



PolyServe Understudy Administrator's Guide



Understudy version 1.3

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Introduction

PolyServe Understudy provides failover protection for network servers and services. It does this by combining servers in logical clusters that support virtual hosts—hosts that continue to provide network services should one of the underlying servers, or a service running on it, go down.

This document provides detailed information on installing and configuring PolyServe Understudy. Additional information is available in Understudy's on-line help facility and in the Release Notes that accompany the software. For information, connect to the PolyServe Web site at www.polyserve.com.

Terminology

The following terms are used in this document in accordance with the definitions given here.

Understudy—The Understudy software in its entirety is simply referred to as *Understudy*. Functionally, Understudy has two main parts—the server daemon (*spare*) and the console GUI (*understudy*). Once configured, the server software runs automatically on server start-up, and you can access the console GUI at any time.

Cluster—A *cluster* consists of two network servers running Understudy. The servers may run any of the supported operating systems. The servers can use the same operating system, or they can use different operating systems.

Virtual Host—Understudy provides failover protection for one or more *virtual hosts*. A virtual host is a hostname/IP address that may move from one real server to another. Understudy uses dynamic IP address assignment to switch

traffic from a malfunctioning server in a cluster to the other server, and so maintain virtual host accessibility independent of any single server failure.

Primary and Backup Servers—Normally, Understudy routes network traffic for the virtual host to the server that is designated as the *primary server* for that virtual host. If Understudy determines that there is a server or service failure on that primary server, it redirects traffic for the virtual host to the other server in the cluster, which is the *backup server*. Additional virtual hosts may be configured for the same cluster, and either server may be primary or backup for these virtual hosts. Neither server needs to be dedicated for Understudy, and both can support other, independent, functions.

Active and Inactive Servers—At any given time, the *active server* is the one receiving the network traffic for a virtual host. The active server is normally the primary server, but if Understudy has redirected traffic to go to the backup server, the backup server becomes the active server. The *inactive server* is the one not currently receiving network traffic for a virtual host.

Services and Service Monitors—A *service* is any network service, such as Web (HTTP) or an FTP service, that is installed and configured on the servers. In addition to monitoring the functioning of the servers, Understudy can be configured to watch specific services with *service monitors*. Understudy will transfer traffic from one server to the other when a service monitor indicates that a particular service is not functioning properly on a server. It would transfer the traffic, for example, if Netscape or Apache were to fail.

Load Balancing or Load Sharing—a cluster can also be configured so that each server receives an equal share of the traffic. Simple load sharing is available in recent releases of DNS/BIND (BIND 4.9 or higher). Combined with Understudy, load sharing can be set up so that DNS sends requests to active servers only.

Document Summary

This chapter is designed to introduce Understudy concepts and terminology, and also help you make the necessary decisions to design effective protection for your network services.

Chapter 2, *Installation*, documents the installation procedure to be performed on each network server.

Chapter 3, *Configuration*, steps through an example configuration of a simple Understudy cluster, and then illustrates some additional configurations.

Chapter 4, *Console Reference*, provides details on every menu option available through the Understudy console GUI.

Chapter 5, *Maintenance and Troubleshooting*, describes the few maintenance procedures that can be performed to maintain Understudy, and also lists possible error messages with explanations.

Understudy Overview

Figure 1-1, “Functioning Understudy Cluster”, illustrates a basic Understudy cluster. It represents a single virtual host, `acme.com`, which is supported by two servers, `acme1` and `acme2`.

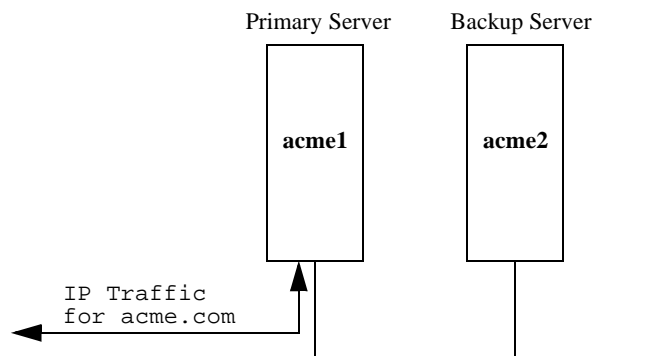


Figure 1-1. Functioning Understudy Cluster

Figure 1-2, “Understudy Cluster with Primary Server Down”, illustrates how the backup server takes over for a failure in the primary server.

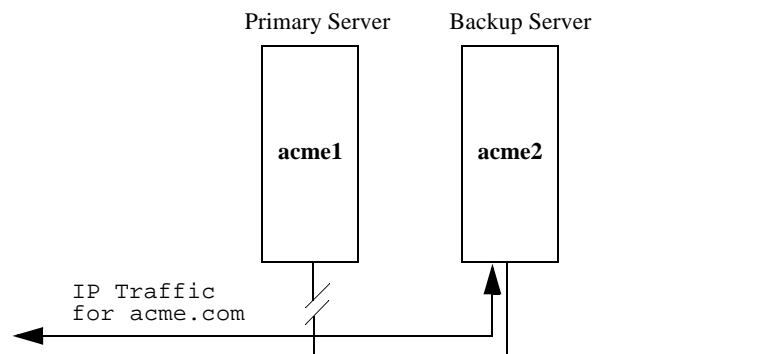


Figure 1-2. Understudy Cluster with Primary Server Down

The “backup” server in a cluster such as the one shown in Figure 1-1 and Figure 1-2 does not have to be dedicated to the backup function—it may well be an active server performing many functions on a routine basis, only doubling as a backup for the primary server should the need arise.

In fact, the two servers in a cluster may be configured to back-up each other, or back-up particular services for each other.

For example, both servers might be Web servers: one, with the virtual host name `sales.acme.com`, could be the primary Web server for the company’s sales people, and it would be backed-up by the other server. The other server might have the virtual host name `support.acme.com`, and be the primary Web server for the support group. If either of the servers or services running on the primary servers goes down, Understudy would switch traffic to the other server. In this case, the cluster is configured as two virtual hosts, and the underlying servers are each primary for one virtual host and backup for the other.

Or, one server may be the primary FTP server, `ftp.acme.com`, and the other the primary Web server, `www.acme.com`, and Understudy could be configured to have the FTP server function as the backup Web server, and the Web server to function as the backup FTP server.

There are many different possibilities. You may have up to 128 virtual hosts configured on any one cluster, and virtual hosts may support multiple services.

The following section discusses issues to consider regarding hardware and software design of Understudy clusters.

Cluster Design Considerations

Understudy provides failover for network servers and services based on the assignment of virtual hosts to clusters.

The basic requirements for Understudy are:

- Two servers: The servers must run Linux, NT, FreeBSD, or Solaris operating systems, but they do not both have to run the same one.
- Ethernet: The servers must be connected with Ethernet or Fast Ethernet.
- TCP/IP networking: The servers must be network hosts on the same TCP/IP subnet.
- Understudy: Understudy must be installed on both servers.
- Virtual Host: One or more virtual host names and IP addresses must be assigned. A virtual host is in every way similar to a normal host name. It has a unique IP address and appears to all who access it as a host machine. The difference is that a virtual host can be switched by the Understudy software to another host machine in the cluster.

Multiple virtual hosts can be defined per cluster. This is ideal for ISPs and other service providers that support multiple sites or applications on a group of servers.

Choosing Understudy Servers

The servers you choose to configure into an Understudy cluster should be properly configured as fully networked hosts supporting the services you desire before installing Understudy. For example, if you want Understudy to provide failover protection for your Web service, the two servers you use

should be set up as Web servers with Apache, Netscape, Microsoft IIS, or whatever server software you use.

Note: Understudy does not provide any database management or data mirroring functionality. You must configure your software to update data between servers as your needs require.

Fault-Tolerance

An easy way to ensure that both servers serve the same data is to configure them, for example with NFS, to access the same data on the same disk. The disadvantage of this method is that if the disk malfunctions, both the primary and backup servers are disabled.

The more physically independent the servers in an Understudy cluster are, the more reliable the virtual host. If the primary and backup servers have separate uninterruptible power supplies (UPSs) and separate disks, the failure of any one of these components will only affect the single server, allowing Understudy to maintain uninterrupted service on the virtual host.

Load Distribution

If you configure Domain Name Service (DNS) to use the round-robin technique of distributing network traffic between multiple servers, Understudy can provide higher availability. Without Understudy, round-robin DNS is vulnerable to service failure: if a server goes down, some fraction of requests still go to the unavailable server and will be unanswered. However, if the IP addresses in the round-robin pool are Understudy-protected virtual hosts, then the loss of a server will not cause requests to go unanswered.

For example, you could configure two servers with two virtual hosts so that each server is the primary server for one virtual host and the backup server for the other. If you create a DNS round-robin pool consisting of the two virtual hosts, in normal operation, roughly half the requests will go to one server and half to the other. If a server should fail, all the requests would go to the remaining server until the failed server resumed functioning.

Configuring Understudy for load distribution (also called load balancing or load sharing) is discussed in Chapter 3.

Migrating Existing Network Servers to Understudy

In some cases, before configuring Understudy, the name of an existing server was the one published as the network host providing one or more services. With Understudy, the actual names of the servers should be separate from the name of the virtual host which they support. This enables the virtual host to respond regardless of the state of any one of the servers.

You have the choice to re-assign the public name of the server to the virtual host, which is generally the better solution, or to keep the name of the published server associated with the particular server which presents a different situation. Both alternatives are described below.

To migrate an existing server name to an Understudy virtual host name, you will have to change the name of the server to something else. External sites that then try to access the same server name will actually be served by the virtual host—basically, a failover-protected version of the server, with no difference in appearance to the clients.

If you want to keep the existing server name on a server, clients will need to use the name of the new virtual host to get benefit from Understudy's failover protection. Clients will still be able to access the server by its name, but those requests will not be protected by Understudy; if the server fails, requests to the server host name will fail, whereas requests to the new virtual host name will be automatically redirected by Understudy to the backup server.

Assigning Service Monitors

You can configure Understudy to monitor HTTP (Web), FTP, SMTP (mail), a generic TCP service, or any combination of these.

When deciding which services you want to monitor with Understudy, choose those services that are most critical to you. There is no point in configuring service monitors for services that you do not care about. Not only would that unnecessarily increase Understudy's overhead but, if one of these services stops working, Understudy will redirect all of the primary server's traffic to the

backup server—something you would normally want to do only if essential services were not working.

