Mask

A bitmask where all the bits of the different states seen in the period of the record are seen.

ngood

The number of good measurements contained in the record.

nbad

The number of bad measurements contained in the record.

## 12.8.3. String checks

String checks are all the kind of checks that produce strings. Currently Log Checks and Incident logs for Nodes are the only kinds.

A CSV file of a string check contains the 4 different fields:

Time

The time at which the string was encountered.

Severity

An indicator of how severe the text message is. Currently three values are supported:

- 1 - Good
- 2 - Warning
- 4 - Alert

Text

The text of the measurement.

## 12.9. Example scripts

In this section we will present two scripts which automate the extraction of all data in SysOrb (except Incident Logs) through the `sysorb-tool`.

One script is for bash, and should work with all Unix'es where bash is installed. The other script is for Windows.

### Example 12-1. Example extracting all data using bash

```
#!/bin/bash

#
# Change these variables to match your setup.
#
SOTOOL="/usr/bin/sysorb-tool"
USERNAME=admin
PASSWORD=admtest
DOMAIN=.
SERVER=localhost

# This directory will be created by the script. If such a file or
# directory already exists, it will be deleted.
OUTPUTDIR=output

STDCMDLINE="${SOTOOL} -l ${USERNAME} -P ${PASSWORD} -s ${SERVER} -d ${DOMAIN}"

# Prepare the output directory.
if [ -e "$OUTPUTDIR" ]; then
    rm -rf "$OUTPUTDIR"
fi

mkdir -p "$OUTPUTDIR"

# The outer loop extracts a list of all the nodes on the server.
$STDCMDLINE listnodes -r -o iN . | while read i; do

    # The id of the node is the characters before the first space
    NODEID=`echo $i | cut -d ' ' -f 1`

    # The name of the node is the rest of the characters. Remember to
    # translate /'es to _, as /'es are illegal in filenames.
    NODENAME=`echo $i | cut -d ' ' -f 2- | tr / _`

    echo "Exporting $NODENAME"

    # The inner loop extracts all the checks on one of the nodes
    $STDCMDLINE listchecks -o iN -i $NODEID | while read j; do

        # The check's id and the checks name, is extracted in the same
        # way as the nodes.
        CHECKID=`echo $j | cut -d ' ' -f 1`
        CHECKNAME=`echo $j | cut -d ' ' -f 2- | tr / _`

        # Extract all data for the check. If there is only need for a
        # period of data, the -b and -e options to the select command
        # can be used, together with the unix date command.
        $STDCMDLINE -f "$OUTPUTDIR/$NODENAME - $CHECKNAME".csv select -i $CHECKID
        done;
    done;
done;
```

**Example 12-2. Example extracting all data on Windows**

```

@ECHO off

REM The parameters to the sysorb-tool. The current one logs in as the user
REM admin with the password admtest in the domain . on the server localhost
SET params="-l admin -P admtest -d . -s localhost"

REM Change sotool to point to the path of the SysOrb tool.
SET sotool="%ProgramFiles%\SysOrb Server\sysorb-tool.exe"

REM Execute the sysorb-tool in order to extract the list of all the domains.
%sotool% %params% -f %tmp%\nodes.txt listnodes -r -o iN .

REM Now use the nodes.txt file as a parameter to the for loop

FOR /F "tokens=1*" %%i IN (%tmp%\nodes.txt) DO (
    REM echo Processing node %%j

    REM Extract a list of all checks present on the node
    %sotool% %params% -f %tmp%\%%i-checks.txt listchecks -o iN -i %%i

    REM If there are no checks on the node, the file will not be created.
    IF EXIST %tmp%\%%i-checks.txt (
        FOR /F "tokens=1*" %%k IN (%tmp%\%%i-checks.txt) DO (
            ECHO Extracting data for %%l on %%j to file %%k.csv

            REM Store the name of the check in the first line
            REM of the CSV file.
            ECHO Node,CheckName > %%k.csv
            ECHO %%j,%%l >> %%k.csv

            REM Extract the data for the check.
            %sotool% %params% select -i %%k >> %%k.csv
        )
        DEL /F %tmp%\%%i-checks.txt
    )
)

rem DEL /F %tmp%\nodes.txt

```

# Chapter 13. Acknowledgments

SysOrb uses parts from other software projects.