When you configure Understudy to monitor a service, that's all you are doing: you are not setting up the service itself. Your servers should be already configured to provide the service, for example with Netscape or Apache to provide HTTP service. Once you have configured the service, you can configure Understudy to monitor it, but the service can run regardless of Understudy monitoring. Once you have configured Understudy to monitor it, however, and you have informed the service about the virtual host, Understudy can quickly switch traffic between servers as required.

Note: This is a key difference between configuring a virtual host and configuring a service monitor: When you configure a service monitor with Understudy, you only configure Understudy to monitor the service. When you configure a virtual host for Understudy, Understudy actually configures the server operating systems to respond to the virtual host IP aliases. Refer to “Assigning Virtual Hosts” on page 1-9 for more information.

The way Understudy monitors services depends on the service it is monitoring:

- To monitor HTTP, Understudy issues a simple HEAD request and waits for a reply. If there is no reply, it concludes that the web server is down.
- To monitor FTP and SMTP, Understudy expects them to send a message without being probed. If such a message is not received, it considers the service to be down.
- For generic TCP monitoring, Understudy considers the service to be functioning as long as a TCP connection can be established with the specified server port.

Refer to Chapter 3, Configuration, for an example of service configuration, and “Add Service Monitor to Selected Virtual Host” on page 4-6 for further details on adding service monitors.

Assigning Virtual Hosts

The virtual host names and IP addresses are the names you want to make available for users to access services in your network. These names can then be dynamically assigned by Understudy to functioning host machines in the cluster. By using an Understudy cluster with two servers, the virtual host will remain available despite any single service or server failure. Moreover, the switch to backup server will be virtually unnoticeable to the client. If HTTP service fails during the actual download of a web page to a client, the client would receive a “transfer interrupted” message and simply have to reload the web page.

When assigning virtual host names, choose some other name than an actual server name—the virtual host is independent of a specific server, so the name should be as well. For example, `acme.com` might be the virtual host name for the Acme Corporation, and underlying servers, say `acme1` and `acme2`, would be known to Understudy but invisible to clients.

You can configure multiple virtual hosts on each server in a cluster. For example, you could configure Understudy so that the virtual hosts `corporate.acme.com` and `sales.acme.com` are also assigned to the servers `acme1` and `acme2`, in addition to the virtual host `acme.com`. You can define up to 128 virtual hosts per cluster, thus enabling you to host multiple web sites per server with high availability for each of them.

When assigning an IP address for the virtual host, it must be in the same subnet as the servers in its cluster.

When you have decided on virtual host names and IP addresses, inform your DNS name service so that it will support them.

Chapter 3, Configuration, gives an example of a virtual host configuration, and “Add Virtual Host” on page 4-5 provides details on how to configure Understudy to support your virtual host. Note that Understudy will configure the server operating system to respond to the virtual host name and address once it has been so configured, and you should *not* directly modify your operating system start-up files or use `ifconfig` to support the virtual host. Once you have configured Understudy, though, you must configure the particular network service software (for example, Apache web server) on both servers, to respond to the virtual host.

CLUSTER DESIGN CONSIDERATIONS

Installation

This chapter presents procedures for installing Understudy software on your servers. Understudy must be installed on all servers in the cluster. You should first read “Before You Begin”, and then follow the instructions for installing Understudy on the particular operating system each server is running.

This chapter provides installation instructions for the following operating systems and specialized servers:

- Red Hat Linux
- Slackware Linux
- Debian Linux
- Cobalt servers
- SUN Solaris
- FreeBSD
- Windows NT

Note: All required files are included with the software distribution. Be sure to read the release notes to check the specific files to use for a particular installation.

Before You Begin

Installation requires root privileges on each server on which Understudy is to be installed. See the release notes for any new information before beginning the installation. The release notes are included in the software distribution. You can see the most recent release notes on-line at the PolyServe website, www.polyserve.com/releasenotes.html.

The complete installation and configuration of an Understudy cluster can be summarized in these steps:

1. Ensure that all real server names and all virtual host names are fully defined in the name server or in the local host files.

Virtual host names and IP addresses must be unique. No duplicate real or virtual name or IP address can exist in the network.

2. Install and configure Understudy on all servers to be in your Understudy cluster.
3. If you plan to run Understudy on a server without a monitor, you must install the Understudy Administrator GUI on another host. This software is available at www.polyserve.com/dnload_gui.html
4. Use the Understudy console to configure the Understudy cluster with virtual hosts and service monitors for failover operation and load balancing.

Installation On Linux

Servers that run the various Linux operating systems have similar installation procedures, with slight variations. This section provides instructions for the following Linux systems:

- Red Hat
- Slackware
- Debian

- Cobalt servers

Red Hat Linux

The Understudy Red Hat distribution contains the following files:

- `understudy-1.3-x.redhat-y.z.i386.rpm`—a Red Hat Package Manager (RPM) file that can be installed on a Red Hat host. The filename includes an Understudy upgrade release number, indicated here as “*x*,” and a Red Hat Linux release number, indicated here as “*y.z*”
- `understudy.pdf`—this administrator’s guide in PDF format
- `README`—contains the latest release notes.

Be sure to read the `README` file for any additional information.

You can obtain the latest `readme` file and any necessary documentation from www.polyserve.com/releasenotes.html.

The minimum requirements for Red Hat are

- Intel 486 compatible or later
- Red Hat 6.0 or later
- 16MB of memory
- 25MB disk space
- Ethernet 10/100 port

To install Understudy on Red Hat

Log on as `root` and enter the following from the directory where you have the package

```
root> rpm -i understudy-1.3-x.redhat-y.z.i386.rpm
```

where *x* is the Understudy upgrade release number and *y.z* is the release of Red Hat Linux.

Repeat this process on any other server that uses Red Hat Linux and will run Understudy. Understudy must be installed on both servers in every cluster you plan to configure. The servers may use different operating systems.

To assign a password

Once the installation is complete, assign a password for Understudy administration. Use the `sppasswd` utility, which comes with Understudy.

To set the “admin” user password, enter the following:

```
root> sppasswd
sppasswd> admin mypassword
```

where *mypassword* is the password you want to use.

Understudy’s GUI administration console prompts for this password when connecting to the Understudy server. You can change the password at any time with the `sppasswd` command. Note that you must assign the password for Understudy administration on each server on which you have installed Understudy.

To start and stop the Understudy daemon

When Understudy is installed, it automatically starts the Understudy daemon process. If you need to start and stop the daemon subsequently, do the following:

```
root> /etc/rc.d/init.d/spare start
root> /etc/rc.d/init.d/spare stop
```

To uninstall Understudy

To uninstall Understudy, enter the following from the directory where you have installed Understudy:

```
root> rpm -e understudy
```

To start the Understudy GUI console

To start the Understudy GUI console, start the windowing environment and type the following:

```
$ understudy
```

The console login screen appears.

Slackware Linux

The Understudy Slackware distribution contains the following files:

- `understudy-1.3-x.slackware-y.zi386.tgz`—a tarball that can be extracted by the `installpkg` utility. The filename includes an Understudy upgrade release number, indicated here as “*x*,” and a Slackware Linux release number, indicated here as “*y.z*”
- `understudy.pdf`—this administrator’s guide in PDF format.
- `README`—contains the latest release notes.

Be sure to read the `README` file for any additional information.

You can obtain the latest readme file and any necessary documentation from www.polyserve.com/download.html.

The minimum requirements for Slackware are

- Intel 486 compatible or later
- Slackware 4.0 or later
- 16MB of memory
- 25MB disk space
- Ethernet 10/100 port

To build a new kernel

The generic kernel that comes with the Slackware distribution doesn’t have the IP Alias module installed.

Understudy uses the IP Alias feature to implement virtual hosts, so a new kernel must be built. Do so by configuring, building, and installing a new kernel under `/usr/src/linux`.

For information, see `/usr/src/linux/README` and `/usr/src/linux/Documentation`.

To install Understudy on Slackware

Log on as root and use the `installpkg` command to install the tarball, for example:

```
root> installpkg understudy-1.3-x.slackware-y.z.i386.tgz
```

(where *x* is the latest Understudy upgrade release, and *y.z* is the latest Slackware release). The tarball contains a shell script that `installpkg` runs which sets up the files `/etc/rc.spare` and `/etc/rc.M` to start spare automatically after reboot.

Repeat this process on any other server that uses Slackware Linux and will support Understudy. Understudy must be installed on both servers in every cluster you plan to configure. The servers may use different operating systems.

To assign a password

Once the installation is complete, assign a password for Understudy administration. Use the `sppasswd` utility, which comes with Understudy.

To set the “admin” user password, enter the following:

```
root> sppasswd
sppasswd> admin mypassword
```

where *mypassword* is the password you want to use.

Understudy’s GUI administration console prompts for this password when connecting to the Understudy server. You can change the password at any time with the `sppasswd` command. Note that you must assign the password for Understudy administration on each server on which you have installed Understudy

To start and stop the Understudy daemon

When Understudy is installed, it automatically starts the Understudy daemon process. If you need to start and stop the daemon subsequently, do the following:

```
root> /etc/rc.d/rc.spare start
root> /etc/rc.d/rc.spare stop
```

To uninstall Understudy

To uninstall Understudy, enter the following from the directory where you have installed Understudy:

```
root> removepkg understudy-1.3-x.slackware-y.z.i386
```

(where *x* is the latest Understudy upgrade release and *y.z* is the latest Slackware release).

To start the Understudy GUI console

To start the Understudy GUI console, start the windowing environment and type the following:

```
$ understudy
```

The console login screen appears.

Debian Linux

The Understudy Debian distribution contains the following files:

- `understudy-1.3-x.debian-y.z.i386.deb`—a debian package that can be extracted by the `dpkg` utility. The filename includes an Understudy upgrade release number, indicated here as “*x*,” and a Debian Linux release number, indicated here as “*y.z*.”
- `understudy.pdf`—this administrator’s guide in PDF format.
- `README`—contains the latest release notes.

Be sure to read the `README` file for any additional information.

You can obtain the latest readme file and any necessary documentation from www.polyserve.com/releasenotes.html.