## 13.1. GD Graphics Library

Portions copyright 1994, 1995, 1996, 1997, 1998, 1999, 2000 by Cold Spring Harbor Laboratory. Funded under Grant P41-RR02188 by the National Institutes of Health.

Portions copyright 1996, 1997, 1998, 1999, 2000 by Boutell.Com, Inc.

Portions relating to GD2 format copyright 1999, 2000 Philip Warner.

Portions relating to PNG copyright 1999, 2000 Greg Roelofs.

Portions relating to libtiff copyright 1999, 2000 John Ellson (ellson@lucent.com).

Portions relating to JPEG copyright 2000, Doug Becker and copyright (C) 1994-1998, Thomas G. Lane. This software is based in part on the work of the Independent JPEG Group.

Portions relating to WBMP copyright 2000 Maurice Szmurlo and Johan Van den Brande.

Permission has been granted to copy, distribute and modify gd in any context without fee, including a commercial application, provided that this notice is present in user-accessible supporting documentation.

This does not affect your ownership of the derived work itself, and the intent is to assure proper credit for the authors of gd, not to interfere with your productive use of gd. If you have questions, ask. "Derived works" includes all programs that utilize the library. Credit must be given in user-accessible documentation.

This software is provided "AS IS." The copyright holders disclaim all warranties, either express or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to this code and accompanying documentation.

Although their code does not appear in gd 1.8.4, the authors wish to thank David Koblas, David Rowley, and Hutchison Avenue Software Corporation for their prior contributions.

## 13.2. OpenSSL Library

### 13.2.1. OpenSSL License

Copyright (c) 1998-2007 The OpenSSL Project. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgment: "This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org/>)"
4. The names "OpenSSL Toolkit" and "OpenSSL Project" must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact [openssl-core@openssl.org](mailto:openssl-core@openssl.org).



5. Products derived from this software may not be called "OpenSSL" nor may "OpenSSL" appear in their names without prior written permission of the OpenSSL Project.
6. Redistributions of any form whatsoever must retain the following acknowledgment:

"This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>)"

THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT "AS IS" AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE OpenSSL PROJECT OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

This product includes cryptographic software written by Eric Young ([ey@cryptsoft.com](mailto:ey@cryptsoft.com)). This product includes software written by Tim Hudson ([tjh@cryptsoft.com](mailto:tjh@cryptsoft.com)).

### 13.2.2. Original SSLey license

Copyright (C) 1995-1998 Eric Young ([ey@cryptsoft.com](mailto:ey@cryptsoft.com)) All rights reserved.

This package is an SSL implementation written by Eric Young ([ey@cryptsoft.com](mailto:ey@cryptsoft.com)). The implementation was written so as to conform with Netscapes SSL.

This library is free for commercial and non-commercial use as long as the following conditions are aheared to. The following conditions apply to all code found in this distribution, be it the RC4, RSA, lhash, DES, etc., code; not just the SSL code. The SSL documentation included with this distribution is covered by the same copyright terms except that the holder is Tim Hudson ([tjh@cryptsoft.com](mailto:tjh@cryptsoft.com)).

Copyright remains Eric Young's, and as such any Copyright notices in the code are not to be removed. If this package is used in a product, Eric Young should be given attribution as the author of the parts of the library used. This can be in the form of a textual message at program startup or in documentation (online or textual) provided with the package.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgment:

"This product includes cryptographic software written by Eric Young ([ey@cryptsoft.com](mailto:ey@cryptsoft.com))"

The word 'cryptographic' can be left out if the rouines from the library being used are not cryptographic related :-).

4. If you include any Windows specific code (or a derivative thereof) from the apps directory (application code) you must include an acknowledgement: "This product includes software written by Tim Hudson ([tjh@cryptsoft.com](mailto:tjh@cryptsoft.com))"

THIS SOFTWARE IS PROVIDED BY ERIC YOUNG “AS IS” AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The licence and distribution terms for any publically available version or derivative of this code cannot be changed. i.e. this code cannot simply be copied and put under another distribution licence [including the GNU Public Licence.]