The minimum requirements for Debian are

- Intel 486 compatible or later
- Debian 2.1 or later
- 16MB of memory
- 25MB disk space
- Ethernet 10/100 port

Caution: Understudy uses the IP Alias feature to implement virtual hosts. When configuring the kernel, make sure that the IP Alias module is loaded.

To install Understudy on Debian

Log on as root and use the `dpkg` command to install the package, for example:

```
root> dpkg --install understudy-1.3-x.debian-y.z.i386.deb
```

(where *x* is the latest Understudy upgrade release and *y.z* is the latest Debian release). Repeat this process on any other server that uses Debian Linux and will support Understudy. Understudy must be installed on both servers in

every cluster you plan to configure. The servers may use different operating systems.

The package uses shell scripts to configure Understudy. These scripts set up files in `/etc/init.d` and `/etc/re?.d` to start `spare` automatically after reboot.

To assign a password

Once the installation is complete, assign a password for Understudy administration. Use the `sppasswd` utility, which comes with Understudy.

To set the “admin” user password, enter the following:

```
root> sppasswd
sppasswd> admin mypassword
```

where *mypassword* is the password you want to use.

Understudy’s GUI administration console prompts for this password when connecting to the Understudy server. You can change the password at any time with the `sppasswd` command. Note that you must assign the password for Understudy administration on each server on which you have installed Understudy

To start and stop the Understudy daemon

When Understudy is installed, it automatically starts the Understudy daemon process. If you need to start and stop the daemon subsequently, do the following:

```
root> /etc/init.d/spare start
root> /etc/init.d/spare stop
```

To uninstall Understudy

To uninstall Understudy, enter the following from the directory where you have installed Understudy:

```
root> dpkg --remove understudy
```

To start the Understudy GUI console

To start the Understudy GUI console, start the windowing environment and type the following:

```
$ understudy
```

The console login screen appears.

Cobalt Linux Server

The Understudy Cobalt distribution contains the following files:

- (for Cobalt Qube and RaQ 2 servers) `understudy-1.3-x.cobalt.mips.pkg`—a Cobalt package that can be installed using Cobalt’s administration tool. The filename includes an upgrade release number, indicated here as “x.”
- (for Cobalt RaQ 3i server) `understudy-1.3-x.cobalt.i386.pkg`
- `understudy.pdf`—this administrator’s guide in PDF format.
- `README`—contains the latest release notes.

Be sure to read the `README` file for any additional information.

Note: You must also obtain the Admin GUI, either the Red Hat or Windows 98 or Windows NT version. Download the appropriate GUI version from the PolyServe Web site, www.polyserve.com/download_gui.html. See “To connect the GUI” later in this chapter.

You can obtain the latest readme files and any necessary documentation from www.polyserve.com/releasenotes.html.

The minimum requirements for Cobalt are

- Cobalt RaQ 2, Qube, or RaQ 3i server appliance
- 16MB of memory for Cobalt RaQ 2, and Qube, 64MB of memory for Cobalt RaQ 3i
- 25MB disk space
- Ethernet 10/100 port

- Host with monitor to run Understudy Java GUI console

To install Understudy on Cobalt

On the administration page of your Cobalt server, use the Install Software menu to install the appropriate PKG file:

- For Qube and RaQ 2 servers, install
`understudy-1.3-x.cobalt.mips.pkg`
where *x* is the latest upgrade release.
- For RaQ 3i servers, install
`understudy-1.3-x.cobalt.i386.pkg`
where *x* is the latest upgrade release.

Here are the steps:

1. Enter `http://yourcobaltbox.com`
Where *yourcobaltbox* is the name of your Cobalt server.
2. Choose Administrator Site from the menu on the left side.
3. Choose Maintenance from the menu on the left side
4. Click the Install Software button.
5. Select the Understudy PKG, enter the administrator's password, and click the Install a '.pkg' Package button.

To assign a password

Once the installation is complete, telnet to the Cobalt box to assign a password for Understudy administration. Use the `sppasswd` utility, which comes with Understudy.

To set the "admin" user password, enter the following:

```
root> sppasswd
sppasswd> admin mypassword
```

where *mypassword* is the password you want to use.

Understudy's GUI administration console prompts for this password when connecting to the Understudy server. You can change the password at any time with the `sppasswd` command. Note that you must assign the password for Understudy administration on each server on which you have installed Understudy

To connect the GUI

The Cobalt servers have no monitor. Understudy on the Cobalt servers can be administered from a remote Understudy GUI client running Red Hat Linux 6.0 or Windows NT. You will install the Understudy GUI application on the client and then connect it to the Understudy daemons on the Cobalt server.

The Understudy Administrator GUI application can be downloaded from:
www.polyserve.com/dnload_gui.html

If you use a Windows 98 or NT client to manage your Cobalt server, install the Windows version of Understudy GUI on the PC.

The Windows setup program is `understudy-gui-1.3-x-setup.exe`, where `x` is the latest upgrade release.

After you have installed Understudy on the Cobalt server, start the Windows Understudy GUI. When prompted, enter the IP address of the Cobalt server.

If you use a Red Hat client to manage your Cobalt server, install the following RPM file: `understudy-gui-1.3-x.redhat.i386.rpm`, where `x` is the latest upgrade release.

To start the Understudy GUI console, start the windowing environment and type the following:

```
$ understudy
```

The console login screen appears.

To use another client as the Understudy console, please contact PolyServe directly for access to another supported client.

To start and stop the Understudy daemon

When Understudy is installed, it automatically starts the Understudy daemon process. If you need to start and stop the daemon subsequently, do the following:

```
root> /etc/rc.d/init.d/spare start
root> /etc/rc.d/init.d/spare stop
```

To uninstall Understudy

To uninstall Understudy, telnet to the Cobalt server and use the `cobalt_uninstall` command, for example:

```
cobalt> /usr/local/sbin/cobalt_uninstall understudy
```

Installation on Windows NT

The Understudy Windows NT distribution contains the following files:

- `understudy-1.3-x.nt-4.0.i386.setup.exe`—an executable that installs all the components of Understudy.
- `understudy.pdf`—this administrator's guide in PDF format.
- `README`—contains the latest release notes.

Be sure to read the `README` file for any additional information.

You can obtain the latest `readme` file and any necessary documentation from www.polyserve.com/releasenotes.html.

The minimum requirements for Windows NT are

- Intel 486 compatible or later
- Microsoft NT Server 4.0 with Service Pack 3.0 or later (NT Server Enterprise Edition is *not* required)
- 16MB of memory
- 20MB disk space

- Ethernet 10/100 port

To install Understudy on Windows NT

Copy the `understudy-1.3-x.nt-4.0.i386.setup.exe` file to a directory you want to use for Understudy (where x in the filename is the latest upgrade release).

Then double-click the file icon, and follow the directions on the subsequent windows.

The installer automatically installs all components.

Repeat this process on any other server that uses Windows NT and will run Understudy. Understudy must be installed on both servers in every cluster you plan to configure.

Note: After installing Understudy, be sure to create at least one virtual host before opening the NT Network Panel.

If you open the Network Panel after installing Understudy before creating a virtual host, you will receive the following error message when you close the Network Panel dialog box: "The subnet mask that you have entered for the IP address is not valid. Please enter a valid mask." This message refers to one of the default IP Addresses created during installation, and it may be ignored. When you create a virtual host, Understudy replaces the invalid address.

To assign a password

Once the installation is complete, assign a password for Understudy administration. Use the Understudy Password Manager which is installed with Understudy.

To set the "admin" user password

1. Choose the Understudy Password Manager from the Start>Programs menu.
2. Enter and confirm the password you want to use for the Administrator.

Understudy's GUI administration console prompts for this password when connecting to the Understudy server.

- You can change the password at any time using the Understudy Password Manager.

Open the Password Manager from
Start>Programs>Polyserve>Understudy Password Manager.

Follow the prompts to change the password.

Note that you must assign the password for Understudy administration on each server on which you have installed Understudy

To start and stop the Understudy daemon

When Understudy is installed, it automatically starts the Understudy daemon process. If you need to start and stop the daemon subsequently, do the following:

1. From Start>Control panel, Open the Services icon.
2. Select the Understudy Cluster Manager service.
3. Use the Start button to start, or use the Stop button to stop, the service.

To uninstall Understudy

Use the Windows NT Add/Remove program, available from the Settings window, to uninstall Understudy.

After the uninstall process is complete, you need to manually remove the Understudy failover driver. To do so,

1. From the Network Panel, open the Adapter Panel.
2. In the Adapter Panel, select the PolyServe Failover Adapter and click Remove.

To start the Understudy console login screen

To start the Understudy GUI console, choose the Understudy Browser from the Start menu: Start>Programs>Polyserve>Understudy Browser.

The console login screen appears.

Installation On SUN Solaris

The Understudy Solaris distribution contains the following files:

- `understudy-1.3-x.solaris-y.z.sparc.pkg`—a package that can be extracted by the `pkgadd` utility. The filename includes an Understudy upgrade release number, indicated here as “*x*,” and a SUN Sparc release number, indicated here as “*y.z*”
- `understudy.pdf`—this administrator’s guide in PDF format.
- `README`—contains the latest release notes.

Be sure to read the `README` file for any additional information.

You can obtain the latest `readme` file and any necessary documentation from www.polyserve.com/releasenotes.html.

The minimum requirements for Solaris are

- Sparc, UltraSparc
- Solaris 2.6 or higher
- 16MB of memory
- 25MB disk space
- Ethernet 10/100 port

Setting up Solaris for Java

Understudy’s GUI administration console is a Java application. In order to run the Java runtime version included with Understudy (JRE version 1.1.8-09), you’ll need a patch to the Solaris operating system. The patch required is 106040-11. The patch, with additional information, can be obtained from SUN’s Web site, www.sun.com/solaris/jre/download.html.

To install Understudy on SUN Solaris

Log on as root and use the `pkgadd` command to install the package, for example:

```
root> pkgadd -d /tmp/understudy-1.3-x.sun-sparc.pkg
```

(where *x* is the latest upgrade release). Repeat this process on any other server that uses SUN Solaris and will support Understudy. Understudy must be installed on both servers in every cluster you plan to configure. The servers may use different operating systems.

The package uses shell scripts to configure Understudy. These scripts set up files in `/etc/init.d` and `/etc/rc?.d` to start `spare` automatically after reboot.

To assign a password

Once the installation is complete, assign a password for Understudy administration. Use the `sppasswd` utility, which comes with Understudy.

To set the “admin” user password, enter the following:

```
root> sppasswd
sppasswd> admin mypassword
```

where *mypassword* is the password you want to use.

Understudy's GUI administration console prompts for this password when connecting to the Understudy server. You can change the password at any time with the `sppasswd` command. Note that you must assign the password for Understudy administration on each server on which you have installed Understudy

To start and stop the Understudy daemon

When Understudy is installed, it automatically starts the Understudy daemon process. If you need to start and stop the daemon subsequently, do the following:

```
root> /etc/init.d/init.spare start
root> /etc/init.d/init.spare stop
```

To uninstall Understudy

To uninstall Understudy, enter the following from the root:

```
root> pkgrm PSspare
```

To start the Understudy GUI console

To start the Understudy GUI console, start the windowing environment and type the following:

```
$ understudy
```

The console login screen appears.

Installation on FreeBSD

The Understudy FreeBSD distribution contains the following files:

- `understudy-1.3-x.freebsd-y.z.i386.tgz`—a tarball that can be extracted by the `pkg_add` utility. The filename includes an Understudy upgrade release number, indicated here as “*x*,” and a FreeBSD release number, indicated here as “*y.z*”
- `understudy.pdf`—this administrator’s guide in PDF format.
- `README`—contains the latest release notes.

Be sure to read the `README` file for any additional information.

You can obtain the latest readme file and any necessary documentation from www.polyserve.com/releasenotes.html.

The minimum requirements for FreeBSD (either version 3.2, or version 4.0 or later) are

- Intel 486 compatible or later
- Free BSD version 3.2 or later
- 16MB of memory
- 25MB disk space
- Ethernet 10/100 port

To install Understudy on FreeBSD

Log on as root and use the `pkg_add` command to install the tarball, for example:

```
root> pkg_add understudy-1.3-x.freebsd-y.z.i386.tgz
```

(where *x* is the latest Understudy upgrade release and *y.z* is the latest FreeBSD release). Repeat this process on any other server that uses FreeBSD and will support Understudy. Understudy must be installed on both servers in every cluster you plan to configure. The servers may use different operating systems.

The tarball contains shell scripts to configure Understudy that are run by `pkg_add`. These scripts set up files to start `spare` automatically after reboot.

To enable Berkeley Packet Filter (bpfiler)

Understudy uses the Berkeley packet filter during failover, so the `bpfiler` option must be enabled for Understudy to work properly. Version 3.2 of FreeBSD defaults the `bpfiler` option to OFF. Version 4.0 defaults the `bpfiler` option ON.

So, for version 3.2, you need to turn the `bpfiler` option to ON and recompile the FreeBSD kernel. To do so, copy the configuration file `/sys/i386/conf/GENERIC` to a new file, turn on the `bpfiler` option and recompile the kernel.

For information, see www.freebsd.org/FAQ/networking.html#AEN2600.

To assign a password

Once the installation is complete, assign a password for Understudy administration. Use the `sppasswd` utility, which comes with Understudy.

To set the “admin” user password, enter the following:

```
root> sppasswd
sppasswd> admin mypassword
```

where *mypassword* is the password you want to use.

Understudy’s GUI administration console prompts for this password when connecting to the Understudy server. You can change the password at any time with the `sppasswd` command. Note that you must assign the password

for Understudy administration on each server on which you have installed Understudy

To start and stop the Understudy daemon

When Understudy is installed, it automatically starts the Understudy daemon process. If you need to start and stop the daemon subsequently, do the following:

```
root> /usr/local/etc/rc.d/spare.sh start
root> /usr/local/etc/rc.d/spare.sh stop
```

To uninstall Understudy

To uninstall Understudy, enter the following from the root:

```
root> pkg_delete understudy-1.3-x.freebsd-y.z.i386
```

where *x* is the latest Understudy upgrade release and *y.z* is the latest FreeBSD release.

To start the Understudy GUI console

To start the Understudy GUI console, start the windowing environment and type the following:

```
$ understudy
```

The console login screen appears.

Configuration

This chapter begins with an example of setting up a simple Understudy cluster in which a single service is configured for failover. The rest of the chapter then expands on this with examples of more complex configurations. The final section describes configuring Understudy to provide failover with load sharing.

Before You Begin

Understudy allows you to create *virtual hosts*, complete with IP addresses and names, so your users can access your services. A virtual host is a name/IP address pair that Understudy uses for its failover operation. A virtual host name is also what the client uses to access the server cluster. By using the virtual host name rather than the real hostname, Understudy can switch which server the virtual host is actually serving.

Before you set up Understudy, choose a name and IP address to use for each virtual host you want to configure. The name service you use should be configured with these virtual host names. The IP address for the virtual host name should be in the same subnet as the servers you will be configuring into a cluster. The virtual host/IP addresses must be unique in your network.

In order to configure virtual hosts with Understudy, you should first be sure you have the following for each cluster:

- primary server—a network server running the services you want to monitor.
- backup server—a network server running the services you want to monitor. It should be in the same subnet as the primary server.

- virtual host—choose a name and IP address to use for each virtual host you want to configure. The name service you use should be informed of the name and the IP address for that name should be in the same subnet as the two servers.

(If you are migrating one or more existing servers to Understudy, refer to “Migrating Existing Network Servers to Understudy” on page 1-7.)

- service—the service(s) you want to monitor should be fully operational on both servers in the cluster.

A Simple Understudy Cluster

Understudy is based on the idea of a cluster, where services are provided by one or more virtual hosts. Each virtual host is comprised of a primary server and a backup server. The backup server need not be a dedicated server—it may well perform other functions on a continuous basis, being called on for backup services only when and if the need arises. At that time, it would automatically respond to the service requests for the service it is backing-up as well as its other duties, and relinquish the new duty when the primary server resumes functioning, as determined by Understudy.

As the basic example of an Understudy cluster, we will next configure failover support for a company’s Web server.

Note: This example assumes that the Web server daemon, `httpd`, is properly configured and running on the primary and backup servers. Understudy does not configure the service itself—it monitors one or more services and automatically initiates failover as necessary.

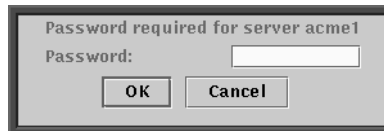
Once Understudy has been properly installed you begin configuring it by starting Understudy (refer to Chapter 2, “Installation”).

In a moment you will see the Understudy console login screen:



If you do not see the login screen, be sure your DISPLAY variable is set correctly, and that your system allows you access to the X display.

Enter the name of one of the servers and select OK or press Enter. You next see a password screen:

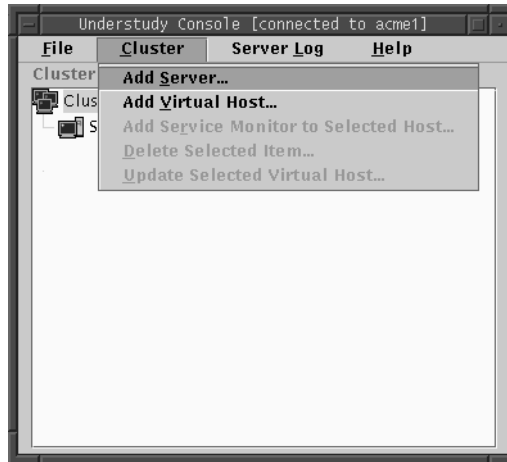


Enter the password you assigned after installation. You now have access to the Understudy console screen:

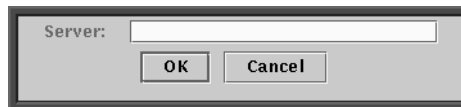


In the example shown, we have connected to the server `acme1` (because we specified the server name `acme1` in the console login screen). The “OK” means that `acme1` is up and running the Understudy daemon. The screen shows that the cluster now consists of just the one server, `acme1`. We will now configure the cluster further.

We will now add our second server, in this case a server named `acme2`. Select **Cluster->Add Server**:



You are prompted for a server name or IP address:



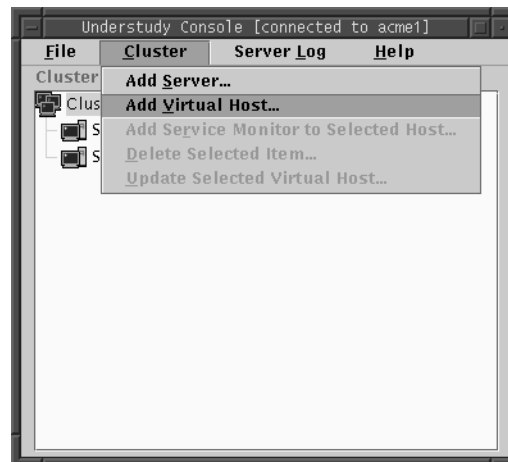
enter the name or IP address of your second server and select OK.

We now see the cluster has two servers:

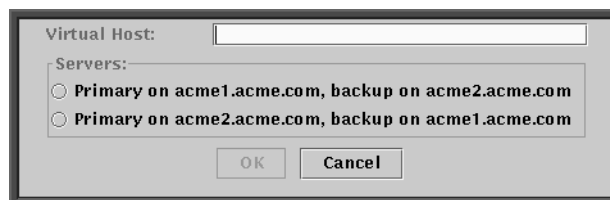


Now that we have a cluster with two servers, we can add a virtual host. The virtual host is the name that will appear in the published URL, and will remain the same regardless of which actual server happens to be supporting the monitored service at the moment. The name must be recognized by your name service, whether by adding it to `/etc/hosts`, or supplying it with the Domain Name Service (DNS) (or whatever name service your subnet uses). The IP address for the virtual host must be in the same subnet as the IP addresses for the two servers in the cluster.

In this case, our name server has been configured for a host named `acme.com`, and we now inform Understudy of this by selecting Cluster->Add Virtual Host...:

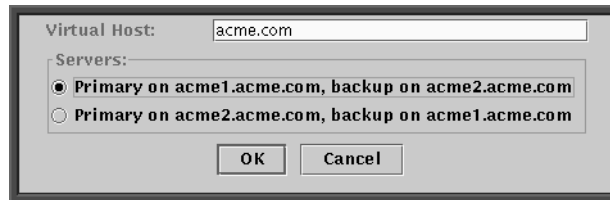


You now see the virtual host configuration screen:

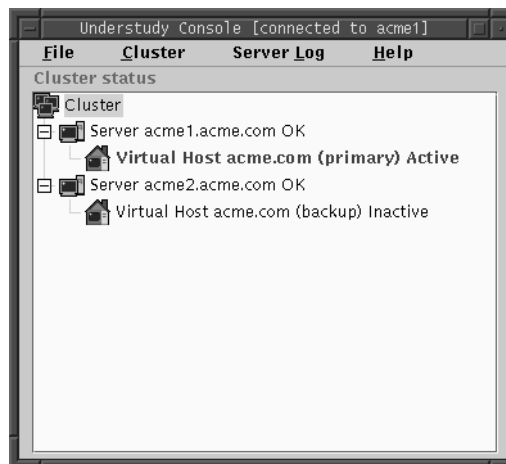


Here you enter the virtual host name or IP address, and also select which of the servers you want to be the primary server, and which should be the backup server.

In this example, the virtual host is `acme.com`, and `acme1` is the primary server and `acme2` is the backup:

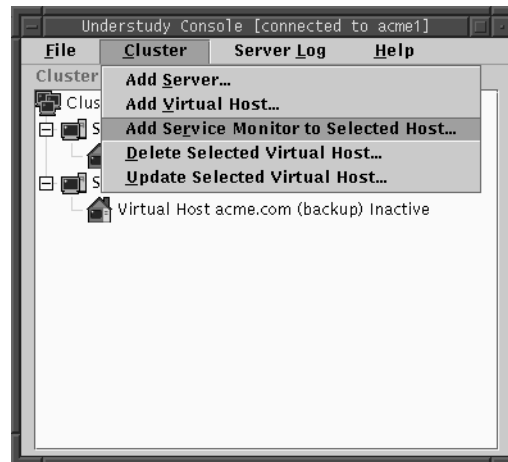


Select `OK`. We now see our cluster configured with the two servers and a virtual host which designates one of the servers as primary and one as backup:

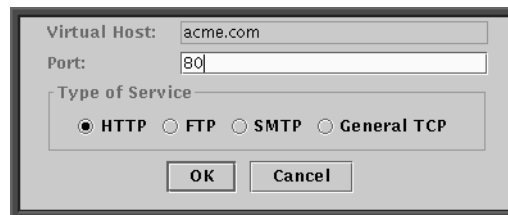


Note that the primary server is marked `Active`, and the backup server is marked `Inactive`. This means the primary server is functioning as intended, and that the backup server is ready as needed.

We now only need to specify which services we want Understudy to monitor. To specify a service, select (click to highlight) a virtual host entry and select Cluster->Add Service Monitor to Selected Host:

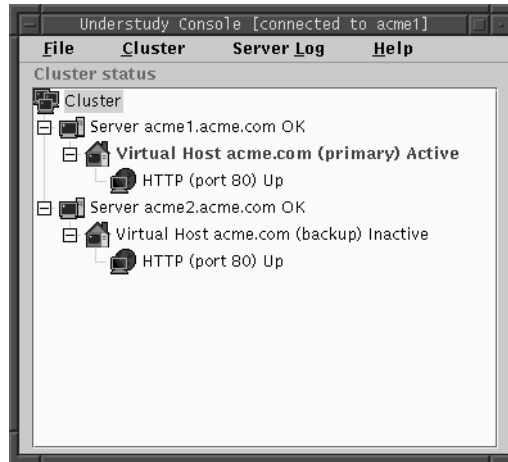


You are prompted for more information:



The Virtual Host field shows the name of the virtual host, the Port field displays the default port for the selected service, and radio buttons allow a choice of different services. In this example, we are only going to monitor HTTP (Web service) with failover, so we select HTTP. (If your HTTP service uses a different port than the default, simply replace the Port number 80 with the number of the port you use.)

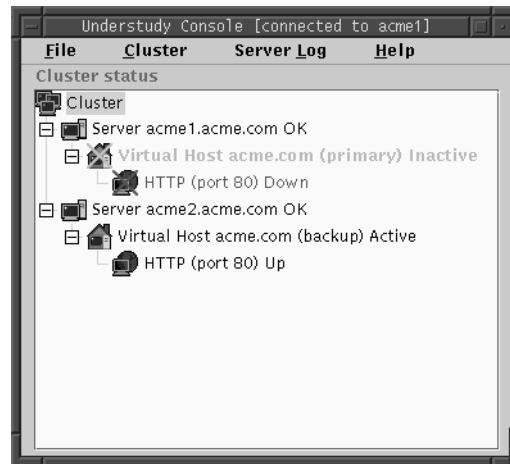
After choosing the service to monitor, select OK. The console window now looks like this:



This is the basic display of a properly configured and functioning Understudy cluster of the simplest sort. We see that one service is monitored, HTTP on port 80, and that the virtual host is Active on the primary server, meaning it is servicing HTTP requests with the primary server, and the backup server is OK but Inactive, meaning that the backup server is ready and able to support the HTTP service as required.

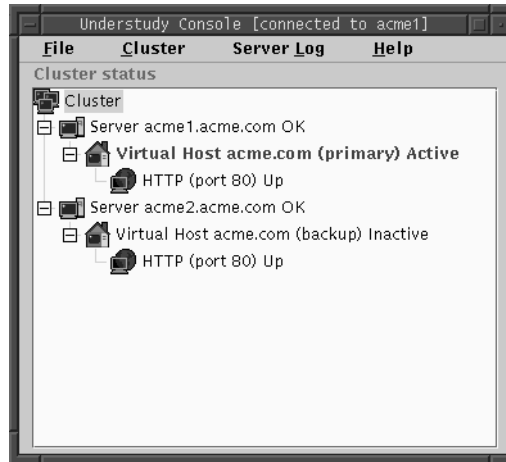
If, for some reason, the HTTP service on the primary server should fail, Understudy would detect this and automatically configure the cluster so that

the backup server handled the HTTP traffic. In that case, the console display would look like this:



Note that the primary server, `acme1`, is still up (OK), but the virtual host entry for the primary server is marked Inactive and the HTTP service is shown as Down. The virtual host entry for the backup server, `acme2`, is now marked as Active, and the HTTP service is shown as Up. Understudy has switched traffic to the backup server, and it is now handling HTTP requests. Unless a client was in the actual process of downloading a web page at the time of failover, they would notice nothing and could continue requesting additional pages and so on without interruption. If a download was in process at the time of the service failure, the client would receive the ordinary transfer interrupted message and simply need to reload the page.

Once the HTTP service on the primary server resumed, Understudy would automatically reconfigure the service to run as before:



After Configuring Understudy

Once you have installed and configured Understudy on your servers and created one or more virtual hosts and service monitors, you must configure the software you use to provide network services to recognize the new virtual host(s).

For example, if you are using the Apache Web server, you may need to edit Apache's configuration files to recognize and respond to the virtual hosts. Similarly, if you are using a Netscape Web server, you may need to configure it through the administration browser to respond to the virtual hosts. By default, FTP responds to any virtual host request it receives.

You should not, however, configure operating system software or files to respond to the virtual host—Understudy does that configuration for you. For example, do *not* edit start-up scripts or run the `ifconfig` command with the virtual host information. You only have to inform your monitored services about the virtual host. This is so that services running on the server will respond to the virtual host requests if Understudy transfers virtual host traffic to them.

The rest of this chapter summarizes some other possible configurations, and illustrates how they are affected by the loss of particular servers or services.

Example Cluster Illustrations

Figure 3-1 illustrates a cluster in which HTTP, FTP, SMTP, and generic TCP services are all monitored by Understudy, and are all configured to run on the same primary server and the same backup server.

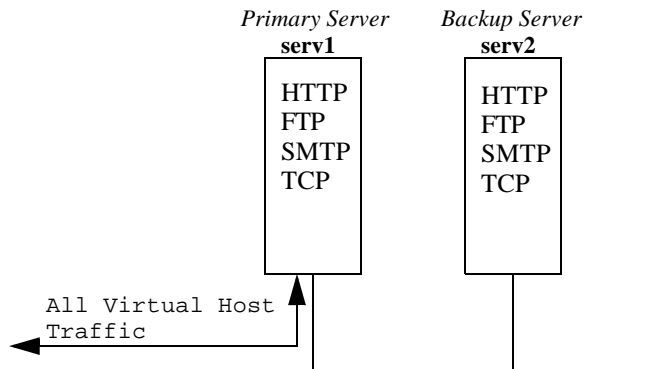


Figure 3-1. Fully-Functioning Understudy Cluster

In the illustration in Figure 3-1, traffic is being routed to the primary server and the backup server is not active. Figure 3-2 illustrates what happens when a single monitored service goes down.

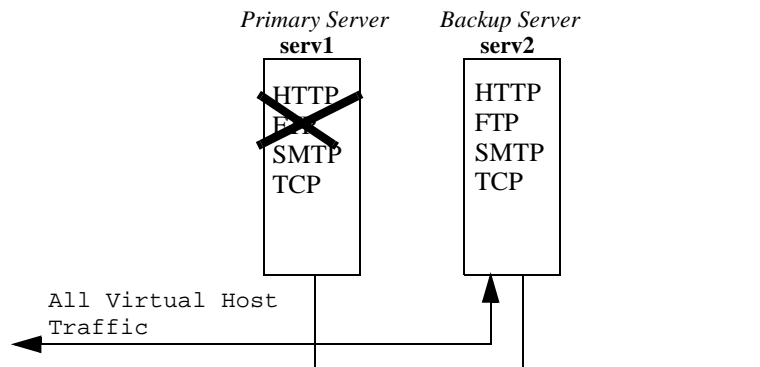


Figure 3-2. Understudy Cluster With Monitored Service Down

As you can see in Figure 3-2, the loss of a single monitored service causes Understudy to switch routing of all virtual host requests from the primary server to the backup server. The backup server remains active until the malfunctioning service on the primary server again functions properly. Understudy restores routing as shown in Figure 3-1 as soon as it determines that all monitored functions are responding properly.

Figure 3-3 illustrates a case in which one server in a cluster is the primary server for one virtual host and the backup server for another virtual host, and the other server performs the opposite functions. In this case, the company might have two virtual hosts named something like `www.acme.com` and `ftp.acme.com`.

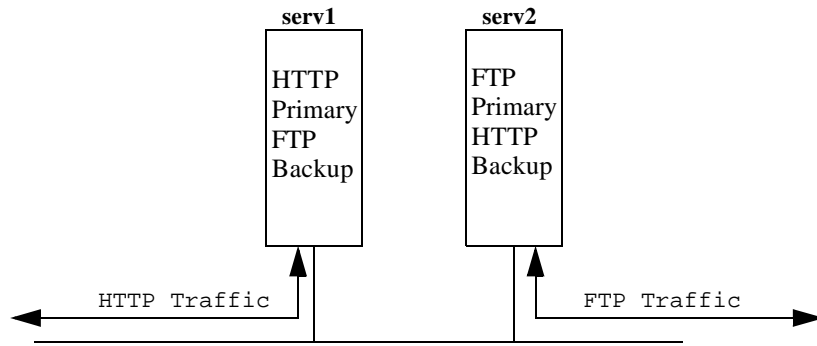


Figure 3-3. Understudy Cluster for Different Services

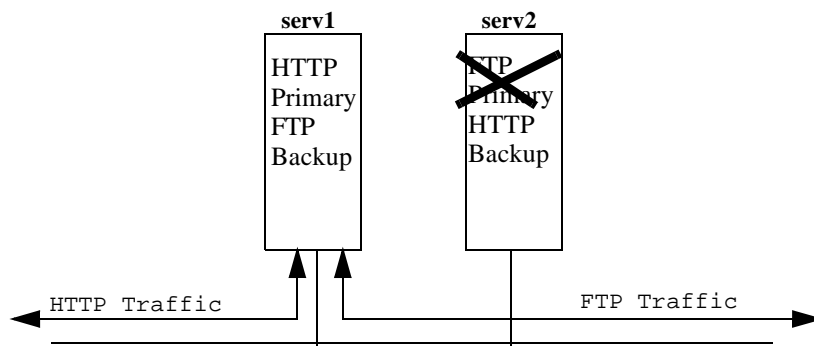


Figure 3-4. Example of Servers Backing-Up Each Other

In Figure 3-3, we see the normal functioning of this cluster. Figure 3-4 illustrates the case when a monitored service fails—in this case the FTP service on the primary FTP server. Understudy transfers all virtual host traffic from the primary FTP server (`serv2`) to the primary HTTP server (`serv1`), which is also the backup FTP server.

As soon as Understudy determines that `serv2` is again responding properly to all monitored services, it restores the default functionality shown at the top of the figure.

Load Sharing in a Cluster

Understudy can be used to provide failover protection for servers configured to provide domain name service (DNS) load sharing using BIND 4.9 or later.

DNS load sharing allows you to set up servers so that requests are sent alternately to each of the servers in a cluster. For example, suppose you want clients to access `acme1` and `acme2` one after another so that the two servers share the load of accepting and responding to client requests.

BIND 4.9 provides a round-robin feature using address records (A records) to alternate requests between IP addresses. If you were to use the round-robin feature of DNS without Understudy, you would create two A records as follows:

Table 3-1. Configuring address records at the DNS

Address	Time to Live	Service	Record Type	IP Address
<code>www.acme.com.</code>	60	IN	A	150.1.1.1
<code>www.acme.com.</code>	60	IN	A	150.1.1.2

- **Address.** These are the virtual host names that customers use to send requests to your site. Notice that a mandatory period follows the “.com” in the address.
- **Time to Live.** The number of seconds an address can be cached by intermediate DNS servers. This value should be short, so that intermediate servers do not cache addresses of servers that are down.

- Service. Always IN for internet.
- Record Type. Always A for address.
- IP address. The IP address for the virtual hosts you will use for each server in the cluster. These are the IP addresses that the DNS will use to send alternate requests.

DNS round-robin supports pools of servers for any application, including web, email, ftp, and database. Most Linux systems and Solaris support BIND 4.9 and later versions. Be sure to check with your vendor to ensure that your operating system supports BIND 4.9. Some operating systems require specific maintenance upgrades. For example, Windows NT requires service pack 4 for round-robin support.

Using the A records in your name server configuration is a straightforward way of gaining load-sharing capability and simplified load balancing, resulting in improved response speed.

Understudy provides failover protection to a load sharing configuration. Without Understudy, requests are simply alternated between the servers. If a server goes down, requests to that server do not connect.

To configure for round-robin load sharing, you define virtual hosts as addresses in the A records on the DNS. Then you use Understudy to associate primary and backup servers to that virtual host. In essence, you use the virtual host capability of Understudy to accept the round-robin requests sent by the DNS. Understudy handles the failover function to the real servers in the cluster.

For a full discussion of load sharing with Understudy, see the white paper at www.polyserve.com/PDFs/white_dns.pdf.

Here is an example of configuring two servers to accept round-robin requests. You start by defining a cluster with the servers you want to use, in this example, `acme1` and `acme2`, as shown in Figure 3-5.

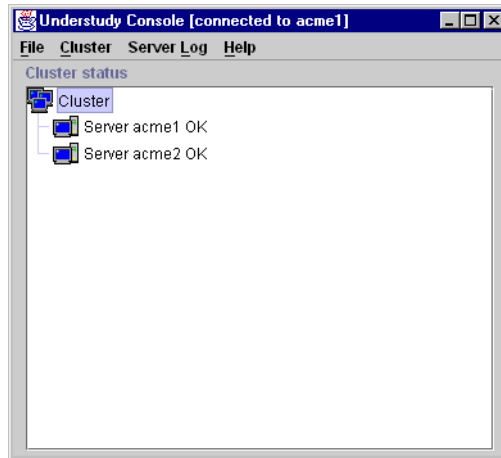


Figure 3-5. Cluster defined for load sharing

Suppose you will use `virtual_acme1` and `virtual_acme2` as the addresses on the name server. You would create two virtual hosts for your cluster with those names. The first virtual host would use `acme1` as the primary server and `acme2` as the backup. The second virtual host would use `acme2` as the primary and `acme1` as the backup. The final setup is shown in Figure 3-6.

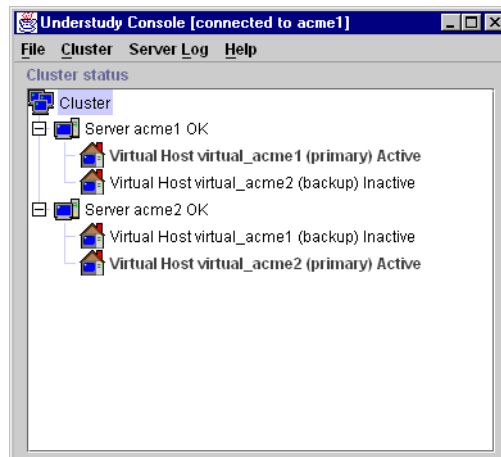


Figure 3-6. Cluster with two virtual hosts

Finally, you would configure the DNS server for round robin, using the following A records:

Table 3-2. Configuring address records at the DNS

Address	Time to Live	Service	Record Type	IP Address
www.acme.com.	60	IN	A	150.1.1.1
www.acme.com.	60	IN	A	150.1.1.2

The result of this setup is that the domain name server sends messages to the two virtual hosts indicated by the IP addresses in a round-robin fashion, thus having the virtual hosts share the request load. Each virtual host has a single primary server on which it performs the work, and has the other server as backup in case the primary goes down or is taken off line for maintenance.

Console Reference

This chapter describes every menu option available through the Understudy console GUI. The console GUI is the utility that allows Understudy administrators to configure the cluster for proper operation. The console GUI is a Java application that is included in the release of each version of Understudy. It can be run on any server that is running Understudy, except those servers that do not have monitors. A monitor is mandatory to run the console GUI. For servers that do not have monitors, PolyServe provides a separate administration console GUI that you can download from our web site at www.polyserve.com/dnload_gui.html. This separate utility runs on the following platforms (which you can directly download):

- **Windows 98/NT** at www.polyserve.com/dnload/understudy-gui-1.3-setup.exe
- **Red Hat Linux 6.x** at www.polyserve.com/dnload/understudy-gui-1.3-1.redhat.i386.rpm

This section discusses how to start and operate the Understudy GUI, and all commands discussed work for both the separate console admin GUI and the embedded admin GUI in Understudy.

Starting the Console GUI

To start an instance of the Understudy console GUI on Unix, FreeBSD, or Linux, run the command `understudy` on a network server or X terminal. If you do not see anything happen, be sure your `DISPLAY` variable is set appropriately.

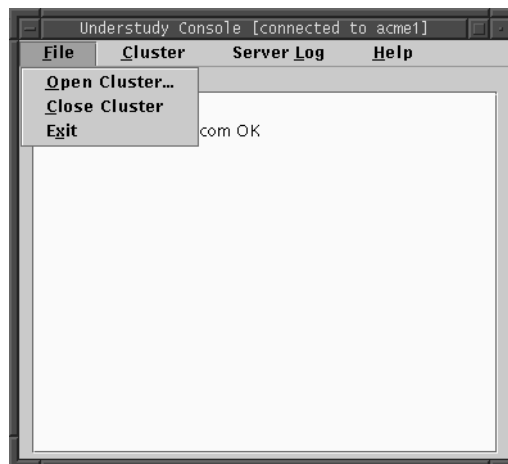
Note: To access menus in the Understudy GUI, move the mouse cursor over the menu item and press the left mouse button or, if you prefer to use the keyboard, hold down the Alt key while you press the underlined letter in the menu item (some window managers may trap these keystrokes, in which case you will have to use the mouse). Select specific items by clicking on them with the left mouse button, or press the key shown as underlined in the menu options.

To start an instance of the Understudy console GUI on Windows NT or 98, choose the Understudy Browser from the Start menu:
Start>Programs>Polyserve>Understudy Browser.

The console login screen appears.

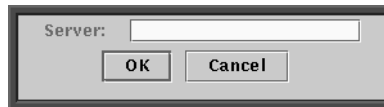
File Menu Options

The File menu allows you to open and close clusters and to exit from Understudy.



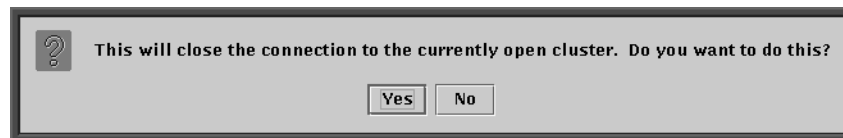
Open Cluster

Select File->Open Cluster to open a connection to a cluster:



Enter the name or IP address of one of the servers in the cluster and select OK. If you do not have a cluster, enter the name of one of the servers that you want to be in the cluster.

If you already have a cluster open and you try to open a new cluster, you will be prompted if you want to close the currently open cluster:

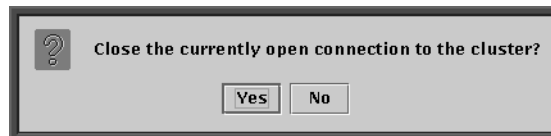


Select Yes to close the connection to the current cluster or No to keep the current connection.

You may only have one cluster open at a time in an Understudy console. If you want to work with another cluster simultaneously, open another Understudy console with the `understudy` command at the command line.

Close Cluster

Select File->Close Cluster to close a connection to a cluster. You will be prompted to confirm:

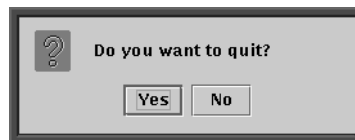


Select Yes to confirm or No to return to the cluster connection.

Note: The cluster continues to operate whether or not you have an open console connection to it.

Exit

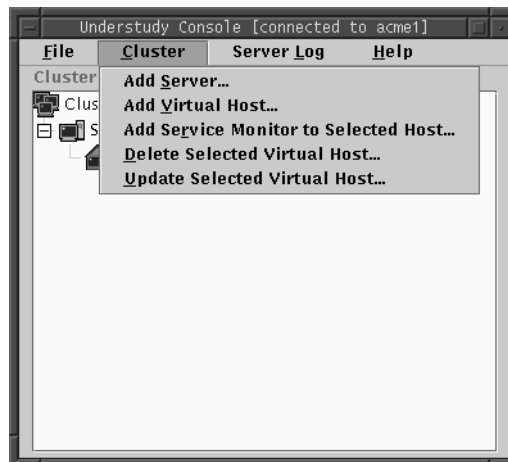
Select File->Exit to end the Understudy console session. You will be prompted to confirm:



Select Yes to exit from the program, or No to continue viewing the Understudy console.

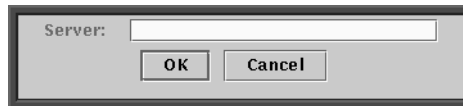
Cluster Menu Options

The Cluster menu allows you to add and delete servers, services, and virtual hosts:



Add Server

Select Cluster->Add Server to add a server to a cluster:



Enter the server name or IP address of the server you want to add and select OK, or select Cancel to cancel the server addition.

Note: The current version of Understudy supports no more than two servers per cluster, and the servers must be on the same subnet. Refer to “Cluster Design Considerations” on page 1-5 for more information.

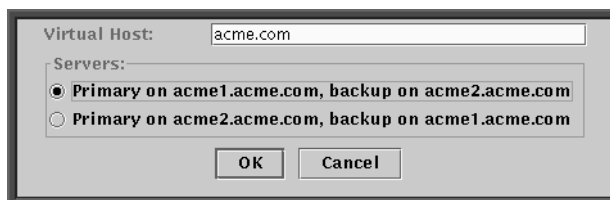
You do not need to add the server to which you connected when you performed the File->Open Cluster operation.

Note: Adding a server to a cluster does not configure services on the server, nor does it configure disk mirroring or any other scheme to maintain duplicate data across servers. Refer to “Cluster Design Considerations” on page 1-5 for more information.

Add Virtual Host

Select Cluster->Add Virtual Host to add a virtual host (sometimes referred to as a “protected IP address”) to a cluster. You may have up to 50 virtual hosts on a cluster.

You will be prompted to specify the virtual host:



Enter the host name or IP address for the virtual host. This host must have an IP address on the same subnet as the server(s) in the cluster.

Note: Do not configure this IP address in the operating system with `ifconfig` or any other tool or in any system start-up script. Understudy will configure the operating system appropriately to support the virtual host. You will, however, have to configure individual services to inform them of the virtual host(s) when Understudy configuration is completed (see “After Configuring Understudy” on page 3-10 for more information.)

Select one server as primary by clicking on the associated button. The primary server is the one that will normally receive the service requests for that virtual host. Should that server be unable to support those requests, Understudy will automatically route those requests to the backup server.

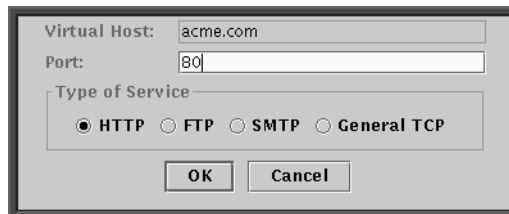
Select OK to add the virtual host configuration, or Cancel to cancel the operation.

Refer to “Cluster Design Considerations” on page 1-5 for more information.

Add Service Monitor to Selected Virtual Host

Select Cluster->Add Service Monitor to Selected Virtual Host to configure monitoring for a particular service. You must select (highlight) the virtual host entry in the console for this selection to be presented in the Cluster menu.

You will be prompted for service information:



Virtual Host: acme.com
Port: 80
Type of Service
 HTTP FTP SMTP General TCP
OK Cancel

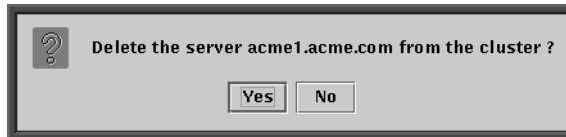
Select the type of service you want to monitor. Understudy will supply the default port number for the service you select—if your service is configured to use a different port than the default, you should enter that port number here.

Note: You can repeat this process to configure a cluster to monitor multiple services. If one of the services fails on the primary server, the requests for ALL protected services on the same virtual host will be routed to the backup server until all services are again available on the primary server.

Adding a service monitor for a service only configures Understudy monitoring of that service. It does not configure the service itself. Refer to “Cluster Design Considerations” on page 1-5 for more information.

Delete Selected Server/Virtual Host/ Service Monitor

Select Cluster->Delete Selected Server (or Virtual Host or Service Monitor) to delete an entry from the cluster you are viewing. You must have selected (highlighted) the object in the console display before making the delete request. You are then prompted to confirm, for example:



Select Yes to delete the entry, or No to cancel the operation.

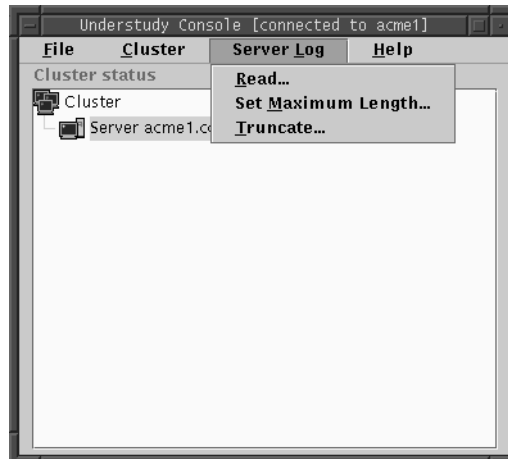
Note: You cannot delete the server you used to connect to the cluster. If you want to delete that server, close the cluster and open it again by specifying the other host. Then delete the server.

Update Selected Virtual Host

Select Cluster->Update Virtual Host to change the primary and backup server positions. This is the proper way to bring down a primary server, for example, for maintenance. Once the primary server has been configured as backup, and the backup server as primary, traffic is routed to the new primary server until failover, so you can take down the former primary server without interruption to the supported service(s). But even if you do not perform this procedure to seamlessly switch servers, and just take down the primary server, Understudy would simply switch traffic to the backup server just as it would in a failover, and any delay would be slight and generally unnoticeable.

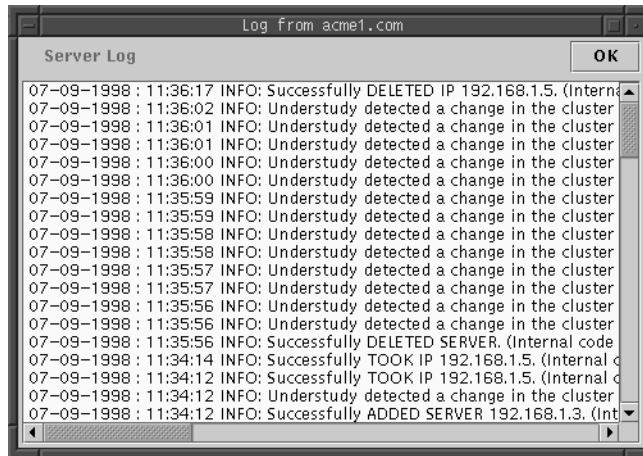
Server Log Menu Options

To access the Server Log menu option, you must first select (highlight) a server entry in the console display:



Read

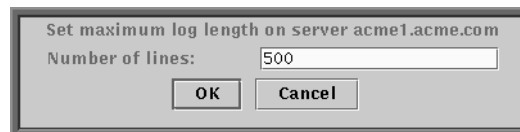
Select **Server Log->Read** to open a view of the server log for the selected server. For example:



This displays the last 100 lines of the server's log file (`/var/log/polyserve/spare_log.dat`) in reverse order, so the most recent entries are displayed first. Scroll bars allow you to move up and down in the file, as well as left and right to see the entire message without resizing the window.

Set Maximum Length

Select **Server Log->Set Maximum Length** to truncate the log file at a certain length:



The default length of the server log is 1000 lines. If you are short of space on the server, you may want to keep this file short, but of course you then save less log information for that server.

When the server log file reaches its maximum length, the current log file is copied to the backup file (`spare_log.dat` is copied to `old_spare_log.dat`), and the 100 oldest lines in the current log file are removed.

Note that each server maintains its own log file, and that any changes you make with this option only refer to the server that is highlighted when you select the option.

Truncate

Select **Server Log->Truncate** to truncate a log file. You will be prompted to enter the number of lines to delete from the log file.

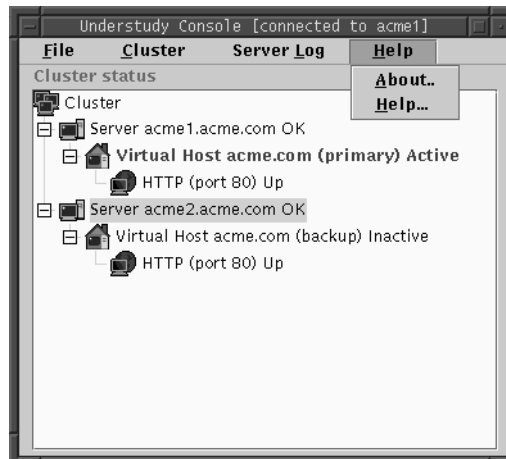


The current log file is copied to the backup file (`spare_log.dat` is copied to `old_spare_log.dat`), and the oldest number of lines entered here are removed from the current log file.

Note that each server maintains its own log file, and that any changes you make with this option only refer to the server that is highlighted when you select the option.

Help Menu Options

Select **Help** to see the Help options:

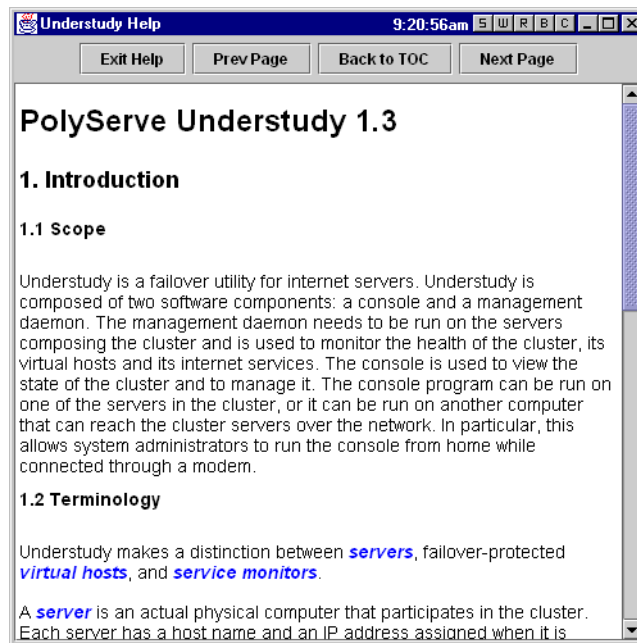


About

Select Help->About for the Understudy version and copyright information.

Help

Select Help->Help to view the on-line help:



You can then click on particular entries in the table of contents, or use the buttons at the top of the window to page through the help or exit as desired.

The Login and Password Screens

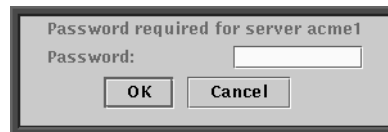
The login and password screens are the ones you first see when you start Understudy with the `understudy` command.

The login screen prompts for a server to connect to:



Enter the name of a server in the cluster or, if you want to create a new cluster, enter the name of one of the servers to be in the new cluster.

The password screen comes up when you request a server connection:

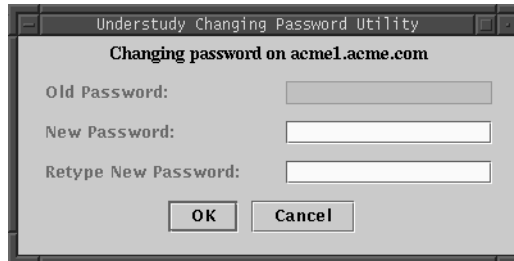


Enter the password you have assigned for that server (see next).

The password prompt or password change screen appears when you request it *as root* with the `sppass` command:

```
$ su -  
<enter the server's root password>  
# sppass
```

For Windows NT, choose Understudy Password Manager through the Start menu.



Enter the old password for the Understudy administrator, and then enter the new password twice and click OK.

Note: When you enter the `sppass` command on an Understudy server, you are prompted for the password for Understudy administration *on that server*. To change the password on another server, you must enter the `sppass` command as root on the other server.

THE LOGIN AND PASSWORD SCREENS

Maintenance and Troubleshooting

Maintenance

There is little special maintenance required for Understudy beyond that which is normally required to maintain your servers and services. You will want to monitor the log files (`/var/log/spare_log.dat`). You can truncate them or adjust their size as desired as described in “Server Log Menu Options” on page 4-8.

Also, refer to “Update Selected Virtual Host” on page 4-8 for details on bringing down a primary server for a seamless transition to the backup server.

Troubleshooting

In this section, General Troubleshooting Issues summarizes some basic troubleshooting approaches, Error Message Synopsis lists error messages and reasons for them, and Log File Message Synopsis does the same for messages that may appear in the server log file.

General Troubleshooting Issues

This section describes some situations you may encounter that do not produce specific error messages.

Understudy Considers a Running Service Down

If Understudy indicates that a service is down even though it is running, it may be that the service is not sending any information to Understudy. Understudy will conclude that it is down even if the TCP connection succeeds. In particular, if an HTTP server is monitored by a FTP monitor, the HTTP server will be considered down.

Other things to consider if a server is running but Understudy shows it as down:

- check that the server is connected to the network
- check that the network devices and interfaces are properly configured on the server
- make sure that the Understudy daemon (the process is called `spare`) is running on the server.

A Virtual Host is Inaccessible

If a site is inaccessible even though Understudy indicates that it is OK, remember that Understudy does not take care of replicating data, or starting services on virtual hosts. Check that the service is running there, and that the actual data exists on the active server.

Understudy Exits Immediately

If the Understudy daemon exits immediately on starting, refer to the last line of the `/var/log/polyserve/spare_log.dat` for an explanation. A typical reason for this is that either the host name is not properly set on the server, or the main Ethernet interface is not installed. Refer to the reference manual page for `ifconfig` for ways of checking this.

Browser Accesses Inactive Server

If you access the virtual host from a Web browser which is running on one of the servers in a cluster, the browser accesses the service on the server it is running on. Note that this allows you to monitor and test the inactive server while the virtual host is fully operational.

Error Message Synopsis

The following section lists Understudy error messages and provides some additional information for troubleshooting.

An attempt was made to configure an existing server

If you try to add a server to the cluster and the server is already configured on the cluster, you will get this error message.

An attempt was made to configure more than 50 IP addresses. However, this version of Understudy only supports 50 IP addresses

This version of Understudy does not allow you to configure more than 50 virtual hosts. Any attempt to configure more than that will prompt this message.

An attempt was made to configure more than two servers. However, this version of Understudy only supports two servers

This version of Understudy does not allow you to configure more than two cluster servers. Any attempt to configure more than that will prompt this message.

Sorry, cannot add a virtual host that has the same IP address as another machine in the same LAN

This is a safety feature to prevent Understudy from stealing IP addresses of other computers on the same LAN. If the user tries to configure a virtual host with the same IP address as an existing computer on the network, it will prompt this message.

Sorry, cannot add a virtual host whose IP address *a.b.c.d* is already configured in this cluster.

Understudy prevents the user from configuring the same virtual host more than once on a given cluster.

Sorry, cannot add an existing IP address

Understudy does not allow you to configure the IP address of a server as a virtual host on the same cluster

Sorry, cannot configure a server which is not on the same subnet

Understudy requires that all servers be on the same subnet

Sorry, cannot configure a virtual host with an IP address which is not on the same subnet

Understudy requires that all virtual hosts be on the same subnet

Sorry, cannot delete myself from the list of configured servers

Understudy does not allow you to delete the server it is connected to from the cluster.

The address of the requested server is already configured on this cluster, which is not allowed

Understudy does not allow you to configure a server that has the same IP address as a configured virtual host.

The IP address a.b.c.d of the requested virtual host is already held by a configured server on this cluster, which is not allowed

Understudy does not allow you to configure a virtual host that has the same IP address as a configured server.

Understudy detected that the requested servers (*server names*) are already clustered together and is becoming a singleton cluster

Understudy prevents attempts to configure clusters in a cascading way; that is, a server may not be in two clusters. For example, if you have a cluster consisting of servers A and B, you cannot also have a cluster consisting of servers B and C.

Log File Message Synopsis

The following section lists messages that may appear in the log file (`spare_log.dat`) and provides some additional information on each.

Internal error at server `serverid`: too many services are configured on this host. Understudy recommends that you delete some.

If too many service monitors are configured on a given virtual host, monitoring the corresponding services requires too many system resources. This is Understudy's way of letting you know about it. There is no fixed limit here, but rather something Understudy learns on the fly.

Understudy encountered a bogus line in the configuration file `/etc/polyserve/spare_conf.dat`. Someone might have edited this file. The offending line is:

This means that the server's cluster configuration file has been corrupted. This file normally maintains cluster information across reboots. A presumably correct file is automatically re-created, but this message is to inform you that you should look at the cluster to verify that it is configured correctly.

An error occurred while trying to read configuration file `/etc/polyserve/spare_conf.dat`

A likely reason for this error is that someone has deleted the file or directory. See the previous message discussion.

Understudy found that the hostname is not properly set on this machine. Please set the host's name in a proper manner. Exiting.

Understudy cannot be started on computers in which hostname was not properly set with regards to the networking configuration. "Properly set" means that the hostname must be correctly mapped to the Ethernet interface address in `/etc/hosts` or your name service. A common reason for this is that the hostname was set with the `hostname` command, rather than through the formal way of doing this. Consult your system administration manual to figure out how to properly set the hostname.

Understudy received a message with false signature. The message is being ignored for security reasons. The offending message is:

Understudy signs messages between the GUI and the daemon. It is possible that someone is trying to send bad messages to the daemon.

Understudy received an out of order message. The message is being ignored for security reasons

Understudy sequences messages to prevent replay attacks. Someone might be trying a replay attack against your host.

Understudy: There does not seem to be any Ethernet device defined for this host, or the hostname is not properly set on this host. Exiting!

The Understudy daemon cannot start if the Ethernet device or hostname are not properly set. Use `ifconfig` to check that the main Ethernet interface is configured on your machine.

Understudy: License Error on Server x.x.x.x: Expired on mm-dd-yyyy. Spare will be terminated in 2 hours.

The Understudy daemon has recognized a license violation. Every 15 minutes this message will be repeated. After two hours, Understudy will time out and Spare will terminate. It may be started again, but this process will continue. Contact PolyServe support to get a valid license or to install your license code correctly.

Firewall Information

Understudy uses UDP ports 9040 and 9045 internally, and uses TCP port 9050 on the cluster servers for Understudy console communication.

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